

ARIETTA 50

Diagnostic Ultrasound System

Instruction Manual

Measurements

Requests to operators and maintenance managers:

- Read the document "Instructions for Use" before using the diagnostic ultrasound system.
- After reading "Instructions for Use", store it near the system so that it is accessible at all times.



MN1-6470 rev.0

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CE 0123





Preface

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Introduction

Thank you for purchasing the ARIETTA 50 Diagnostic Ultrasound System by Hitachi, Ltd.
This document is the instruction manual for the ARIETTA 50 Diagnostic Ultrasound System.

Name and classification of medical equipment

Product name

Diagnostic Ultrasound System ARIETTA 50

Revision history

Revision no.: 0

Date of revision: September 26, 2018

Symbols used in this manual

This manual uses the following terms to describe the safety precautions that must be observed to prevent danger or injury to operators and patients. The severity of risks and injuries that might occur if safety precautions are not observed are classified into three levels: DANGER, WARNING, and CAUTION. In addition, NOTICE indicates precautions that operators must observe.



DANGER

Indicates an imminently hazardous situation that, if not avoided, might result in death or serious injury. This symbol also indicates an immediate danger that might result in the total destruction of devices, or in fire.



WARNING

Indicates a potentially hazardous situation that, if not avoided, might result in death or serious injury. This symbol also indicates a potential (latent) danger that might result in the total destruction of devices, or in fire.



CAUTION

Indicates a situation that, if not avoided, might result in light or moderate injury. This symbol also indicates a situation that might result in damage to a device or to part of a device, or in the loss of computer data.

NOTICE

Indicates a precaution that we strongly urge operators to observe to prevent damage to or deterioration of devices during operation, as well as to ensure that the devices are used efficiently. Alternatively, this symbol indicates a recommended procedure, condition, or action that requires careful attention.

Safety precautions are categorized as follows and indicated by the following symbols.



Indicates prohibited conditions or actions. Safety precautions accompanied by this symbol describe conditions or actions that are prohibited.



Indicates required actions that the user must perform.

Non-alphanumeric characters used in this manual

Please note that actual screen displays (including icons and design) might differ from the Diagnostic Ultrasound System screens reproduced in this manual.

Some of the messages described in this manual might not be displayed by the Diagnostic Ultrasound System, depending on its configuration (including options).

The following symbols are used in this manual.

Character	Explanation
α	Alpha
γ	Gamma
π	Pi

About the ARIETTA 50 Diagnostic Ultrasound System

This system is intended for use by doctors and other qualified persons for the purpose of performing tomography and hemodynamic diagnosis of blood flow in the human body.

Note, however, that this system cannot be used to perform ophthalmologic ultrasound examination. The acoustic output power of the system exceeds the upper ophthalmologic limit stipulated in the U.S. FDA standards.

1. Precautions concerning the use and management of the system
 - Only doctors and other qualified persons are allowed to operate the system for diagnostic purposes.
 - Scan for the minimum length of time necessary for making a diagnosis, and at the lowest suitable output.
 - Do not disassemble, repair, or modify the system or its optional equipment without Hitachi's permission. System repairs must be carried out by our certified personnel. Please notify us when repairs are needed.
NOTE: Disassembly refers to the use of tools to remove the casing or other parts.
NOTE: Modification means attachment, to this system, of parts or devices other than those specified by the manufacturer. Replacement of a power cable is considered a modification.
 - Installation of the system and any optional equipment (the mounting and connecting of the system by using tools) is to be performed by our certified partners. Please notify us when the system or any optional equipment needs to be installed.
 - Transportation of the system (movement of the product by using a vehicle such as a car or ship) is to be carried out by our certified partners. Please notify us if the system needs to be transported.

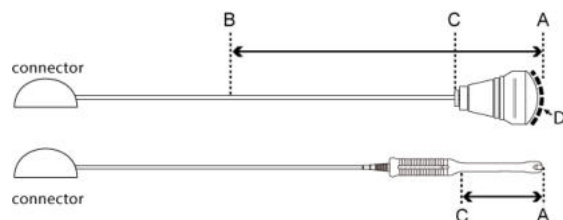
- Clean and inspect the system periodically. For details, see "Instructions for Use".
 - If any abnormality occurs during the use of the system, remove the probe from the patient immediately, and stop using the system. If the patient exhibits unusual or abnormal symptoms, immediately provide the appropriate medical treatment. Perform the required measures for the system as described in "Instructions for Use". If an abnormality occurs that is not described in "Instructions for Use", please contact our office.
2. Precautions on system installation
- This system is medical electrical equipment intended for use in hospitals, research institutions, and similar facilities. Install this system as described below.
- Install the system according to the instructions given in "Setup Before Use" in "Instructions for Use".
 - Install it in an environment that satisfies the conditions described in "Ambient conditions" in "Instructions for Use".
 - Install the system in an environment where electromagnetic compatibility can be maintained in accordance with "Precautions for maintaining electromagnetic compatibility" and "Guidelines for electromagnetic compatibility" in "Instructions for Use".
- Electromagnetic compatibility (EMC) means that the system can maintain basic performance and safety within the specified electromagnetic environment, without causing electromagnetic interference that cannot be tolerated by other devices in that environment.
3. External dimensions and weight of the system

External dimensions	Width: 531 mm $\pm$ 10% Depth: 767 mm $\pm$ 10%
	Height: 1317 mm to 1567 mm
External dimensions If the flexible monitor arm (optional) is used	Width: 531 mm $\pm$ 10% Depth: 797 mm $\pm$ 10%
	Height: 1280 mm to 1647 mm
Weight	64 kg $\pm$ 10% (main unit only), 105 kg $\pm$ 10% (with all options included)

Classification of the ARIETTA 50 Diagnostic Ultrasound System

- Protection against electrical shock: Class I and ME equipment
- Protection against electrical shock (applied parts): Type BF applied parts
 - Probes and scanner

Refer to the following diagrams (for the probe or scanner) and the following table for details about applied parts and parts that are handled as applied parts.



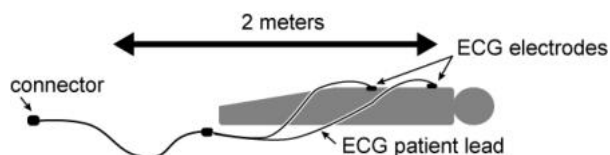
The upper figure is an example of a probe for surface and intra-operative use. The lower figure is an example of a body cavity probe.

Probe application	Applied part	Parts handled as applied parts	Length between B and C
Body surface	Ultrasonic irradiation area (D)	Between A and B	100 cm
Intra-operative	Ultrasonic irradiation area (D)	Between A and B	20 cm
Inside body cavities	Between A and C	Between A and C	-

- ECG

Parts that are within 2 meters of the biosignal sensor are handled as applied parts. (See the figure below.)

Example: ECG



- Protection against electrical shock (defibrillation-proof applied parts): This system is not suitable for use with defibrillation-proof applied parts.
- Protection against penetration by water or particulate substances
 - Probe applied part: IPX7 (rated for brief immersion in water)
 - Foot switch
 - MP-2819: IPX7 (rated for brief immersion in water)
 - MP-2345B: IPX8 (rated for continuous immersion in water)
 - Other Details: IPX0 (ordinary equipment)
- Level of safety for use in air and flammable anesthetic gas, or in oxygen/nitrous oxide and flammable anesthetic gas.
 - This system is not suitable for use in a mixture of air and flammable anesthetic gas, or in a mixture of oxygen or nitrous oxide and flammable anesthetic gas.
- Operation mode: Continuous operation

Recycling or Disposal



CAUTION



Recycle or dispose of this equipment properly according to your organizational rules and your local laws.



This symbol on the equipment or on its packaging indicates that this equipment shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic products. By ensuring this equipment is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this equipment. The recycling of materials will help to conserve natural resources.

The equipment contains a primary battery (lithium battery). You should recycle or dispose of this equipment properly according to your organizational rules and your local laws. For more detailed information about recycling of this equipment, please contact one of our offices as listed on the back cover, or your household waste disposal service.

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Precautions concerning the software installed on the system

The following actions are prohibited with respect to the software installed on this system:

1. Reselling, assigning, or transferring the software itself
2. Reverse engineering, reverse compiling, or reverse assembling
3. Modification, alteration or translation
4. Creating copies or duplicates
5. Leasing to third parties

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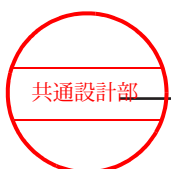
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Basic controls

- 1.1 Overview of Measurement on This System
- 1.2 Measurement Methods

1.1 Overview of Measurement on This System

The measurement functions of this system are Abdomen, URO, Small Parts, OB, GYN, Cardio, and Vascular, corresponding to applications (clinical area). The measurement values found in the ultrasound examination are recorded and managed for each patient. They are effective for follow-up evaluations, etc. In addition to selecting a subject for direct measurement, you can also transfer the results of a basic measurement to an applied measurement and compute the results for that applied measurement.

The measurement functions of this system are divided into basic measurements and application measurements.

- Basic Measurements
- Basic Measurements in Application Measurements
 - Basic measurements to measure distances and areas
 - Measurements that are part of all applications
 - Basic measurement results can be used in application measurements.
- Application measurements
 - These are measurements for individual applications (diagnostic fields). (Refer to the following table.)
 - Measured values are recorded and managed as reports internally on the system by each individual patient, and these are useful for evaluating follow-up observations, for example.
 - Application measurements consist of Studies that compile measurement parameters by application. When the measurements to be used differ according to the examination purpose in each application, change the Study to use those measurements.

Application	Example of a measurement Study			
Abdom	Basic			
URO	Prostate & SV	Bladder & Testis	Kidney	
Small Parts	Basic	Breast	Thyroid	
GYN	GYN	Follicles	Bladder	
OB	Basic	Early	Twin Basic	Twin Early
	Tri. Basic	Tri. Early		
Cardio	Cardiac Func.	Coronary	TDI	Asynchrony
Vascular	R-Carotid A	L-Carotid A	R-Lwr Extr. A	L-Lwr Extr. A
	R-Lwr Extr. V	L-Lwr Extr. V	R-Upr Extr. A	L-Upr Extr. A
	R-Upr Extr. V	L-Upr Extr. V	R-TCD	L-TCD

The applied measurements above use measurement conditions and formulas based on references, which presents their clinical validity. The references are stated at the end of each chapter.

NOTE: The HOME button is not available during measurements.

The workflow for taking measurements is as described below, regardless of the type of application or study.

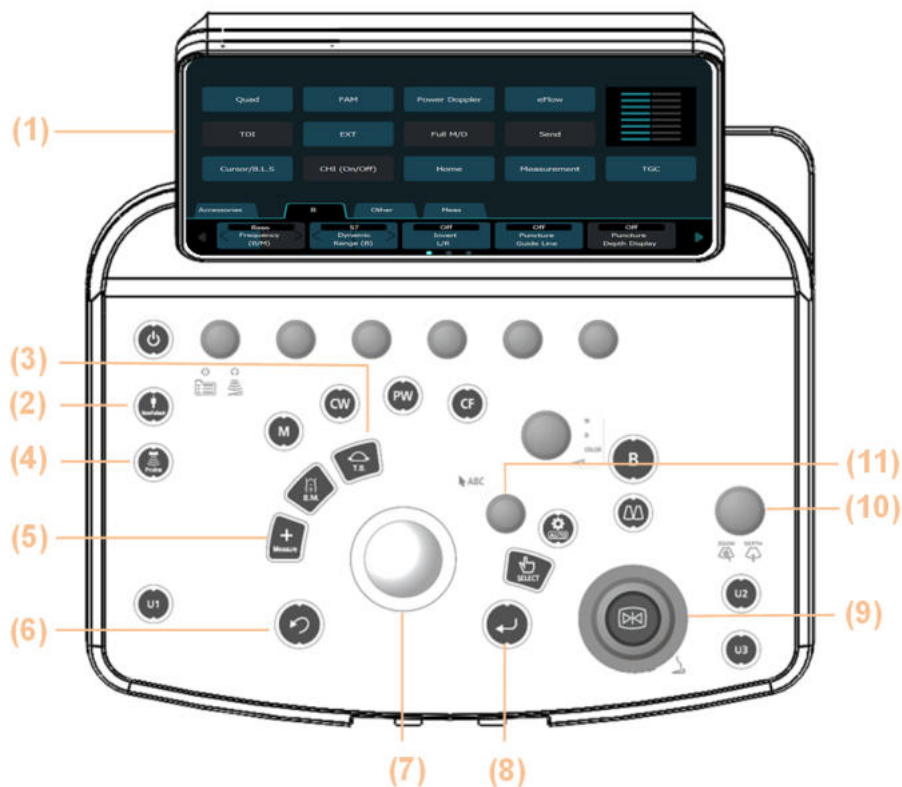
- | | | |
|-----|----------------------------|---|
| (1) | Select application. | Select applications (clinical fields) via Preset.
The calculation formulas and patient management database are applied to the selected application. |
| (2) | Enter patient information. | Once patient data has been input, measurement values and calculated index values can be recorded and managed for each patient. Reports and graphs can be displayed for follow-up (development assessment, treatment evaluation, etc.).
Refer to the separate "Instructions for Use" or "How to Use" for details about entering patient data. |
| (3) | Select ultrasound study | Measurement menus and reports corresponding to the selected study are applied. |
| (4) | Take measurements. | The measurement values are updated in real time until the measurements are finalized.
Up to 10 measurement results can be displayed on the screen. |
| (5) | Reports | Reports present the latest measurement results and average values.
NOTE: Report display requires patient data input. |

Measurement results and reports can be output using the following methods.

- Output the Measurement Results Display screen or the Reports screen to a storage device connected to the system.
- Print only the necessary parts of reports.
- Output measurement results and findings from reports as CSV files.
- Create DICOM SR files and send them to a DICOM SR server.
DICOM SR files can be created in the Cardio, Vascular, Abdomen, GYN, and OB applications.
NOTE: The optional DICOM SR compatible software ((SOP-AR50-21)) is necessary for creating DICOM SR files.
NOTE: The optional DICOM networking software (SOP-AR50-10) is necessary for connecting to a DICOM SR server.
NOTE: The HOME button is not available in the Report screen or during printing.

1.1.1 Operation panel

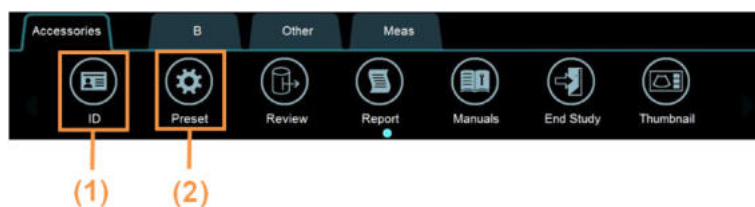
The following are the main keys used for measurements.



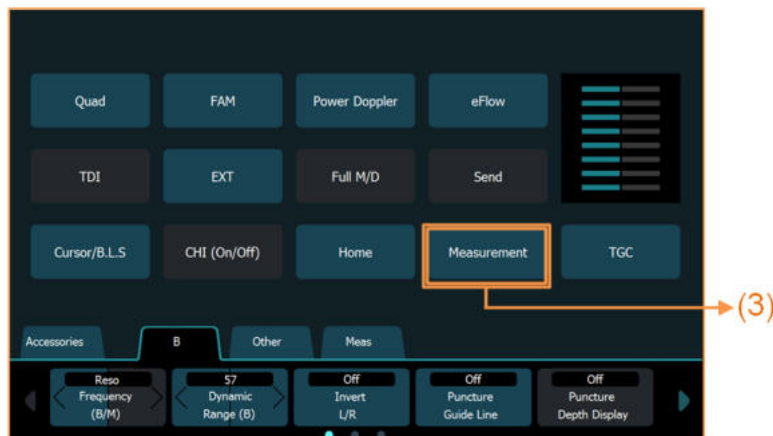
- (1) Touch panel
- (2) [New Patient] key
- (3) [T.B.F.] key
- (4) [Probe] key
- (5) [Caliper] key
- (6) [Cancel] key
- (7) Trackball
- (8) [Enter] key
- (9) [Freeze] key
- (10) [Zoom/Depth] rotary encoder
- (11) [Pointer] rotary encoder

1.1.2 Touch Panel Operations

The Measurement menu is displayed below.



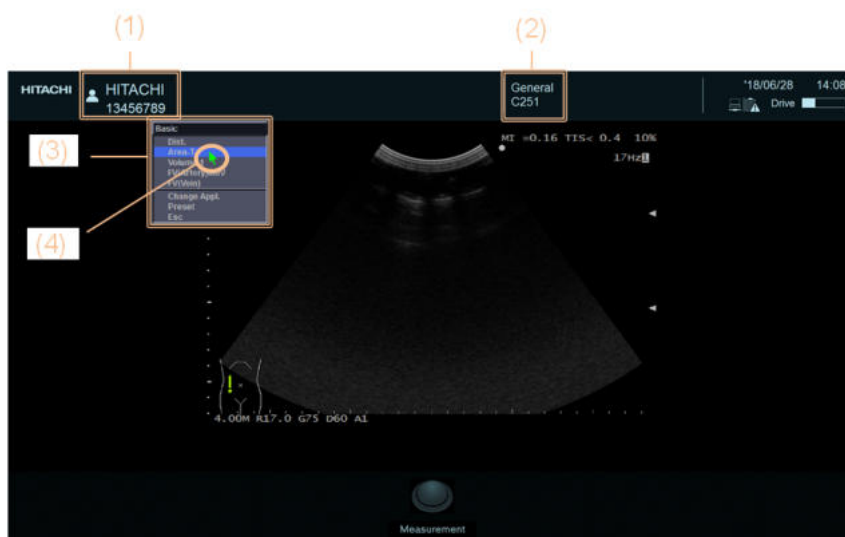
- (1) [ID] Displays the ID input screen (Details) of the current examination.
- (2) [Preset] Displays the preset screen.



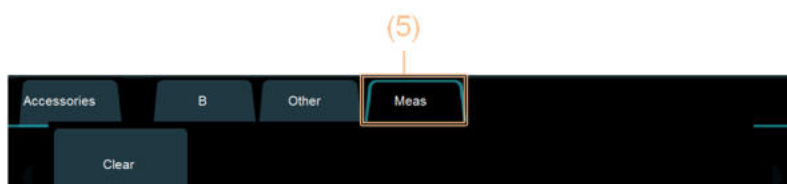
- (3) [Measurement] Displays the measurement menu corresponding to the current display mode.

1.1.3 Measurement Screen

The following is displayed when the Measurement menu is displayed.



- (1) Patient data Displays patient data on the current patient (patient ID and name).
- (2) Preset name Displays preset names.
- (3) Measurement menu This menu is displayed when [Measurement] button is pressed on touch panel. The selected Study is displayed at the top. The measurement menu corresponding to the display mode is displayed.
- (4) Pointer Controlled with the trackball.



- (5) [Meas] tab Displayed when the [Meas] tab from the function menu is selected. Menu items that have been assigned are displayed.

During measurement, the following items are displayed.



- | | | |
|-----|---|--|
| (1) | Assistance messages | Provides guidance on operating procedures. |
| (2) | Caliper marks of completed measurements | The numbers indicate measurement order. |
| (3) | Caliper mark (active) | Displays caliper marks during a measurement. |
| (4) | Measurement results | The number to the left of the measurement name indicates the measurement order. The + mark indicates the parameter currently being measured. |

1.1.4 Starting Measurements

The following methods can be used to start measurements.

- Press the [Caliper] key on the operation panel to take a basic measurement. You can transfer the results obtained here to each parameter of an application measurement.
- Press the [Measurement] button on the touch panel to display the measurement menu, and then perform the selected measurement.

(1) Performing startup by using the [Caliper] key

Selects from the basic measurement menu.

The basic measurement menu can be setup with the Measurement Preset ([SW Assignment > +Mark Key Assignment]).

Procedure

1. Press [Caliper]key.
The caliper mark is displayed on the screen. The Measurement menu is displayed below the measurement results.



2. Select the item you want to measure from the measurement menu.

To move to the next measurement:

Use [Pointer] rotary encoder to move the highlight and press the [Enter] key.

When in a hybrid display mode, such as B/M mode:

The basic measurement items for the screen mode where the caliper mark appears are displayed. If you move the caliper mark to the other screen, the basic measurement items of that screen mode are displayed.

(2) Performing startup by using the [Measurement] button on touch panel

The application measurement for the displayed mode is started.

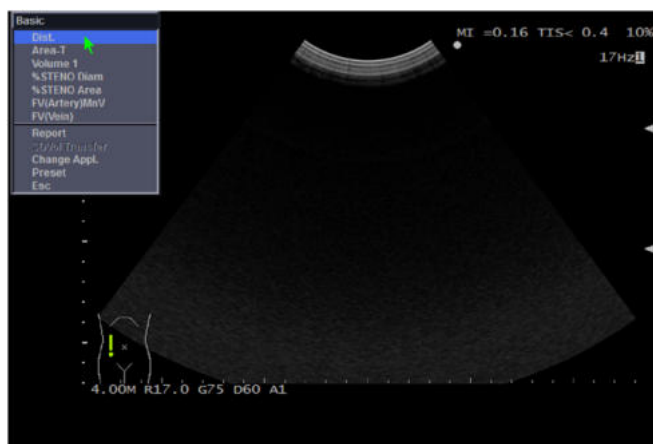
The measurement menu can be set up with the measurement preset ([Study Assignment > (Study Name) > Menu Assign]).

Prior confirmation

Ensure [Measurement] function is assigned to Direct software button.

Procedure

1. Press [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.



2. Select the measurement item.

1.1.5 Switching Measurement Menus

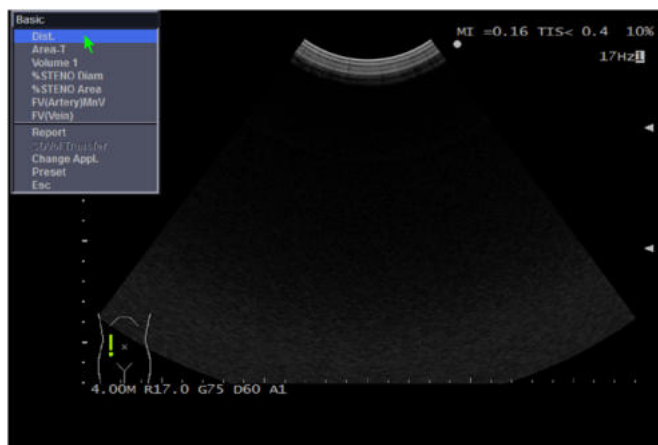
Use this function to switch between measurement Studies and Applications.

(1) Switching Measurement Studies

Switches the Study within the same application.

Procedure

1. Press [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.



2. Select the item at the very top (current study name) from the Measurement menu.



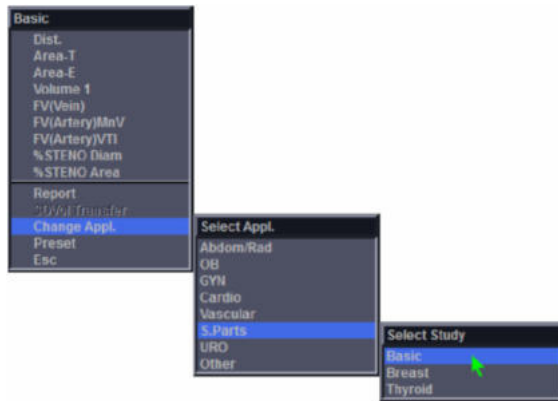
3. Select Study.

(2) Switch the Study Using a Different Application

Switches to a study in a different application.

Procedure

1. Press [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select [Change Appl.] from the Measurement menu.
3. Select the application.
4. Select Study.



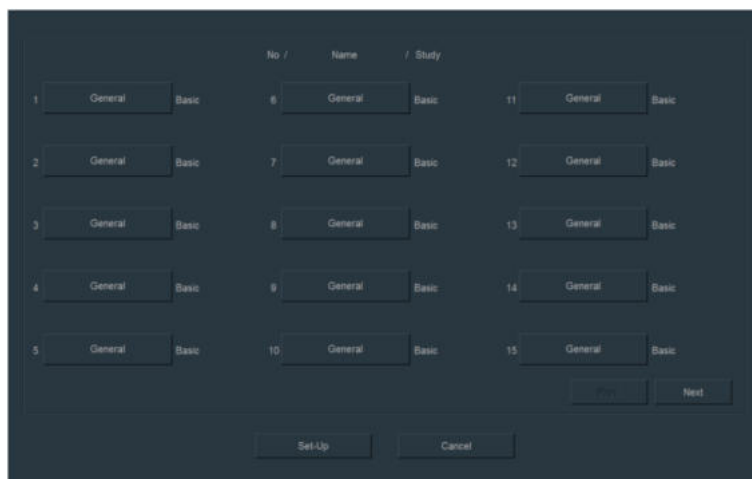
Example of menu display: [Change Appl.] > [S.Parts] > [Basic] is selected.

(3) Switching a Measurement Application

Switches from the current preset to the desired application.

Procedure

1. Select [Preset] from the [Accessories]]tab in the function menu.
The Preset screen opens.



2. Select the desired application from the presets listed under Name.
If the desired application is not listed:
Select [Prev.] or [Next] to change the page and then select the desired preset.

1.1.6 Editing Basic Measurement Results

Up to 10 measurements results can be displayed with basic measurements. These measurements results can be corrected and sent to applied measurements.

(1) Modifying and Remeasuring Basic Measurement Results

Prior confirmation

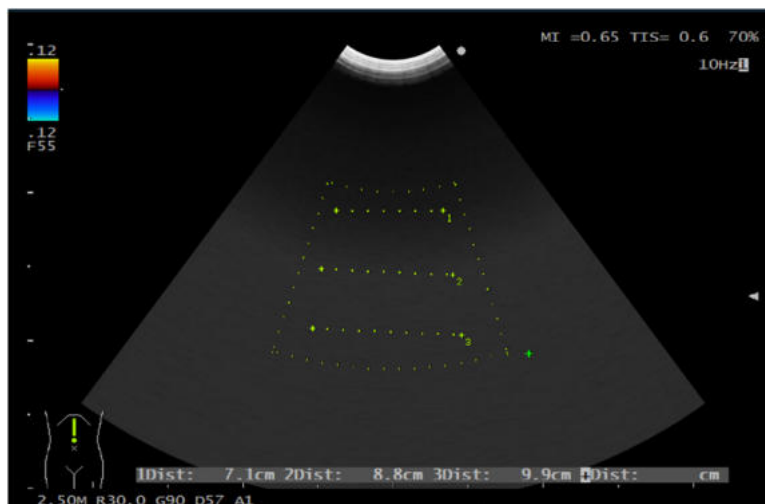
The following presets have to be made.

- Assign [Sel Ch] to the [Meas] tab in the function menu.

Use the measurement preset ([SW Assignment > Touch Panel SW Assignment]) to set this function.

Procedure

1. Press [Cancel] key if the caliper mark is displayed.
2. Select [Sel Ch] from the [Meas] tab in the function menu.
The measurement results are highlighted.



3. Select measurement results you wish to correct or delete.
The selected measurement results are deleted.
The caliper mark for taking new measurements is displayed. If you continue and remeasure as is, that number is displayed with the measurement results.

(2) Deleting Caliper Marks

(a) Deleting + marks After Completing a Measurement

The caliper mark and the measurement results are erased from the screen.

Procedure

- Select [Clear] from the [Meas] tab.
- Press [Measurement] button on the touch panel.
- Unfreeze the image.
If Caliper Auto Off is set to [ON] for a given measurement, the caliper mark and the measurement results are erased.
Basic measurements can be configured with the measurement preset ([Create Measurement Tools > Basic Measurement > Caliper Auto Off]). Applied measurements can be configured with the measurement preset ([Create Measurement Tools > Application Measurement > Caliper Auto Off]).

(3) Transferring Basic Measurement Results to Applied Measurements

This is for using the results from basic measurements as the parameters for applied measurements.

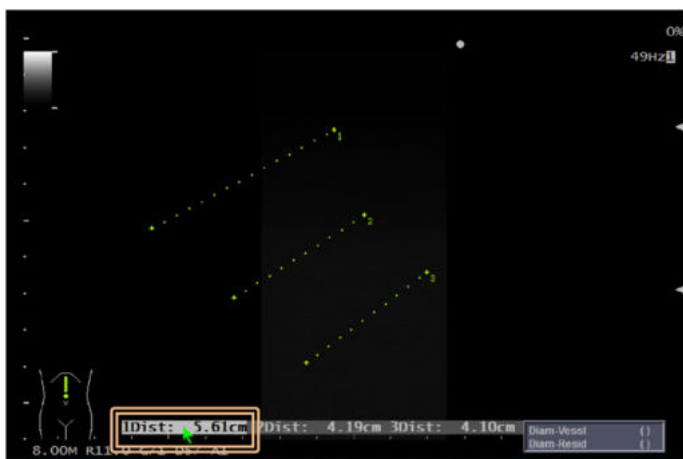
Prior confirmation

The following presets have to be made.

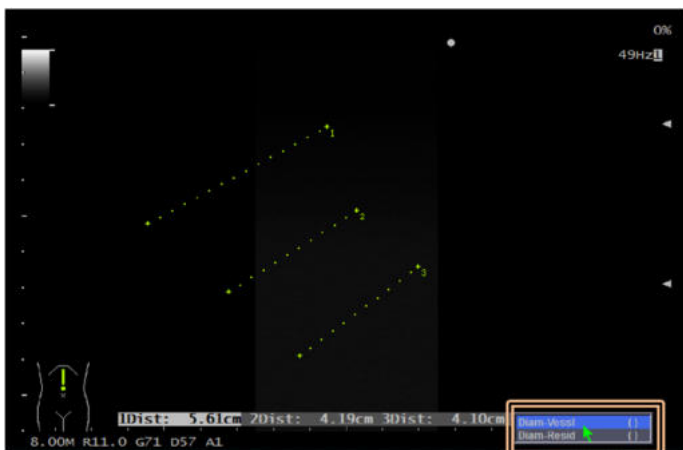
- Assign [Transfer] to the [Meas] tab in the function menu. Use the measurement preset ([SW Assignment > Touch Panel SW Assignment]) to set this function.
- Set the measurements that can be transferred.
Use the measurement preset ([Study Assignment > (Study Name) > Transfer List Assign]) to set this measurement.
- Assign [Transfer Menu Auto Display] to the function menu using preset ([Preset Set-Up Menu > Menu-Function]) for transferring Real Time Doppler Auto Trace to applied measurements.

Procedure

1. Press the [Caliper] key to start basic measurement.
2. Select [Transfer] from the [Meas] tab in the function menu.
3. Select the basic measurement results you wish to transfer.



4. Select applied measurement items for the transfer destination from the transfer destination list, and then transfer the measurement results.



To transfer Real Time Doppler Auto Trace

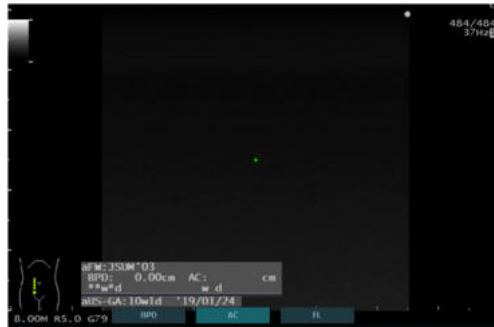
Select [Transfer Menu Auto Display] from the function menu and then select the applied measurement parameters for the transfer destination.

5. Repeat steps 2 to 4 as needed, to transfer other basic measurement results.

Retaking Applied Measurements

When measurements have been completed, or when basic measurement results have been transferred to applied measurements, the measurements can be redone using these measurement results.

1. Select the applied measurement you wish to remeasure.
The measurement results are displayed in the parameters that have been measured. If there are any unmeasured parameters remaining, the parameter selection menu opens.



If all parameters have been measured, then just the measurement results are displayed.

2. Retake the measurements.
 - a. If all the parameters have been measured, Press [Measurement] key.
The measurement parameters selection menu opens.
 - b. Operate [Pointer] rotary encoder to move the highlight and press the [Enter] key.
To remeasure Real Time Doppler Auto Trace
Select [Trace] from the Measurement menu. When [Trace] is selected, the Real Time Doppler Auto Trace and trace line are erased.
 - c. Measure those items.

1.1.7 Finishing Measurement

Use the following operation to delete all measurement marks and measurement results.

Procedure

- Select [Clear] on the touch panel.
- Press the [Measurement]key.
- Unfreeze the image.

1.2 Measurement Methods

This section describes the methods used for each measurement parameter in basic and applied measurements.

The following methods are used for measurement.

- Caliper Method

- Ellipse Method
- Circle Method
- B Trace Method
- Doppler Trace Method

Measurement methods vary depending on the setting of Move on to next measurement with. To check the setting, see the Move on to next measurement with in the Measurement Presets ([Create Measurement Tools > Basic Measurement > Caliper Mark Control]).

- When set to "Enter":
Select [Enter] to confirm the position of the caliper mark. When you finish an applied measurement, confirm the measurement results to transfer them to the report.
By selecting [Cancel] before confirming the measurement results, you can return to the state immediately after the measurement menu was selected to redo the measurements.
- When set to "Enter & +":
If you select [Enter], the active area of the caliper mark is switched (enables the other end to be modified).
By selecting [Cancel] before confirming the measurement results, you can return to the state immediately after the measurement menu was selected to redo the measurements.
Select [Caliper] to confirm the position of the caliper mark.

1.2.1 Caliper Method

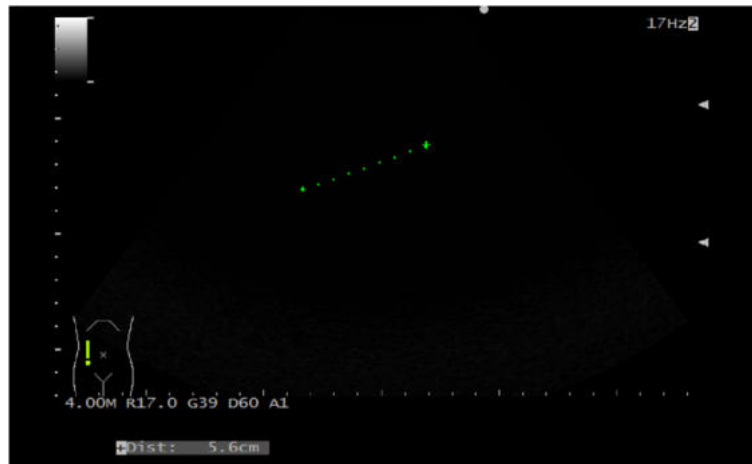
Using calipers allows you to set the start and end points, as well as measure the distance, time and blood flow velocity.

The Move on to next measurement with settings in the measurement preset ([Create Measurement Tools > Basic Measurement > Caliper Mark Control]) determines the measurement method.

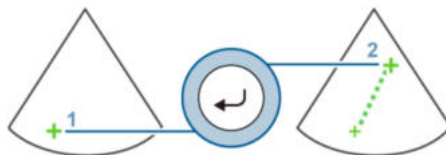
When Move on to next measurement with is "ENTER"

Procedure

1. Set the start point.
 - a. Use the trackball to move the plus mark (+) (or line cursor) to the start point.
 - b. Press the [Enter]key.



2. Set the end point.



- a. Use the trackball to move the plus mark (+) (or line cursor) to the end point.

To modify the start and end point positions

Press [Cancel] key to reset from the start point.

3. Confirm the results.
 - To finish the measurement, press [Send] button.
 - To continue measurement of another area, press [Enter] key.

When Move on to next measurement with is "Enter & +"

Procedure

1. Set the start point.
 - a. Use the trackball to move the plus mark (+) (or line cursor) to the start point.
 - b. Press the [Enter]key.
2. Set the end point.
 - a. Use the trackball to move the plus mark (+) (or line cursor) to the end point.

To modify the start and end point positions
Select [Cancel] to reset from the start point.
3. Confirm the results.
 - To finish the measurement, press [Send] button.

- To continue measurement of another area, press [Caliper] key.

1.2.2 Ellipse Method

You can measure the area, circumference, and the lengths of the long and short axes by using an ellipse.

The Move on to next measurement with settings in the measurement preset ([Create Measurement Tools > Basic Measurement > Caliper Mark Control]) determines the measurement method.

When Move on to next measurement with is "Enter"

Procedure

1. Measure the long axis with the Caliper method.
An ellipse is displayed when you set the long axis.
2. Enlarge or reduce the length of the short axis with the trackball to set the size of the ellipse.
To reset the long axis:
Press [Cancel] to reset from the start point of the long axis.
3. Confirm the results.
 - To finish the measurement, press [Send] button.
 - To continue measurement of another area, press [Enter] key.

When Move on to next measurement with is "Enter & +"

Procedure

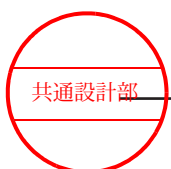
1. Measure the long axis with the Caliper method.
An ellipse is displayed when you set the long axis.
2. Use the trackball to adjust the length of the short axis to set the size of the ellipse.
To reset the long axis:
Select [Enter] to switch the active caliper mark to adjust the axis. The active caliper mark changes in the following order: long axis end point, short axis diameter, long axis starting point, short axis diameter and long axis end point.
3. Confirm the results.
 - To finish the measurement, press [Send] button.
 - To continue measurement of another area, press [Caliper] key.

1.2.3 Circle Method

Use this method to treat the measurement target as a circle, and to measure its area, circumference, etc.

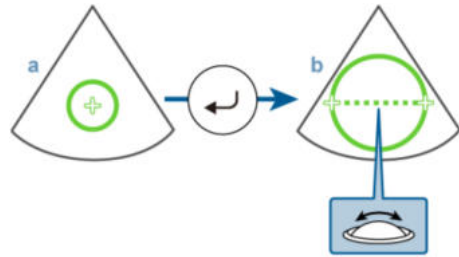
This method uses the B mode measurement.

When Move on to next measurement with is "Enter"



Procedure

1. Use the trackball to move the circle mark to the part to be measured and press [Enter] key.
2. Adjust the size of the circle.
 - a. Use the trackball to adjust the size of the circle.



To modify the position of the circle:

Press [Cancel] key and reset from the center of the circle.

3. Confirm the results.
 - To finish the measurement, press [Send] button.
 - To continue measurement of another area, press [Enter] key.

When Move on to next measurement with is "Enter & +"

Procedure

1. Use the trackball to move the circle mark to the part to be measured and press [Enter] key.
2. Adjust the size of the circle with the trackball.

To modify the position of the circle:
Press [Enter] key to modify the active area.
The active area is toggled between the center of the circle, size of the circle and center of the circle.
3. Confirm the results.
 - To finish the measurement, press [Send] button.
 - To continue measurement of another area, press [Caliper] key.

1.2.4 B Trace Method

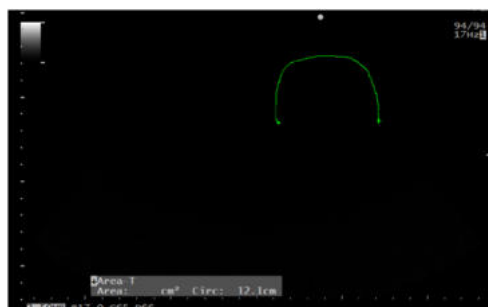
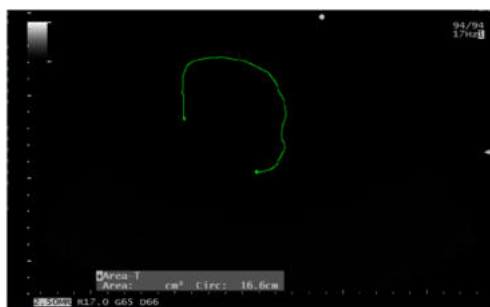
Use this method to measure the area and circumference from the trace mark pattern.
The B Trace method is the same method until closing the trace line regardless of the Move on to next measurement with settings.

Procedure

1. Move the plus mark (+) to the start point with the trackball.
2. Press the [Enter]key.
3. Trace along the border of the measurement target with a trackball.

To erase or re-display part of the trace line:

If [Pointer] rotary encoder is rotated counter clockwise, the trace line is erased from the present position toward the start point.



If you rotate [Pointer] rotary encoder clockwise, the part of the trace line that has been erased is re-displayed toward the end point.

To reset from the start point, press [Cancel] key.

4. Press the [Enter]key.
The trace closes.



1.2.5 Doppler Trace Method

Use this method to trace the wave pattern of the frozen image in D mode.

The Doppler Trace method consists of Auto Trace and Manual Trace.. Doppler Auto Trace is set as the Peak method when the system is shipped.

The Doppler Trace method is the same method regardless of the Move on to next measurement with settings.

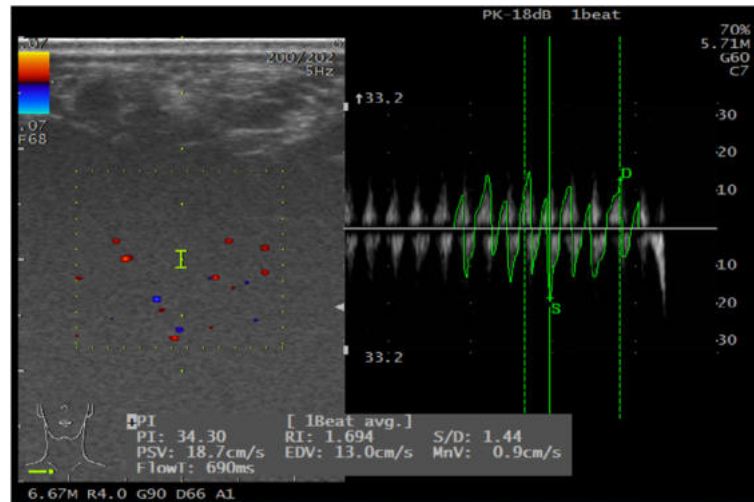
Doppler Auto Trace

NOTE: RGB+Line is the only format for which Doppler Auto Trace is available for images saved in the system.

Procedure

1. Set the Doppler waveform trace range.
 - a. Use the trackball to move the line cursor to the measurement start point, and press [Enter] key.
 - b. Use the trackball to move the line cursor to the measurement end point, and press [Enter] key.

The points corresponding to the peak flow velocity (mean velocity) on the spectrum between these two lines are automatically traced.



At the PSV (Peak Systolic Velocity) point, a line cursor accompanied by "S" is displayed. At the EDV (End Diastolic Velocity) point, a line cursor accompanied by "D" is displayed.

2. Adjust the position of the trace line with the [Pointer] rotary encoder.
 - If [Pointer] rotary encoder is rotated counter clockwise, the trace line shifts from the present position toward the baseline.
 - If [Pointer] rotary encoder is rotated clockwise, the trace line shifts toward the peak flow velocity point.

If adjustments fail to work well with [Pointer] rotary encoder:

Switch to the Manual Trace method and try again.

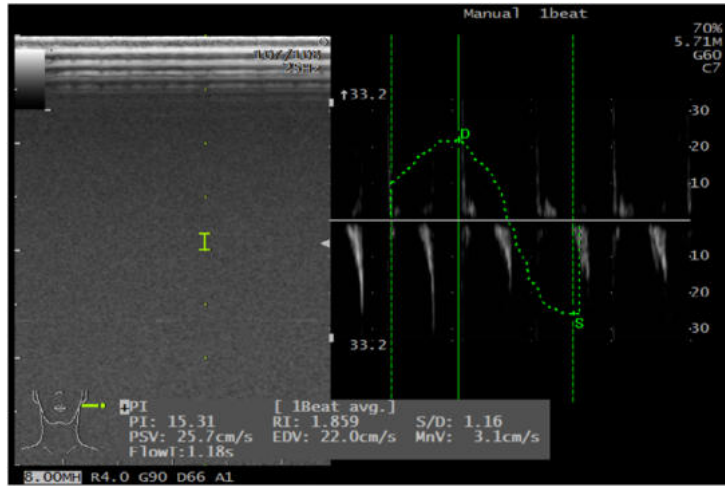
Press the [Cancel]key.

3. Select a heartbeat (when multiple heartbeats are traced in cases of measurement where one heartbeat can be selected from multiple heartbeats).
 - a. Select [Beat Select] from the [Meas] tab in the function menu.
 - b. Use [Pointer] rotary encoder to select a heartbeat.
The selected heartbeat is displayed with a broken line connecting its start point and the start point of the next heartbeat.
4. Adjust the "S" position with the trackball and press [Enter] key.
5. Use the trackball to shift the "D" position to the end-diastolic or minimum blood flow velocity point and press [Enter] key.

Doppler Manual Trace

Procedure

1. Use the trackball to move the caliper mark to the start point, and press [Enter] key.
2. Use the trackball to trace the edge on the spectrum.



To erase or re-display part of the trace line:

If [Pointer] rotary encoder is rotated counter clockwise, the trace line is erased from the present position toward the start point.

If [Pointer] rotary encoder is rotated clockwise, the part of the trace line that has been erased is re-displayed toward the end point.

To reset from the start point:

Press the [Cancel]key.

3. When you have traced to the end point, press [Enter] key.
The end point is fixed.
4. Adjust the "S" position with the trackball and press [Enter] key.
5. Use the trackball to shift the "D" position to the end-diastolic or minimum blood flow velocity point and press [Enter] key.

Basic measurements

2.1 Basic measurement menu

2.2 Measurement Methods

2.1 Basic measurement menu

The following measurement menus and parameters are available under basic measurements.

Table1: B Mode

Menu	Measurement Methods	Measurement Results Display Parameters				
Distance measurements						
Distance		Dist				
Dist-trace		Dist-trace				
Area and Circumference Measurements						
Area-Trace		Area	Circ			
Area-Circle		Area	Circ	Diam		
Area-Ellipse		Area	Circ	x-axis	y-axis	
Volume measurements						
Volume 1	Area-Length	VOL	Area	Dist	Circ	
Volume 2	Ellipse+Caliper	VOL	Area	Circ	x-axis	y-axis
		z-axis				
	3 Caliper	VOL	x-axis	y-axis	z-axis	
	Ellipse	VOL	Area	Circ	x-axis	y-axis
Index measurements						
B.Index	Caliper, Ellipse, Trace, Circle	A	B	A/B	B/A	A-B /A
Histogram measurements						
Histogram	Square, Rectangle, Circle, Trace	T	L	M	MN	SD
Bone angle measurements						
Rt. Hip J Angle Lt. Hip J Angle		A	B	type		
Angle measurements						
Angle	2 Caliper, Point	Angle 1	Angle 2	D1	D2	

Table2: M Mode

Menu	Measurement Methods	Measurement Results Display Parameters				
Distance measurements (amplitude)						
M. Length		d				
Time measurements						

Menu	Measurement Methods	Measurement Results Display Parameters				
Time		dt				
Heart rate measurements						
HR		HR	dt	beats		
Velocity measurements						
Velocity	Caliper Horizontal L	v	dt	dD		
Index measurements						
M. Index	Time Length Velocity	A	B	A/B	B/A	A-B /A

Table3: D Mode

Menu	Measurement Methods	Measurement Results Display Parameters				
Time measurements						
Time		dt				
Heart rate measurements						
HR		HR	dt	beats		
Blood flow velocity measurements						
Velocity1	Horizontal L, Vertical L, Cross Line, Cross Point	pV	PG			
Velocity2	Horizontal L, Vertical L, Cross Line, Cross Point	v1	v2	dv	dt	v1/v2
		PG1	PG2	dPG	dPG/dt	ACC
Acceleration (deceleration) measurements						
ACCEL	Horizontal L, Vertical L, Cross Line, Cross Point	v1	v2	dv	dt	v1/v2
		PG1	PG2	dPG	dPG/dt	ACC
RI measurements						
RI		RI	PSV	EDV	S/D	D/S
Pressure half-time measurements						
P1/2T		pV	PG	P1/2T	VA	
D. Caliper measurements						
D.Caliper1 D.Caliper2	Horizontal L, Vertical L, Cross Line, Cross Point	v1	v2	dv	dt	v1/v2
		v2/v1	PG1	PG2	dPG	dPG/dt
		ACC	P1/2T	VA		
Mean flow velocity measurements						

Menu	Measurement Methods	Measurement Results Display Parameters				
Mean VEL		MnV	MPG	PV	PG	VTI
		FlowT	AccT	ACC	AccT/FT	
PI measurements						
PI		MnV	MnPG	PSV	EDV	dV
		dT	PG1	PG2	dPG	VTI
		PI	RI	FT	AccT	ACC
		AccT/FT	S/D	D/S	Vm	
Stenosis flow measurement						
STENO Flow		MnV	MnPG	PVcl	PG	VTI
		FT	AccT	ACC	AccT/FT	P1/2T
		VA				
Regurgitant flow measurement						
Regurg Flow		MnV	MnPG	PVcl	PG	VTI
		FT	P1/2T			
D. Trace measurements						
D.Trace1 D.Trace2		MnV	MnPG	PSV	EDV	dV
		dT	PG1	PG2	dPG	VTI
		PI	RI	FT	AccT	ACC
		AccT/FT	S/D	D/S		
D. Index measurements						
D.Index (Caliper)	Velocity, PG, Time	A	B	A/B	B/A	A-B /A
D.Index (Caliper)	Mn Vel, MnPG, VTI	A	B	A/B	B/A	A-B /A

Table4: B/D Mode

Menu	Measurement Methods	Measurement Results Display Parameters				
Blood flow Volume Measurements (for peripheral blood vessels)						
FV(Artery)MnV	MnV	PSV	EDV	dv	dt	
	VTI	PI	RI	FlowT	ACCT	
	ACC	AccT/FT	S/D	Vm	FV(MnV)	
	FVm(MnV)	CSD	CSA			
Blood flow Volume Measurements (for peripheral blood vessels)						
FV(Artery)VTI	MnV	PSV	EDV	dv	dt	
	VTI	PI	RI	FT	ACCT	
	ACC	AccT/FT	S/D	Vm	FV(beat)	
	FV(min)	CSD	CSA	HR		
Blood flow Volume Measurements						

Menu	Measurement Methods	Measurement Results Display Parameters				
F.Volume (Vein)		MnV	pV	VTI	AccT	ACC
		FV	CSD	CSA		
Blood flow Volume Measurements (for cardiovascular use)						
SV/CO		MnV	pV	VTI	AccT	ACC
		SV	CO	CSD	CSA	HR

2.2 Measurement Methods

2.2.1 B mode measurement

(1) Distance measurements

Caliper and Trace methods are available for measuring the distance between two points.

Distance measurement: Caliper method

The distance between 2 points can be measured via the caliper method.

Procedure

1. Press [Measurement] button on the touch panel.
2. Select [Dist.] from the Measurement menu.
The + mark is displayed.
3. Set the start and end point positions with the Caliper method.
The distance is displayed.

Example of Measurement Results Display

Dist:	cm	Distance measurement value
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Dist-trace measurement: Trace method

The distance of two points can be measured using the Trace method.

Procedure

1. Press [Measurement] button on the touch panel.
2. Select [Dist-trace] from the Measurement menu.
3. Trace along the boundary of the measurement target with the B Trace method.
The distance is displayed.

Example of Measurement Results Display

Dist-trace:	
cm	Distance measurement value

(2) Area and Circumference Measurements

The Trace, Ellipse and Circle methods are available for measuring area and circumference.

Area-T measurement: Trace methods

This function calculates the length of the line traced with the +mark and the area enclosed by the trace line.

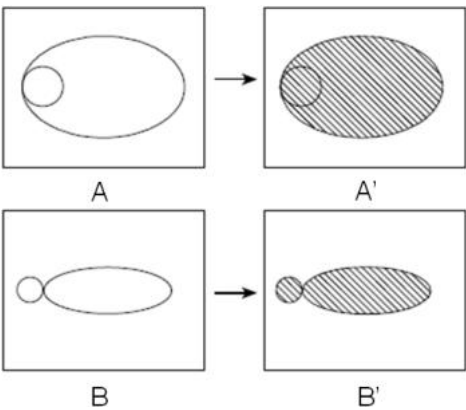
Procedure

- 1. Press [Measurement] button on the touch panel.
- 2. Select [Area-T] from the Measurement menu.
The + mark is displayed.
- 3. Trace along the boundary of the measurement target with the B Trace method.
The length of the circumference is displayed.
- 4. Select [Enter]] to close the trace line.
The area and length of the circumference are displayed.

Example of Measurement Results Display

Area-T	
Area: cm ²	: Area
Circ: cm	: Circumference

If there are several parts enclosed by trace lines, the total area enclosed by the outermost line is calculated (see figure below). The circumference is displayed as the total length of the trace line.



Area-E measurement: Ellipse methods

This measurement approximates the measurement subject to an ellipse, and measures the area and circumference.

Procedure

- 1. Press [Measurement] button on the touch panel.
- 2. Select [Area-E] from the Measurement menu.
The + mark is displayed.
- 3. Use the Elipse method so the ellipse encloses the area to be measured.
The area and length of the circumference are displayed.

Example of Measurement Results Display

Area-E	
--------	--



Area: cm ²	: Area
Circ: cm	:Circumference
x-ax: cm	:Long axis length of the ellipse (x-ax > y-ax)
y-ax: cm	:Short axis length of the ellipse

Area-C measurement: Circle methods

This measurement approximates the measurement subject to circle, and measures the area, diameter and circumference.

Procedure

1. Press [Measurement] button on the touch panel.
2. Select [Area-C] from the Measurement menu.
The + mark is displayed.
3. Use the Circle method so the circle encloses the area to be measured.
The area and length of the circumference are displayed.

Example of Measurement Results Display

Area-C	
Area: cm ²	: Area
Circ: cm	: Circumference
Diam: cm	: Circle diameter

(3) Volume Measurement: Volume1/Volume2

The following calculation methods are used for volume measurements.

- Spheroidal
Three diameters (long axis, short axis and the maximum cross-sectional diameter in the direction perpendicular to the long axis (= intermediate axis diameter) measured from the image of two orthogonally intersecting cross-sectional planes, and the volume of the rotating ellipsoid is calculated.
- Prolate
The volume is calculated by finding the long and short axes of the ellipse in the same way as measuring the area of an ellipse and measuring the hypothetical circle on the cross-sectional plane perpendicular to the short axis.
- Method of calculating volume from the traced area:
There are two trace methods; (1) automatic trace of three indicated points, and (2) manual trace.
 - Area-Length
Trace the long axis cross-section and calculate volume from this area and long axis diameter.

- BP Simpson
The volume is computed using the basic principles of the Disk method (measurement with two cross sections).
- SP Simpson
The volume is computed using the basic principles of the Disk method (measurement with one cross section).

There are four types of measurement method. The following are the combinations of calculation methods.

	Spheroidal	Prolate	Area-Length	BP Simpson	SP Simpson
Ellipse+Caliper	yes	-	-	-	-
Area-Length	-	-	yes	yes	yes
3 Caliper	yes	-	-	-	-
Ellipse	-	yes	-	-	-

The volume measurements on the Measurement menu are Volume1 and Volume2. Use the measurement preset ([Create Measurement Tools > Basic Measurement > Measured Method & Display Items > B.Mode]) to select measurement and calculation methods for Basic Measurement > Measured Method & Display Items > B.Mode />Volume1 and Volume2.

Volume1/Volume2 measurement: Area-Length method

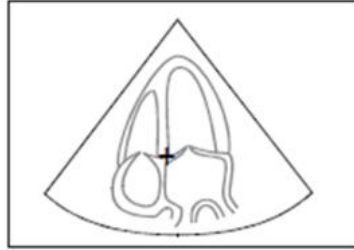
Trace the boundary region and calculate volume from this area. There are 2 types of traces.

- Manual Trace
Trace the boundary with the B.Trace method.
Set the Area-Length to [Manual] with Volume 1 or Volume 2 under the measurement presets ([Create Measurement Tools > Basic Measurement > Measured Method & Display Items > B.Mode]).
- Auto Trace
Specify 3 points in the boundary region. It automatically traces the boundary region based on those 3 points.
Set the Area-Length to [Auto] with Volume 1 or Volume 2 under the measurement presets ([Create Measurement Tools > Basic Measurement > Measured Method & Display Items > B.Mode]).

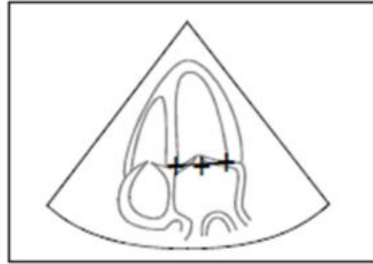
Procedure

1. Display the orthogonal intersecting long axis cross-sectional image and the short axis cross-sectional image with the B/B mode.
2. Press [Measurement] button on the touch panel.
3. Select the [Volume1]or [Volume2] from the measurement menu.
The + mark is displayed.
4. Trace the boundary region.
Manual trace
Trace along the contours of the measurement target using the B Trace method.
Auto trace

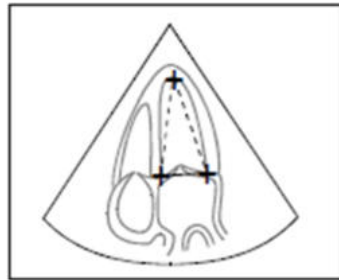
- a. Use the trackball to move the + mark to the 1st point in the boundary region and press [Enter] key.



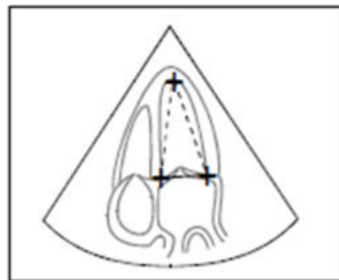
- b. Use the trackball to move the + mark to the 2nd point in the boundary region and press [Enter] key.



- c. Use the trackball to move the + mark to the 3rd point in the boundary region (top of long axis).



- d. Press the [Enter]key.



Example of Measurement Results Display

Volume 1:		
Vol:	cm ³	: Volume
Area:	cm ²	: Area
Dist:	cm	: Long axis of the long axis view

Volume1/Volume2 measurement: 3 Caliper method

Measures the two orthogonal cross-sectional images. Measure the long axis, short axis and the maximum cross-sectional diameter in the direction perpendicular to the long axis

(intermediate axis diameter) with the Caliper method. It calculates the volume from the 3 measured axes as a spheroid.

Procedure

1. Display the orthogonal intersecting long axis cross-sectional image and the short axis cross-sectional image with the B/B mode.
2. Press [Measurement] button on the touch panel.
3. Select the [Volume1] or [Volume2] from the measurement menu.
The + mark is displayed.
4. Set the long axis with the long axis view.
5. Use the Caliper method to set the short axis on the long axis cross-sectional image or the short axis cross-sectional image.
6. Measure the cross-sectional diameter in the direction perpendicular to the long axis (= intermediate axis diameter) on the short axis cross-sectional image with the Caliper method.
The volume value is displayed.

Example of Measurement Results Display

Volume 1:	
Vol: cm ³	: Volume
x-ax: cm	: Long axis of the long axis view
y-ax: cm	: Short axis of the long axis view
z-ax: cm	: Intermediate axis of the short axis view

Volume1/Volume2 measurement: Ellipse method

Approximates the image of the part to be measured as an ellipsoid, and computes the volume. The short axis cross-section is assumed to be a circle.

Procedure

1. Press [Measurement] button on the touch panel.
2. Select the [Volume1] or [Volume2] from the measurement menu.
The + mark is displayed.
3. Set the long axis with the long axis view.
4. Set the measurement target with the Ellipse method.
The volume is displayed. To redo, press [Cancel] key.

Example of Measurement Results Display

Volume 1:	
Vol: cm ³	: Volume
Area: cm ²	: Area
x-ax: cm	: Long axis
y-ax: cm	: Short axis

Volume1/Volume2 measurement: Ellipse + Caliper method

Measures the two orthogonal cross-sectional images. Measure the long axis and short axes using the Ellipse method. On the other image, measure the cross-sectional diameter in the direction perpendicular to the long axis (= intermediate axis diameter) with the Caliper method. It calculates the volume from the 3 measured axes as a spheroid.

Procedure

1. Display the orthogonal intersecting long axis cross-sectional image and the short axis cross-sectional image with the B/B mode.
2. Press [Measurement] button on the touch panel.
3. Select the [Volume1] or [Volume2] from the measurement menu.
The + mark is displayed.
4. Set the ellipse on the long axis view with the Ellipse method.
The area is displayed.
To redo, press [Cancel] key.
5. Measure the cross-sectional diameter in the direction perpendicular to the long axis (= intermediate axis diameter) on the short axis cross-sectional image with the Caliper method.
The volume value is displayed.

Example of Measurement Results Display

Volume 1:	
Vol: cm^3	: Volume
Area: cm^2	: Area
x-ax: cm	: Long axis of the long axis view
y-ax: cm	: Short axis of the long axis view
z-ax: cm	: Intermediate axis of the short axis view

(4) Angle Measurement: Angle

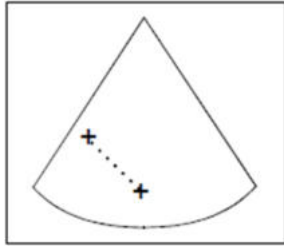
Measures the angle at which 2 straight lines intersect.

The 2 Caliper method and Point method can be used for taking this measurement.

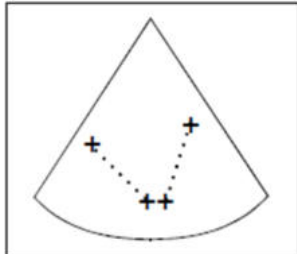
Using the 2 Caliper Method for Measurement

Procedure

1. Press [Measurement] button on the touch panel.
2. Select [Angle] from the Measurement menu.
The + mark is displayed.
3. Use the Caliper method to draw a straight line along one side of the angle to be measured.



4. Draw a straight line along the other side of the angle using the Caliper method.



The angle of the 2 intersecting straight lines is displayed.

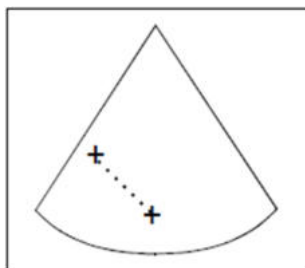
Example of Measurement Results Display

Angle:		
Angle1:	°	:Angle
D1:	cm	:Length of 1st side
D2:	cm	:Length of 2nd side

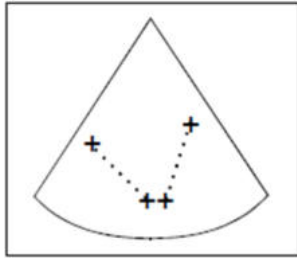
Measuring Angles with the **Point Method**

Procedure

1. Press [Measurement] button on the touch panel.
2. Select [Angle] from the Measurement menu.
The + mark is displayed.
3. Move the + mark to the one side of the angle to measure and press [Enter] key.
4. Move the + mark to the vertex of the angle to measure and press [Enter] key.



5. Move the + mark to the one side of the angle to measure and press [Enter] key.



The angle is displayed.

Example of Measurement Results Display

Angle:	
Angle1: °	:Angle
D1: cm	:Length of 1st side
D2: cm	:Length of 2nd side

(5) General Purpose Index Measurement: B.Index

The general purpose index (A/B , B/A , $|A-B|/A$) is obtained from two measurement values A and B.

The following measurement methods are available.

Use B.Index in the measurement preset ([Create Measurement Tools > Basic Measurement > Measured Method & Display Items > B.Mode]) to set the measurement method.

Measurements Methods	Measurements	Unit	Measurements results display	Remarks
Caliper	Distance	cm	B.Index(Calp)	Measures the target distance.
Ellipse	Area	cm ²	B.Index(Ellp)	This measurement approximates the target range to an ellipse.
Circle	Area	cm ²	B.Index(Circ)	This measurement approximates the target range to a circle.
Trace	Area	cm ²	B.Index(Trac)	This measurement approximates the target range to a trace.

Procedure

1. Press [Measurement] button on the touch panel.
2. Select [B.Index] from the Measurement menu.
The + mark is displayed.
The method is displayed as "B. Index(Calp)" in the measurement results display.
3. Measure measurement target A.
4. Measure measurement target B.
The general purpose index is displayed.

Example of Measurement Results Display

B. Index (Calp)	Measurement method in parentheses.
A/B:	Indices
1A: cm	Measurement of A (when the Ellipse, Circle or Trace method is used, cm ²)
2B: cm	Measurement of B (when the Ellipse, Circle or Trace method is used, cm ²)

(6) Histogram Measurement: Histogram

Displays the echo intensity data and the intensity distribution of echoes in the ROI of the ultrasound tomographic image as a histogram.

The ROI shape and size can be set with Histogram under the measurement preset ([Create Measurement Tools > Basic Measurement > Measured Method & Display item > B.Mode]).

ROI Shape	ROI Size	Measurement Results Display	Description
Square	Free Fixed: 5, 7, 10, 15	Hist-Box ##	Displays the size (mm) in ##.
Circle	Free Fixed: 5, 7, 10, 15	Hist-Cir ##	Displays the size (mm) in ##.
Rectangle	Any rectangle	Hist-Rect	Set the target range on the cross-sectional image.
Trace	Trace range	Hist-Trace	Trace the target region on the cross-sectional image.

The factory default setting of ROI Shape is "Square", and ROI Size is 10 mm.

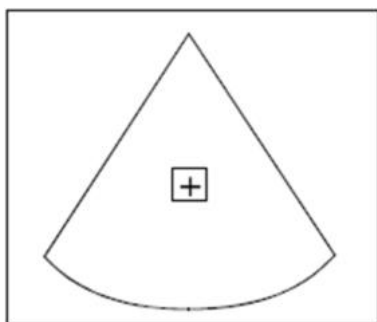
When images are saved in the system, histogram measurements can be made if the images are saved in the Line or Palette formats.

NOTE: This measurement is affected by setting conditions, such as TGC or Gain. When making comparisons using multiple images, it is necessary to bear in mind any differences in their setting conditions.

Procedure

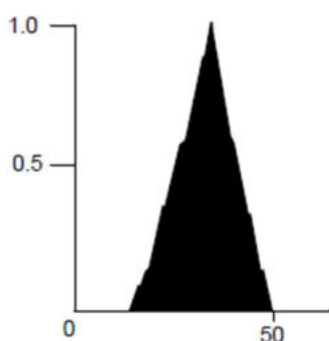
1. Display a cross-sectional image of the part to be measured in the B mode, and freeze it.
2. Press [Measurement] button on the touch panel.
3. Select [Histogram] from the Measurement menu.

ROI is displayed. If the shape of the ROI is Square, the display will appear like the following.



4. Set the ROI size (when the ROI Size is "Free", or ROI Shape is "Rectangle" or "Trace").

5. Move the ROI to the region of interest, and press [Enter] key.
Brightness data and a histogram are displayed in the measurement results (see the figure below).



Frequency distribution of the brightness gradation level
X-axis:
Brightness level of pixels in the ROI (0 to 63).
Y-axis:
Shows the frequency of appearance of the brightness level gradation level of the total number of pixels as 100%.

To continue measurements, press [Enter]. Continue and set up to 3 ROIs.

Example of Measurement Results Display

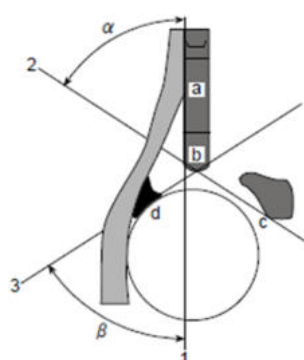
Hist-Box 10	:ROI Shape and Size (mm)
T:	:Number of echo brightness pixels sampled from within the ROI
L:	:Most frequent (echo brightness) gradient value inside the ROI
M:	:Number of pixels at the most frequent gradient value in the ROI
MN:	:Average gradient value (echo brightness) in the ROI
SD:	:Standard deviation of gradient value inside the ROI

(7) Measurement of Congenital Dislocation of the Hip Joint: Hip J Angle

Measurement is based on Graf's ultrasound classification using the echo of the hip joint for neonate or infant by means of a lateral approach. This measurement is an aid for diagnosing the degree of congenital dislocation of the hip joint in a patient.

NOTE: The patient's age may be used when classifying the degree of dislocation. Normally the age data calculated from the DOB in the patient data is used. If the age is input directly, 12 weeks or 84 days or more is treated as 3 months.

Angles α and β are measured from three auxiliary lines (1 - 3).



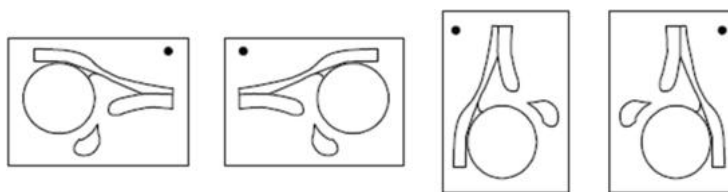
1. Base Line
2. Bony roof line
3. Cartilage roof line
- α . Bony roof angle
- β . Cartilage roof angle
- a. The point where the acetabular perichondrium and the iliac wall meet
- b. Bony acetabular rostrum
- c. Lower iliac margin
- d. The main echo of the acetabular labrum

Procedure

1. Display the hip joint image in the 1B mode and freeze.

Drawing pattern:

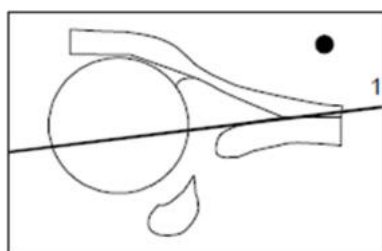
Congenital dislocation of the hip joint can be measured using the pattern below. In either case, it is assumed that the direction in which the active mark (●) is displayed is the head, and the direction in which there is no active mark is the foot.



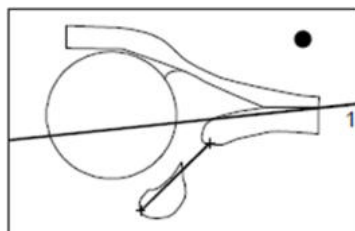
NOTE: Measurements cannot be made in the B/B mode. Displayed in 1B mode.

NOTE: Invert U/L, Invert L/R, Image Rotation and Depth/Range are changed at this stage. The changes cannot be made once the measurement has started.

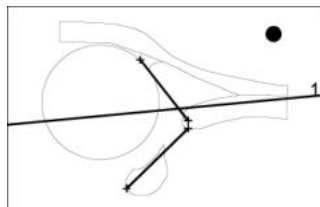
2. Press [Measurement] button on the touch panel.
3. Select the [Rt.Hip J Angle]or [Lt.Hip J Angle] from the measurement menu.
The + mark is displayed.
4. Set up the Baseline.
 - a. Use the trackball to move the + mark to one end of the Baseline, and press [Enter] key.
 - b. Move the + mark to the other end and press [Enter] key.
The Baseline is confirmed.



5. Set up the Bony roof line.
 - a. Use the trackball to move the + mark to one end of the Bony roof line, and press [Enter] key.
 - b. Move the + mark to the other end and press [Enter] key.
The Bony roof line and angle α are confirmed.



6. Set up the cartilage roof line.
 - a. Use the trackball to move the + mark to one end of the Cartilage roof line, and press [Enter] key.
 - b. Move the + mark to the other end and press [Enter] key.
Three auxiliary lines are drawn in enlarged form.



Example of Measurement Results Display

Rt Hip Angle	
1Baseline	
2A (1-2) :	:Bony roof angle (angle formed by auxiliary lines 1 & 2: α)
3B (1-3) :	:Cartilage roof angle (angle formed by auxiliary lines 1 & 3: β)

Graf's Ultrasound Classification

The Hip type as estimated based on the angles, α , β and patient age is classified based on the following. Set the dislocation type display with Hip J Angle under the preset ([Create Measurement Tools > Basic Measurement > Measured Method & Display Items > B.Mode]).

Table5: Hip Type based on Graf's classification

Sub Classification TYPE	Hip Type Assessment Standard			Dislocation Type Displayed
	α	β	Patient age	
I	$\alpha \geq 60$		every	I
II a	$50 \leq \alpha \leq 59$		Age < 3 months	II a
II b	$50 \leq \alpha \leq 59$		Age $\geq$ 3 months	II b
II c	$43 \leq \alpha \leq 49$	$\beta \leq 77$	every	II c
D	$43 \leq \alpha \leq 49$	$\beta > 77$	every	D
III	$\alpha < 43$		every	III, IV
IV	$\alpha < 43$		every	III, IV
	$50 \leq \alpha \leq 59$		Age unknown	II a, II b
	$43 \leq \alpha \leq 49$		every	II c, D
	other cases	other cases		??

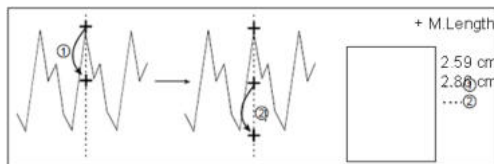
2.2.2 M mode

(1) Distance (amplitude) Measurement: M.Length

Measures the distance between two points on the same time phase on an M mode image.

Procedure

1. Press the [Measurement] button on the touch panel.
2. Select [M. Length] from the Measurement menu.
+ mark appears on the line cursor.
3. Measure the distance (amplitude) using the Caliper method.
The distance is displayed.
4. To continue the measurement, move the + mark to the next point and press [Enter] key.



Multiple distance measurements can be made in succession. Five segments made up of 6 points in the same phase can be measured.

Example of Measurement Results Display

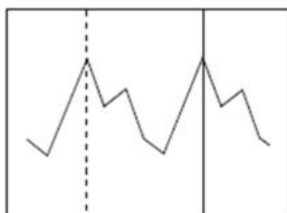
M.Length		
d1:	cm	: Distance between marks 1 - 2
d2:	cm	: Distance between marks 2 - 3
d3:	cm	: Distance between marks 3 - 4

(2) Time Measurement: Time

Use the steps below to measure the time between two points on an M mode image.

Procedure

1. Press the [Measurement] button on the touch panel.
2. Select [Time] from the Measurement menu.
The line cursor is displayed.
3. Set the starting time and ending time with the Caliper method.



The time between the two points is displayed.

Example of Measurement Results Display

dt:	ms	:Time between two points
-----	----	--------------------------

(3) Heart Rate Measurement: Heart Rate

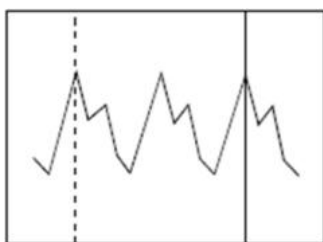
Measures the heart rate during the time between two points on the M mode image.

- Heart rate during the time between two points
Select HR under the measurement preset ([Create Measurement Tools > Basic Measurement > Measured Method & Display Items > M.Mode]).

Procedure

1. Press the [Measurement] button on the touch panel.
2. Select [Heart Rate] from the Measurement menu.
The line cursor is displayed.

3. Measure the heart rate in the results display using the Caliper method.



The heart rate and the time between the two points are displayed.

Example of Measurement Results Display

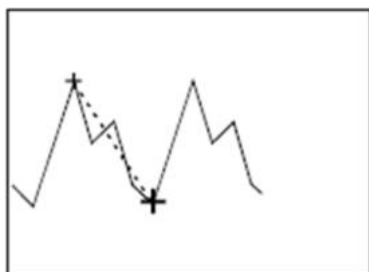
HR:	BPM	: Heart rate
dt:	ms	:Time between two points (corresponding to HR below)
every 2 beats		: Number of heart beats between two points

(4) Velocity Measurement: M.VEL

Use the following steps to measure the time, amplitude and velocity from the inclination between two points on an M mode image.

Procedure

1. Press the [Measurement] button on the touch panel.
2. Select [M. VEL.] from the Measurement menu.
The + mark is displayed.
3. Set the start and end point positions with the Caliper method.



The velocity, amplitude and time between the two points are displayed.

Example of Measurement Results Display

M.VEL		
v:	cm/s	:Velocity
dD:	cm	:Amplitude (distance)
dt:	ms	:Time

(5) General Purpose Index Measurement: M.Index

The general purpose index (A/B , B/A , $|A-B|/A$) is obtained from two measurement values A and B. The following measurement methods are available.

Use M.Index in the measurement preset ([Create Measurement Tools > Basic Measurement> Measured Method & Display Items > M.Mode]) to set the measurement method.

Measurement Methods	Measurement Target	Measurements Target	Unit	Measurement Results Display
Line	Length	Distance (amplitude)	cm	M.Index(Leng)
Line	Time	Time	ms	M.Index(Time)
Caliper	Velocity	Velocity	cm/s	M.Index(Vel.)

Procedure

1. Press the [Measurement] button on the touch panel.
2. Select [M.Index] from the Measurement menu.
The + mark is displayed.
The measurement target is displayed as "M. Index(Leng)" under the measurement results display screen.
3. Measure measurement target A.
4. Measure measurement target B.
The general purpose index is displayed.

Example of Measurement Results Display

		: Measurement method in parentheses.
A/B:		: Indices
1A:	cm	: Measured value of A
2B:	cm	: Measured value of B

2.2.3 D mode

NOTE: When performing multiple measurements of blood flow on a blood flow waveform drawn using the color Doppler method as a guide, use identical recording conditions (forward and reverse flow directions) for all of the blood flow waveforms.

The measured blood flow values obtained using this system are displayed in absolute values on the observation monitor. They are managed as positive and negative values for the purpose of calculating the arithmetic index.

If the display of each measured value in a report is set to "Average" in the preset, the positive and negative values are added together and displayed as a mean value. If the blood flow directions are different, correct results will not be displayed.

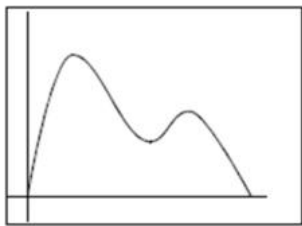
(1) Time Measurement: Time

Use the steps below to measure the time between two points on an D mode image.

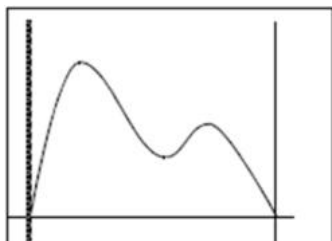
Procedure

1. Press the [Measurement] button on the touch panel.
2. Select [Time] from the Measurement menu.

The line cursor is displayed.



3. Set the start and end point positions with the Caliper method.



The time between the two points is displayed.

Example of Measurement Results Display

dt:	ms	:Time between two points
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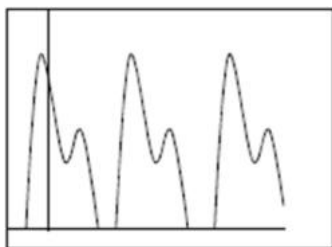
(2) Heart Rate Measurement: Heart Rate

You can measure the heart rate from the time between two points on an D mode image

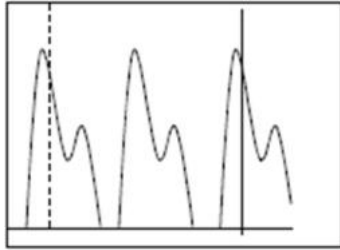
- Heart rate during the time between two points
Use HR in the measurement preset ([Create Measurement Tools > Basic Measurement> Measured Method & Display Items > D.Mode])).

Procedure

1. Display the D mode image.
2. Press the [Measurement] button on the touch panel.
3. Select [Heart Rate] from the Measurement menu.
The line cursor is displayed.



4. Set the start and end point positions with the Caliper method (position of the heart rate part in the results display).



Set the start and end point positions with the Caliper method (position of the heart rate part in the results display).

Example of Measurement Results Display

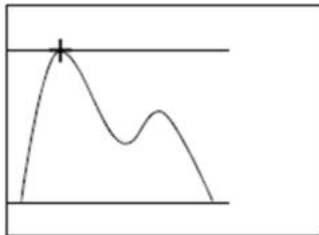
HR:	BPM	: Heart rate
dt:	ms	: Time between two points (corresponding to HR below)
every 2 beats		: Number of heart beats between two points

(3) Blood Flow Velocity Measurement: D.Velocity1

Use the steps below to measure the peak blood flow velocity and the peak pressure gradient.

Procedure

1. Press the [Measurement] button on the touch panel.
2. Select [D.VEL1] from the Measurement menu.
The + mark is displayed.



3. Use the trackball to move the + mark to the measurement point, and press [Enter].
It displays the peak velocity and the peak pressure gradient.

Example of Measurement Results Display

D.VEL1		
pV:	cm/s	: Peak blood flow velocity
PG:	mmHg	: Peak pressure gradient

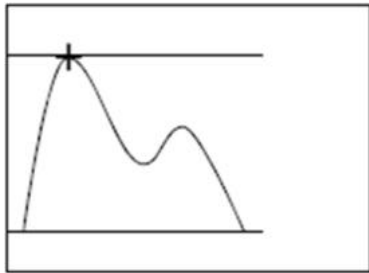
(4) Blood Flow Velocity Measurement: D.Velocity2

Use the steps below to measure the blood velocity at the two points and the flow velocity ratio on a D mode image.

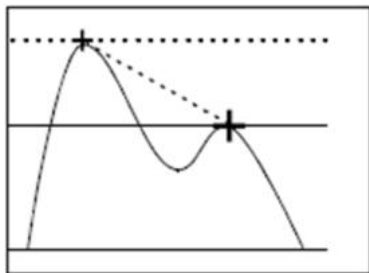
Procedure

1. Display the D mode image and freeze it.

2. Press the [Measurement] button on the touch panel.
3. Select [D.VEL2] from the Measurement menu.
The + mark is displayed.



4. Use the trackball to move the + mark to the first measurement point, and press [Enter].
5. Use the trackball to move the + mark to another measurement point, and press [Enter].



The flow velocities at the two points and the ratio of those blood flow velocities are displayed.

Example of Measurement Results Display

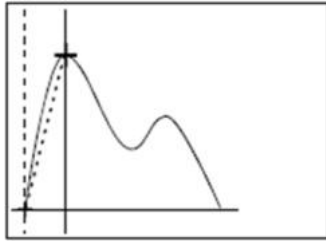
D.VEL2	
v1: cm/s	:Blood flow velocity of measurement point 1
v2: cm/s	:Blood flow velocity of measurement point 2
dV: cm/s	:Blood velocity difference
v1/v2:	:Blood flow velocity ratio

(5) Acceleration (deceleration) Measurement: ACCEL

Use the steps below to measure the acceleration (deceleration) between two points on an D mode image.

Procedure

1. Display the D mode image and freeze it.
2. Press the [Measurement] button on the touch panel.
3. Select [ACCEL] from the Measurement menu.
The + mark is displayed.
4. Set the start and end point positions with the Caliper method.



The acceleration between the two points is displayed.

Example of Measurement Results Display

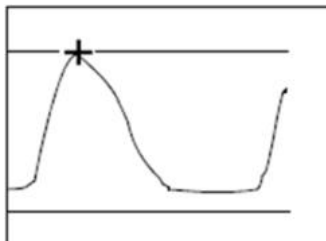
ACCEL		
ACC:	cm/s ²	:Acceleration (DEC: is displayed if deceleration)
v1:	cm/s	:Blood flow velocity at the start point
v2:	cm/s	:Blood flow velocity at the end point
dt:	m/s	:Time between two points
dV:	cm/s	:Blood flow velocity deviation between two points

(6) Resistance Index Measurement: RI

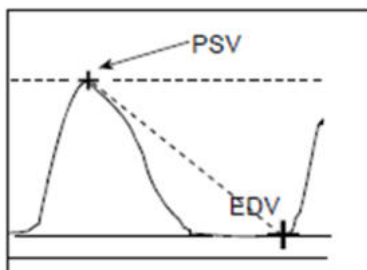
You can measure the RI (Resistance Index) from the two flow velocity values (PSV and EDV) on the blood flow waveform pattern.

Procedure

1. Display the D mode image and freeze it.
2. Press the [Measurement] button on the touch panel.
3. Select [RI] from the Measurement menu.
The + mark is displayed.
4. Use the trackball to move the + mark to the peak-systolic velocity (PSV), and press [Enter].



5. Use the trackball to move the + mark to the end diastolic velocity (EDV), and press [Enter].



"RI" and "S/D" are displayed.

Example of Measurement Results Display

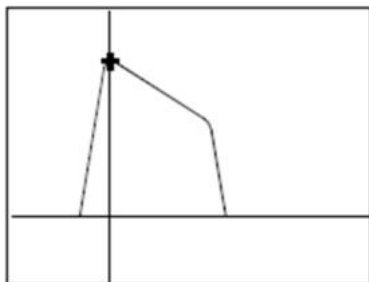
RI		
RI :		: Resistance Index
S/D :		: Systolic/Diastolic Velocity Ratio
PSV :	cm/s	:Peak Systolic Velocity
EDV :	cm/s	: End Diastolic Velocity

(7) Pressure Half-Time Measurements: P1/2T

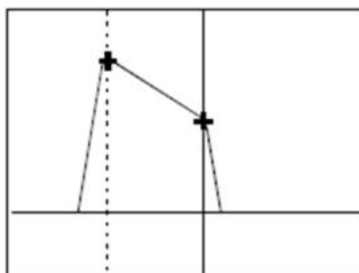
Measures the pressure half-time. The valve area can also be calculated from the pressure half time.

Procedure

1. Display the D mode image and freeze it.
2. Press the [Measurement] button on the touch panel.
3. Select [P1/2T] from the Measurement menu.
The + mark is displayed.
4. Use the trackball to move the + mark to the peak velocity point, and press [Enter].



5. Use the trackball to move the + mark so the auxiliary line follows the deceleration waveform, and press [Enter].



"P1/2T" and "VA" are displayed.

Example of Measurement Results Display

P1/2T		
P1/2T :	ms	: Pressure half-time
VA :	cm ²	: Stenosis valve area estimated from the stenosis blood flow
pV :	cm/s	: Peak velocity at stenosis

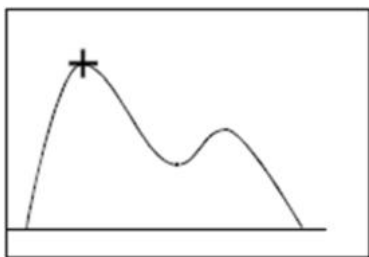
PG:	mmHg	: Pressure gradient corresponding to pV
-----	------	---

(8) Dop Caliper Measurement: D.Caliper1, D.Caliper2

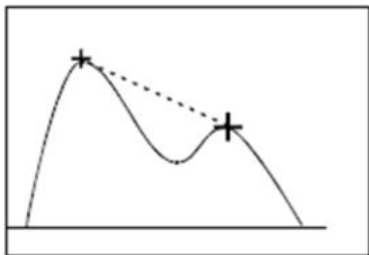
Use the steps below to measure the blood flow velocity, blood flow velocity difference, time difference, blood flow velocity ratio, and so on, between two points on the D mode image.

Procedure

1. Display the D mode image and freeze it.
2. Press the [Measurement] button on the touch panel.
3. Select the [D.Caliper1] or [D.Caliper2] from the measurement menu.
The + mark is displayed.
4. Use the trackball to move the + mark to the measurement point, and press [Enter].



5. Use the trackball to move the + mark to another measurement point, and press [Enter].



The time between two points, acceleration or deceleration is displayed.

Example of Measurement Results Display

D.Caliper1	
v1: cm/s	:Blood flow velocity at the start point
v2: cm/s	:Blood flow velocity at the end point
dv: cm/s	:Blood flow velocity deviation between two points
dt: ms	:Time between two points
PG1: mmHg	:v1 pressure gradient
PG2: mmHg	:v2 pressure gradient
DEC: cm/s ²	: Deceleration between v1 - v2 (acceleration is indicated as ACC).

(9) General Purpose Index Measurement: D.Index

The general purpose index (A/B, B/A, |A-B|/A) is obtained from two measurement values A and B. The following measurement methods are available.



The measurement method can be set with D.Index under the preset ([Create Measurement Tools > Basic Measurement > Measured Method & Display Items > D.Mode]).

Measurement Methods	Measurement Target	Measurement Target	Unit	Measurement Results Display
D.Index(Caliper)	Velocity	Velocity	cm/s	D.Index(Vel.)
	PG	Pressure gradient	mmHg	D.Index(PG)
	Time	Time	ms	D.Index(Time)
D.Index(Trace)	MnVel	Mean velocity	cm/s	D.Index(MnV)
	MPG	Mean pressure gradient	mmHg	D.Index(MPG)
	VTI	Velocity time integral	cm	D.Index(VTI)

Procedure

1. Press the [Measurement] button on the touch panel.
2. Select [D.Index] from the Measurement menu.
The + mark is displayed.
The method is displayed as "D. Index (Vel.)" on the measurement results display screen.
3. Measure measurement target A.
4. Measure measurement target B.
The general purpose index is displayed.

Example of Measurement Results Display

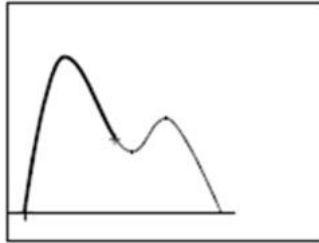
D . Index (Vel .)	: Measurement method in parentheses. Display example is velocity.
B / A :	:Indices
1A : cm / s	:Measured value of A
2B : cm / s	:Measured value of B

(10) Measurement of Mean Velocity and Mean Pressure Gradient: Mean VEL

You can trace the blood flow waveform and measure blood flow data such as the mean velocity and the mean pressure gradient.

Procedure

1. Display the D mode image and freeze it.
2. Press the [Measurement] button on the touch panel.
3. Select [Mean VEL] from the Measurement menu.
The + mark is displayed.
4. Use the Doppler Trace method to trace the blood flow waveform.



The trace line and the measurement results are displayed.

Example of Measurement Results Display

Mean VEL	
MnV: cm/s	: Mean velocity
MPG: mmHg	: Mean pressure gradient
VTI: cm	: Velocity time integral
FlowT: ms	: Flow time

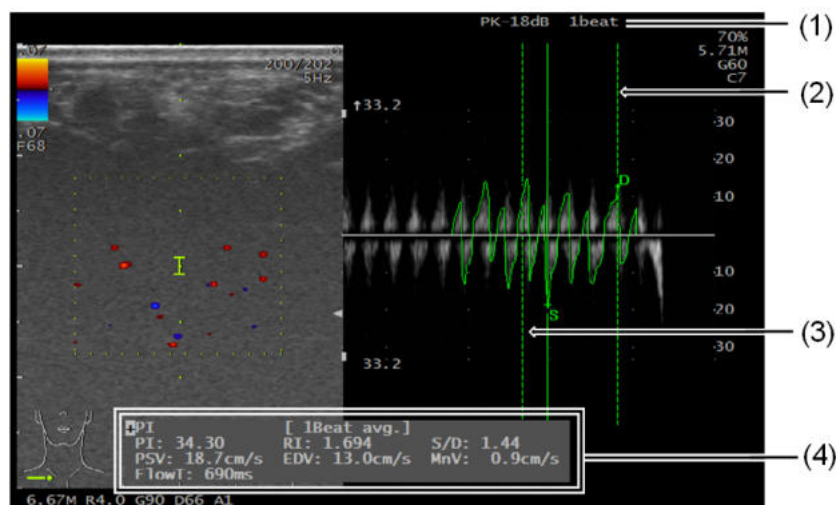
(11) Pulsatility Index Measurement: PI

You can trace the blood flow waveform and measure data on hemodynamics, such as PI, RI, and S/D.

NOTE: It has been reported that minimum diastolic velocity is also used to calculate this index. End-diastolic blood velocity (EDV) and the minimum diastolic velocity are not necessarily identical. If required, adjust the EDV phase to the end-diastolic or minimum diastolic velocity point.

Procedure

1. Display the D mode image and freeze it.
2. Press the [Measurement] button on the touch panel.
3. Select [PI] from the Measurement menu.
4. Use the Manual Trace method or Auto Trace method to trace the blood flow waveform. A line cursor accompanied by "S", "D" is displayed.



Example of PI measurement display.

(1) detected heart rate, (2) active heartbeat (dashed line), (3) start point of detected heartbeat waveform, (4) measurement results.

5. Select a heartbeat (when multiple heartbeats are traced).
 - a. Select [Beat Select] from the [Meas] tab in the function menu.
 - b. Use [Pointer] rotary encoder to select a heartbeat.
The selected heartbeat is displayed with a broken line connecting its start point and the start point of the next heartbeat.
6. Adjust the "S" (Peak Systolic Velocity point) position, and press [Enter] key.
7. Align "D" (End Diastolic Velocity point) position to the end-diastolic or minimum blood flow velocity point and press [Enter] key.
8. Adjust the start point (rising point in the waveform), and press [Enter] key.

Example of Measurement Results Display

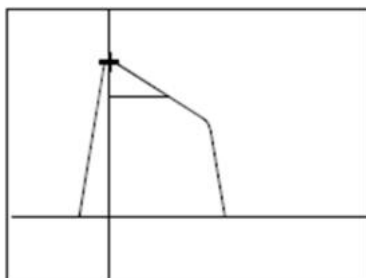
PI	
PI:	: Pulsatility Index
RI:	: Resistance Index
PSV: cm/s	: Peak Systolic Velocity
EDV: cm/s	: End Diastolic Velocity
MnV: cm/s	: Mean Velocity
FlowT: ms	: Flow Time
[1 Beat avg.]	: Detected Heartbeats

(12) Stenosis Flow Measurement: Steno Flow

You can trace the stenosis blood flow waveform and measure the stenosis valve passage peak blood flow velocity (pV), maximum pressure gradient between valves (PG), the mean pressure gradient (MnPG) and pressure half-time (P1/2T).

Procedure

1. Display the D mode image and freeze it.
2. Press the [Measurement] button on the touch panel.
3. Select [Steno Flow] from the Measurement menu.
4. Use the Doppler Trace method to trace the blood flow waveform.
The PV line cursor is displayed.



5. Adjust the PV point position with the trackball, and press [Enter] key.

Example of Measurement Results Display

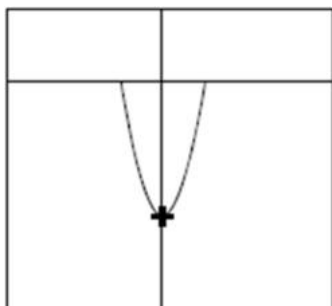
Steno Flow		
MnV:	cm/s	: Mean Velocity
MPG:	mmHg	: Mean pressure gradient
pV:	cm/s	: Peak blood flow velocity
VTI:	cm	: Velocity time integral
FlowT:	ms	: Flow time
P1/2T:	ms	: Pressure half-time
VA:	cm ²	: Valve area

(13) Regurgitant Flow Measurement: Regurg Flow

Use the steps below to trace the regurgitant flow waveform and measure the peak valve regurgitation blood flow velocity (pV) and the peak pressure gradient between valves (PG).

Procedure

1. Display the D mode image and freeze it.
2. Press the [Measurement] button on the touch panel.
3. Select [Regurg Flow] from the Measurement menu.
4. Use the Doppler Trace method to trace the blood flow waveform.
The PV line cursor is displayed.



5. Adjust the PV point position with the trackball, and press [Enter] key.

Example of Measurement Results Display

Regurg Flow		
MnV:	cm/s	: Mean velocity
MPG:	mmHg	: Mean pressure gradient
pV:	cm/s	: Peak blood flow velocity
PG:	mmHg	: Pressure gradient
FlowT:	ms	: Flow time

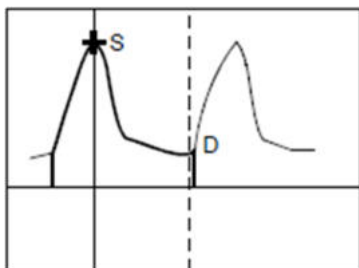
(14) D. Trace Measurement: D.Trace1, D.Trace2

Measures the Doppler information from the traced waveform.

The names of "D.Trace1" and "D.Trace2" can be set by the user. Use Name Assignment in the measurement preset ([Create Measurement Tools > Basic Measurement > Measured Method & Display Items > D.Mode]) to select a method.

Procedure

1. Display the D mode image and freeze it.
2. Press the [Measurement] button on the touch panel.
3. Select the [D.Trace1] or [D.Trace2] from the measurement menu.
4. Use the Doppler Trace method to trace the blood flow waveform.
A line cursor accompanied by "S", "D" is displayed.



5. Adjust the "S" (PSV) position with the trackball, and press [Enter] key.
6. Adjust the "D" (EDV) position, and press [Enter] key.

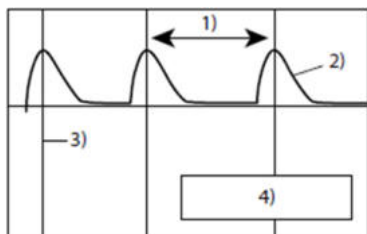
Example of Measurement Results Display

D Trace1:	
PSV: cm/s	: Peak systolic velocity
EDV: cm/s	: End diastolic velocity
MnV: cm/s	: Mean velocity
dv: cm/s	:Deviation between the velocities of PSV and EDV
PG1: mmHg	:PSV pressure gradient
PG2: mmHg	:EDV pressure gradient
MPG: mmHg	:Mean pressure gradient
dPG: mmHg	:Deviation in the pressure gradient (PG1-PG2)
VTI: cm	:Velocity time integral
FlowT: ms	:Flow time

(15) Real Time Doppler Auto Trace

This function automatically traces the Doppler waveform in real-time D mode and displays the Doppler information for the most recent single heartbeat. You can also perform tracing immediately after the image is frozen without tracing in real time. The calculated Doppler information can be transferred to an application measurement.

This is suitable for use with the pulsatile waveform of peripheral arteries, such as the carotid artery.



1) Most recent single heartbeat

The most recent single heartbeat is displayed.

2) Trace Line

The line traced by the Peak method is displayed.

3) R-wave search line cursor

While the ECG signals are being displayed, it is displayed at the timing of when an R-wave is detected. It is also displayed when the image is frozen.

4) Measurement results display

Measurement values such as PI, RI, S/D, PSV and EDV are displayed for the most recent single heartbeat.

When PI and RI are calculated using Real Time Doppler Auto Trace measurement, the minimum blood flow velocity point during a single heartbeat is the EDV. In the case of a waveform in which the polarity of the blood flow changes during the interval between the systole and the diastole, as is the case with the arteries of the lower extremities, the peak of the waveform that has undergone a polarity change is detected as EDV.

The following settings are required before Real Time Doppler Auto Trace measurement begins.

- Navigate the preset to [Preset Set-Up Menu > Doppler2] and set the items to be displayed to Doppler2/>[On] under D. Trace Display Items.
- Assign the following to the function menu using Preset ([Preset Set-Up Menu> Menu-Function]).
 - [Doppler Auto Trace]
 - [Trace Threshold]
 - [Freeze Trigger]
 - [Trace Direction]
 - [Trace Smooth]
 - [Trace Locate]
- Set up the menu for transferring applied measurements after measurement.
 - Make function menu settings.
Use the preset ([Preset Set-Up Menu > Menu-Function])to assign Menu-Function />[Transfer Menu Auto Display] to the function menu.
Once selected, the menu display can be switched during measurement.
 - Set to display after freezing.
This appears only when all the following conditions are met.
 - Set Measurement Transfer List under the preset [Preset Set-Up Menu > Doppler2]) to Doppler2/>"Auto".
 - Set trackball Priority (Freeze On) in the preset [Preset Set-Up Menu > Display2]) to Display2/>"Measurement".
 - Set Basic measurements are displayed together. in the measurement preset ([Create Measurement Tools >Application Measurement > Display Form]) to Application Measurement > Display Form />"No"

- Set the [Freeze Trigger] to "On" during measurement.

Tracing the Doppler Waveform in Real-time

This function traces a Doppler waveform in real-time display.

Procedure

1. Display a satisfactory D mode image in real-time.
 - Velocity range settings
Set to avoid aliasing.
 - Wall filter settings
Navigate the preset to [Preset Set-Up Menu > Doppler1] and make settings under Wall Filter. The mean flow velocity is calculated in the PI/RI measurement. The mean value of the flow velocity is calculated based on all velocity components that are displayed relative to the most recent single heartbeat. If the low velocity components are removed from the Doppler waveform by excessive application of the wall filter, etc., the mean velocity will be underestimated and could affect the PI value.
 - Dop Gain settings
Adjust D mode gain so that the sonogram is free of noise.
 - Angle correction settings
Correct the angle difference between the angle of incidence of the Doppler waveform ultrasound and the blood vessel.
2. Select [Doppler Auto Trace] from the function menu.
The trace line and the measurement results for the most recent single heartbeat are displayed on a Doppler waveform of a D mode image.
The result is displayed as "****" if a Doppler waveform required for the measurement cannot be captured.
Measurement results are updated when a new R-wave is detected (as the most recent heartbeat is updated).
3. Select [Trace Direction] from the function menu and set the trace range.
4. Select and adjust the trace range.
Adjusting the detection level of the trace line
Select [Trace Threshold] from the function menu and make adjustments.
Smoothing trace line
Select [Trace Smooth] from the function menu and make adjustments.
5. Press [Freeze] key and freeze the image.
This also freezes the Doppler waveform and the measurement results.
When the image conditions change as a result of the search function, a change in the sweep velocity, or a request, the trace line and the measurement results are updated accordingly. If there is no valid heartbeat on the screen, no measurement values are displayed.
When the menu for transferring to applied measurement is displayed, the measurement results can be transferred to the applied measurement items. Select [Transfer Menu Auto Display] from the function menu when the transfer menu is not displayed.
6. Select [Doppler Auto Trace] to finish tracing.

Example of Measurement Results Display

RT Doppler Auto Trace:	
PI: .	: Pulsatility Index
RI: .	: Resistance Index
S/D: .	: Ratio of Velocity between Systole and Diastole
D/S: . .	: Ratio of Velocity between Diastole and Systole
PSV: . cm/s	: Peak Systolic Velocity
EDV: . cm/s	: End Diastolic Velocity
MnV: . cm/s	: Mean Velocity
FlowT: ms	: Flow Time

After measurement results are confirmed, they can be measured again using the Doppler Trace method (Auto Trace or Manual Trace).

Reference information

2.2.6(3) *Transferring Basic Measurement Results to Applied Measurements* on page 76

Tracing the Doppler Waveform after Freezing

You can perform automatic tracing immediately after an image is frozen, without tracing it in real time, and then display the Doppler information.

Prior confirmation

Set the [Preset Set-Up Menu > Doppler2] Freeze Trigger to "On".

Procedure

- Display a satisfactory D mode image in real-time.
 - Velocity range settings
Set to avoid aliasing.
 - Wall filter settings
Navigate the preset to [Preset Set-Up Menu > Doppler1] and make settings under Doppler1/> Wall Filter. The mean flow velocity is calculated in the PI/RI measurement. The mean value of the flow velocity is calculated based on all velocity components that are displayed relative to the most recent single heartbeat. If the low velocity components are removed from the Doppler waveform by excessive application of the wall filter, etc., the mean velocity will be underestimated and could affect the PI value.
 - Dop Gain settings
Adjust D mode gain so that the sonogram is free of noise.
 - Angle correction settings
Correct the angle difference between the angle of incidence of the Doppler waveform ultrasound and the blood vessel.
- Press [Freeze] key and freeze the image.
The D mode image is traced and the trace line and the calculation results are displayed. When the image conditions change as a result of the search function, a change in the

sweep velocity, or a request, the trace line and the measurement results are updated accordingly. If there is no valid heartbeat on the screen, no measurement values are displayed.

- To transfer the measurement results to the applied measurement items, select [Transfer Menu Auto Display] from the function menu.

Reference information

2.2.6(3) *Transferring Basic Measurement Results to Applied Measurements* on page 76

2.2.4 B/D Mode

Basic measurements that can be made in the B/D mode include any volume of blood flow measurement. Select a measurement appropriate for blood flow. Use FV (Vein) for steady flow, FV (Artery) MnV or FV (Artery) VTI for artery (pulsatile blood flow).

This section describes the methods used for [Enter & +].

Reference information

1.2 *Measurement Methods* on page 26

(1) FV (Artery) MnV

Calculates the blood flow volume in the pulsatile blood flow waveform from the time-averaged maximum blood flow velocity (MnV) and flow path cross-sectional area (CSA).

- Coefficient setting
Correction using a coefficient may be required with peripheral arteries or portal veins. Set coefficients using COEF under the measurement preset ([Create Measurement Tools > Basic Measurement > Measured Methods & Display Items > D.Mode]). The factory default coefficient (COEF) setting is 1.00..
- Setting for the method for measuring the cross-sectional diameter (CSD) or cross-sectional area (CSA)
The measuring method can be set in CSA Method in the measurement preset ([Create Measurement Tools> Basic Measurement > Measured Methods & Display Items > D.Mode]).
 - "Caliper": Measure the CSD with the caliper method and then calculate the CSA based on the CSD being the diameter of a circle.
 - "Trace": Measure CSA using the B Trace method.
 - "Ellipse": Measure CSA using the Ellipse method.
 - "Circle": Measure CSA using the Circle method.

Procedure

1. Display the B/D mode image and freeze it.

To improve measurement accuracy

Expand the cross-section image in the B mode. Accuracy will improve, especially when measuring the cross-sectional area CSA with the caliper method.

2. Press the [Measurement] button on the touch panel.
3. Select [FV (Artery) MnV] from the measurement menu.
4. Measure the interval of single heartbeat with the Doppler Trace method
5. Press the [Caliper]key.
6. Measure the cross sectional diameter (CSD) or cross sectional area (CSA).
The flow path cross-sectional area (CSA) and blood flow volume are displayed.

Example of Measurement Results Display

FV (Artery) MnV	
1MnV: cm/s	: Mean Velocity
2CSA: cm ²	: Cross-sectional area
CSD: cm	:Cross-sectional diameter
FV (MnV) :	
ml/m	:Blood flow volume for one minute
COEF: 1.00	: Coefficient
[1Beat avg.]	: Detected heartbeats

(2) FV (Artery) VTI

Calculates the blood flow volume from the velocity time integral value of one heartbeat (VTI), flow path cross-sectional area (CSA) and heart rate.

- Setting for the method for measuring the cross-sectional diameter (CSD) or cross-sectional area (CSA)

Procedure

1. Display the B/D mode image and freeze it.
To improve measurement accuracy
Expand the cross-section image in the B mode. Accuracy will improve, especially when measuring the cross-sectional area (CSA) with the Caliper method.
2. Press the [Measurement] button on the touch panel.
3. Select [FV (Artery) VTI] from the measurement menu.
4. Measure the interval of single heartbeat with the Doppler Trace method
The velocity-time integration value (VTI) and HR are calculated.
5. Press the [Caliper]key.
6. Measure the cross sectional diameter (CSD) or cross sectional area (CSA).
The flow path cross-sectional area (CSA) and blood flow volume are displayed.

Example of Measurement Results Display

FV (Artery) VTI	
1VTI: cm	: Velocity-time integral value

2HR:	BPM	: Heart rate
3CSA:	cm ²	: Cross-sectional area
CSD:	cm	:Cross-sectional diameter
FV: b	ml/	:Blood flow volume corresponding to 1 beat
FV: m	ml/	: Blood flow volume per minute
[1Beat avg.]		: Detected heartbeats

Reference information

2.2.4(1) FV (Artery) MnV on page 69

(3) FV (Vein)

Calculates the flow blood volume in a steady blood flow waveform from the time-averaged flow velocity (MnV) and the cross-sectional area (CSA).

- Coefficient setting
Correction using a coefficient may be required with peripheral arteries or portal veins. Set coefficients using COEF under the measurement preset ([Create Measurement Tools > Basic Measurement > Measured Methods & Display Items > D.Mode]). The factory default coefficient (COEF) setting is 1.00. Settings using animals or phantoms are on the scale of 0.5 to 0.7. There are reports of portal vein blood flow volume of 0.57.
- Setting for the method for measuring the cross-sectional diameter (CSD) or cross-sectional area (CSA)

Procedure

1. Display the B/D mode image and freeze it.
To improve measurement accuracy
Expand the cross-section image in the B mode. Accuracy will improve, especially when measuring the cross-sectional area (CSA) with the Caliper method.
2. Press the [Measurement] button on the touch panel.
3. Select [FV (Vein)] from the measurement menu.
4. Measure for an appropriate interval with the Doppler Trace method.
5. Press the [Caliper] key.
6. Measure the cross sectional diameter (CSD) or cross sectional area (CSA).
The flow path cross-sectional area (CSA) and blood flow volume are displayed.

Example of Measurement Results Display

FV (Vein)	
1MnV:	
. cm/s	Mean velocity

2CSA: cm ²	Cross-sectional area
CSD: cm	Cross-sectional diameter
FV: ml/m	Blood flow volume per minute
COEF: 1.00	Coefficient

Reference information

2.2.4(1) FV (Artery) MnV on page 69

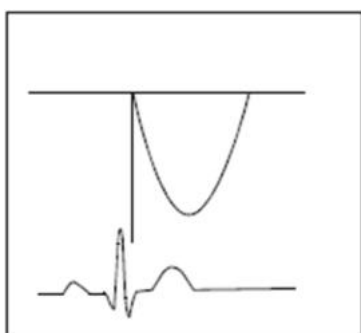
(4) Blood Flow Volume Measurement: SV/CO

Calculates the blood flow volume (SV, CO) in the pulsatile blood flow waveform from the velocity time integral value of one heartbeat (VTI), flow path cross-sectional area (CSA) and the heart rate.

- Setting for the method for measuring the cross-sectional diameter (CSD) or cross-sectional area (CSA)

Procedure

- Display the B/D mode image and freeze it.
To improve measurement accuracy
Expand the cross-section image in the B mode. Accuracy will improve, especially when measuring the cross-sectional area (CSA) with the Caliper method.
- Press the [Measurement] button on the touch panel.
- Select [SV/CO] from the measurement menu.
- Use the Auto Trace or Manual Trace to trace the blood flow waveform for an interval of one heartbeat.
The trace line and the line cursor for heartbeat measurement are displayed.



- Press the [Enter]key.
When no ECG is displayed
Measure the heartbeat.

6. Measure the cross sectional diameter (CSD) or cross sectional area (CSA).
The blood flow volume (SV, CO) is displayed.

Example of Measurement Results Display

SV/CO		
1VTI:	cm	:Velocity time integral
2HR:	BPM	:Heart rate (1 beat)
3CSA:	cm ²	: Cross-sectional area
CSD:	cm	:Cross-sectional diameter
SV:	ml	: 1 stroke volume
CO:	l/m	: Cardiac output

Reference information

2.2.4(1) FV (Artery) MnV on page 69

2.2.5 B/Flow Mode

The measurements that can be made in B/Flow mode include measurement of the blood flow volume.

(1) Blood Flow Volume Measurement: Flow Profile

This function makes it easy to measure the blood flow volume of the tubular peripheral vascular system (including the carotid artery) with good reproducibility. These measurements can be applied to the peripheral vascular system throughout the body. It is not applicable to non-circular vessels such as veins or for measuring blood flow in the heart cavities.

The one-dimensional flow rate profile detected by the Color Doppler method is expanded to a two-dimensional profile. The individual flow values from the two-dimensional profile are multiplied by the areas of the respective micro-area elements to obtain the individual flow volumes, which are totaled in order to quantify the instantaneous blood flow. The blood flow volume which flows for any given time in a region of interest can be calculated with the integration processes of instantaneous blood flow in a longitudinal direction.

The target of this measurement is successive multiple B/Flow images.

If you pay attention to the following points during image acquisition, an improvement in measurement accuracy can be expected.

- Image and blood vessel to be measured
 - A tomographic image of the maximum diameter of the blood vessel and a long axis view with a flow direction that is as uniform as possible
 - The image must be saved in the system in the RGB+Line format.
- Color image display settings

Related items	Description
[Velocity range]	There must be no aliasing caused by the range being too low. Nor must there be any end-diastole frames without color caused by being set too high.

Related items	Description
Wall Filter (Color Flow)	Should be set at the lowest value that ensures unwanted signals are not displayed.
Rejection (Color Flow)	Do not use.
Gain (Color Flow)	Adjust so that the blood vessel lumen is well integrated within the color signal and the interference is not distracting.
[Persistence]	Set at the lowest value
[Line Density (Color Flow)]	Set as high as possible. There is greater error when the frame rate lowers and there are fewer frames for one heartbeat.
[Smoothing]	Set to Off.
[Wall Motion Reduction]	Set as low as possible.

3. Position of the physiological signal waveform display
Set to the bottom of the screen, the same as the factory default.

Procedure

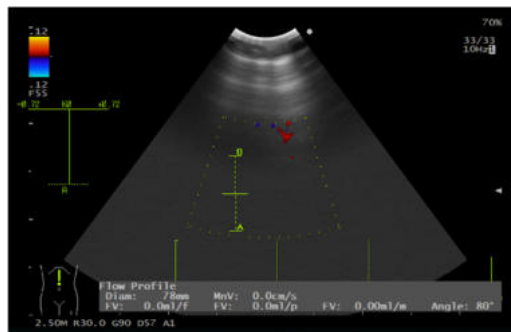
1. Depict a good long axis cross-section image continuing and passing through the center of blood vessel using the normal Color Doppler method, then press [Freeze] key.
2. Set the interval for flow volume measurement.
 - a. If the trackball function display is not on "Playback", press [T.B.F] key.
 - b. Use the trackball to display the start frame and press [Enter] key.
 - c. Use the trackball to display the end frame and press [Enter] key.
3. Press the [Measurement] button on the touch panel.
4. Select [Flow Profile] from the measurement menu.
The mark "A" for the blood flow measurement is displayed on the screen.
5. Set the flow volume profile line.
 - a. Move mark "A" close to the anterior vessel wall.
 - b. Press the [Enter]key.
The profile line A-B is displayed. The position where you initially set A is displayed as B.
 - c. Move mark "A", for measuring the blood flow, close to the back of the posterior vessel wall so that the profile line passes through the center of the blood vessel and is perpendicular to the vascular wall.
A blood flow volume profile graph is displayed on the left side of screen.

Precautions when setting profile lines

Pay attention to the following points when setting profile lines to increase measurement accuracy.

- Align the profile line A-B bar with the anterior and posterior vessel wall. Refer to the diagram below.
 - Do not include other vessels on the profile line (color information)
6. Press the [Enter]key.

The blood flow volume "FV" (ml/p) and the minute blood flow (ml/m) volume corresponding to the target are displayed. The flow volume change curve is displayed at the bottom of the screen.



- (1) Profile line A-B
- (2) Flow volume profile graph
- (3) Flow volume change curve
- (4) Search mark

7. If necessary, reset the arbitrary section flow volume.
 - a. Use the trackball to move the search mark to the initial frame of the flow volume change curve.
 - b. Press the [Enter]key.
 - c. Move the search mark to the end frame position of the flow volume change curve.
The blood flow volume corresponding to the set sector is displayed.

Example of Measurement Results Display

Flow Profile		
Diam:	mm	:Internal vessel diameter on the profile line
MnV:	cm/s	:Mean blood flow velocity on the profile line between A-B
FV:	ml/f	:Blood flow volume corresponding to 1 frame
FV:	ml/p	:Blood flow velocity of the specified segment
FV:	ml/m	: Blood flow volume per minute
Angle:	°	:Angle between the ultrasound beam and flow direction at the center of the blood vessel

If the flow volume being measured is low, the volume tends to be slightly overestimated due to the impact of the flow filter.

Where low speed components are suppressed by the filter, the average flow rate value tends to be higher than the real value. When an average flow rate value is high, there is little effect, even if low speed components are suppressed, but the effect becomes evident when an average flow rate is low. For this reason, the tendency to overestimate the flow rate becomes apparent in low flow rate conditions.

2.2.6 Editing Basic Measurement Results

Up to 10 measurements results can be displayed with basic measurements. These measurements results can be corrected and sent to applied measurements.

(1) Modifying and Remeasuring Basic Measurement Results

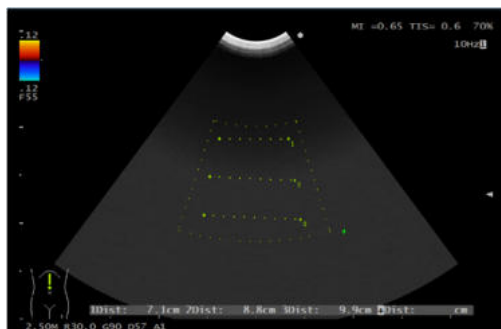
The following presets have to be made:

- Assign [Sel Ch] to the [Meas] tab in the function menu.

Use the measurement preset ([SW Assignment > Touch Panel SW Assignment]) to set this function.

Procedure

1. Select [Cancel] if the caliper mark is displayed.
2. Select [Sel Ch] from the [Meas] tab in the function menu.
The measurement results are highlighted.



3. Select measurement results you wish to correct or delete.
The selected measurement results are deleted.
The caliper mark for taking new measurements is displayed. If you continue and remeasure as is, that number is displayed with the measurement results.

(2) Deleting Caliper Marks

The caliper mark and the measurement results are erased from the screen.

Procedure

1. Select [Clear] from the [Meas] tab.
2. Press the [Measurement] button on the touch panel.
3. Unfreeze the image.
If Caliper Auto Off is set to [ON] for a given measurement, the caliper mark and the measurement results are erased.
Basic measurements can be configured with the measurement preset ([Create Measurement Tools > Basic Measurement > Caliper Auto Off]). Applied measurements can be configured with the measurement preset ([Create Measurement Tools > Application Measurement> Caliper Auto Off]).

(3) Transferring Basic Measurement Results to Applied Measurements

This is for using the results from basic measurements as the parameters for applied measurements.

Prior confirmation

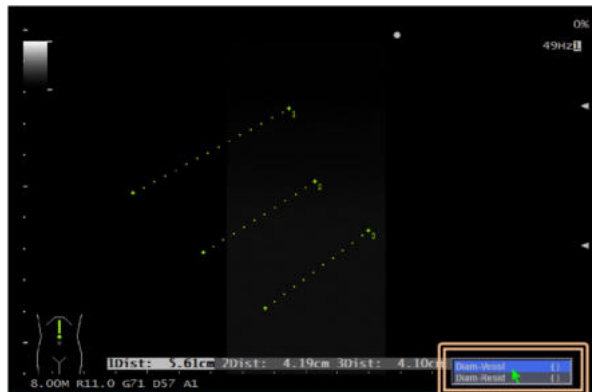
The following presets have to be made:

- Assign [Transfer] to the [Meas] tab in the function menu. Use the measurement preset ([SW Assignment > Touch Panel SW Assignment]) to set this function.

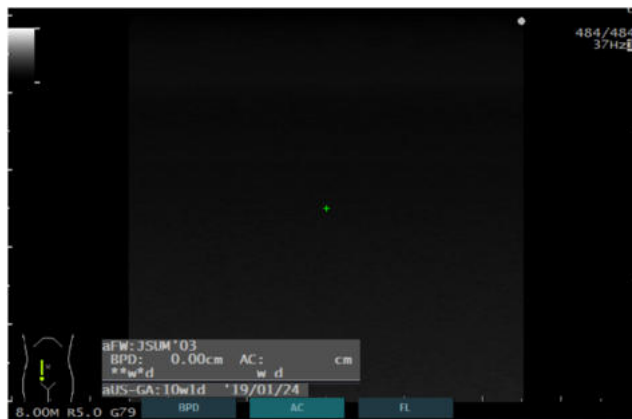
- Set the measurements that can be transferred.
Use the measurement preset ([Study Assignment > (Study Name) > Transfer List Assign]) to set this measurement.
- Assign [Transfer Menu Auto Display] to the function menu using preset ([Preset Set-Up Menu > Menu-Function]) for transferring Menu-Function/>Real Time Doppler Auto Trace to applied measurements.

Procedure

1. Press the [Caliper] key to start basic measurement.
2. Select [Transfer] from the [Meas] tab in the function menu.
3. Select the basic measurement results you wish to transfer.



4. Select applied measurement items for the transfer destination from the transfer destination list, and then transfer the measurement results.



To transfer Real Time Doppler Auto Trace

Select [Transfer Menu Auto Display] from the function menu and then select the applied measurement parameters for the transfer destination.

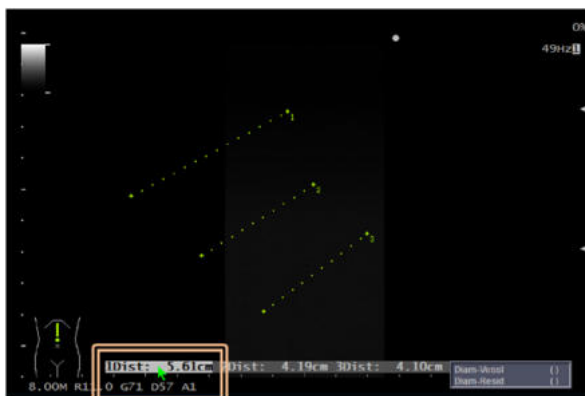
5. Repeat steps 2 to 4 as needed, to transfer other basic measurement results.

Retaking Applied Measurements

When measurements have been completed, or when basic measurement results have been transferred to applied measurements, the measurements can be redone using these measurement results.

1. Select the applied measurement you wish to remeasure.

The measurement results are displayed in the parameters that have been measured. If there are any unmeasured parameters remaining, the parameter selection menu opens.



If all parameters have been measured, then just the measurement results are displayed.

2. Retake the measurements.

- a. If all the parameters have been measured, Press [Measurement] key.
The measurement parameters selection menu opens.
- b. Operate [Pointer] rotary encoder to move the highlight and press the [Enter] key.
To remeasure Real Time Doppler Auto Trace
Select ([Trace]) from the Measurement menu. When [Trace] is selected, the Real Time Doppler Auto Trace and trace line are erased.
- c. Measure those items.

2.2.7 Presets

Preset configuration is common across all applications (clinical fields). For the sake of explanation, the abdomen is used here.

The measurement presets consist broadly of the following 3 elements:

- Create Measurement Tools
Makes settings related to measurement method, mark size, report display, and so on, for basic measurements and for applied measurements.

Basic Measurement	Sets the basic measurement method, mark style and result display items.
Measured Method & Display Items	Sets the measurement method, mark style, and result display items, for each measurement type.
B.Mode	B mode measurement settings.
M.Mode	M mode measurement settings.
D.Mode	D mode measurement settings.
F.Mode	F mode measurement settings.
Caliper Mark Control	Measurement mark size and dot line settings.
Unit Selection	Display unit settings for taking measurements.
Caliper Auto Off	Settings for automatically erasing measurement marks and results when the image is unfrozen.

Display Form	Settings for the basic measurement result display style.
Mark Display	Settings for caliper mark display.
Application Measurement	Sets the application measurement method, mark style, and result display.
Measured Method & Display Items	Sets the measurement method, mark style, and result display items, for application measurements.
Caliper Mark Control	Settings for application measurement mark sizes and dot lines. *1
Unit Selection	Settings for application measurement mark sizes and dot lines. *1
Caliper Auto Off	Settings for automatically erasing measurement marks and results when the image is unfrozen.
Report Data	Selects the method of displaying measurement values in reports.
Display Form	Settings for the applied measurement result display style.
Mark Display	Settings for caliper mark display.
Users' Calculation	Settings for the applied measurement result display style.
Reserved Word	Settings for index names (reserved words) registered by the user.

*1.

Application (clinical field) is not displayed under Other.

- Study Assignment

Settings for configuring the display of reports, transfer lists and menus, at the study level.

Defined Study Name	
Menu Assign	Function for creating and editing measurement menus.
Combined Report Display*1	Settings for the information presented in reports.
Transfer List Assign*1	Sets the basic measurement results that can be transferred to applied measurement items
Other	Settings for the display of measurement operational guide messages.

*1.

Application (clinical field) is not displayed under Other.

- SW Assignment

Assigns measurement functions to menu items.

SW Assignment	Sets the measurement function to start when a specific menu item is selected.
Touch Panel SW Assignment	Sets the functions to be assigned to [Meas] tab on the function menu.
+Mark Key Assignment	Sets the measurement function to start when [Caliper] is selected.

NOTE: The HOME button is not available when the Preset screen is displayed.

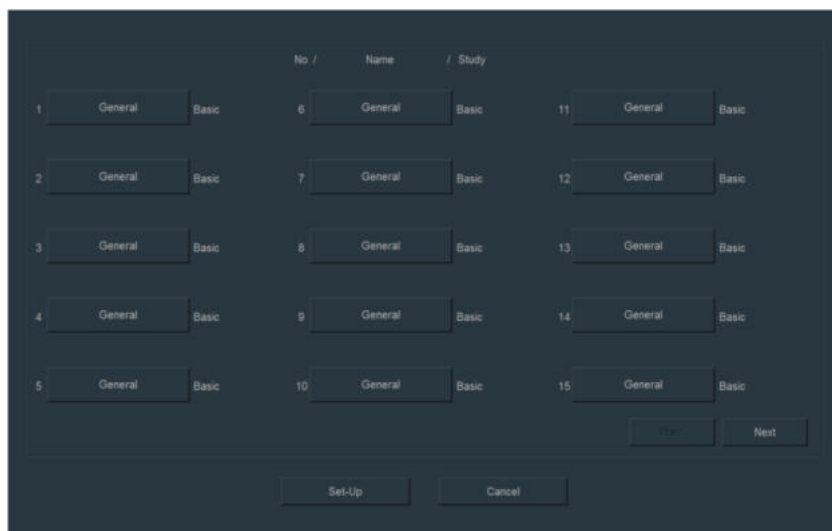
(1) Displaying Presets

There are two methods for displaying presets.

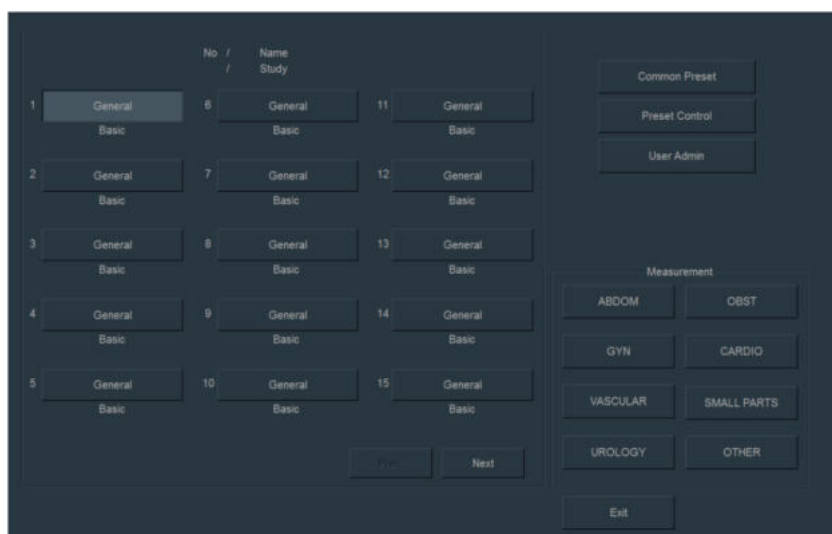
(a) Displaying Presets from the Function Menu.

Procedure

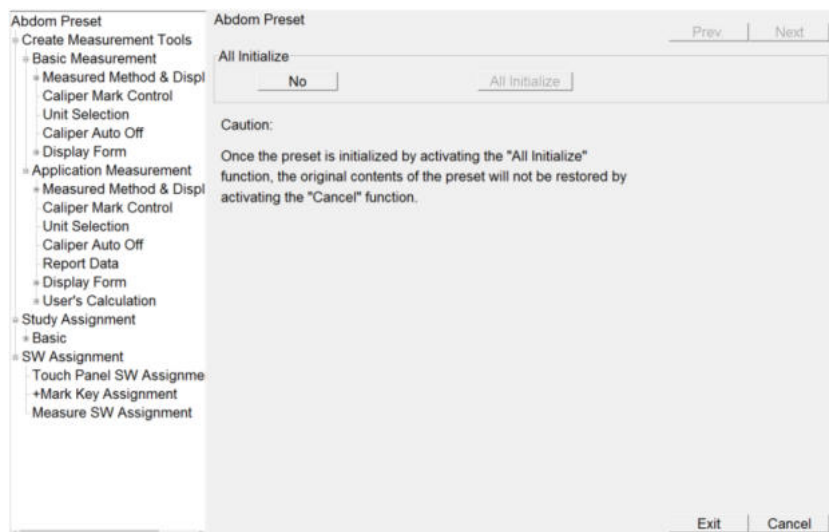
1. Select [Preset] from the [Accessories]]tab in the function menu.
The Preset screen opens.



2. Select [Set-Up].



3. Select an application from the Measurement list.
The top page is displayed.
If you select [ABDOM], the top page of the Abdom Preset opens:



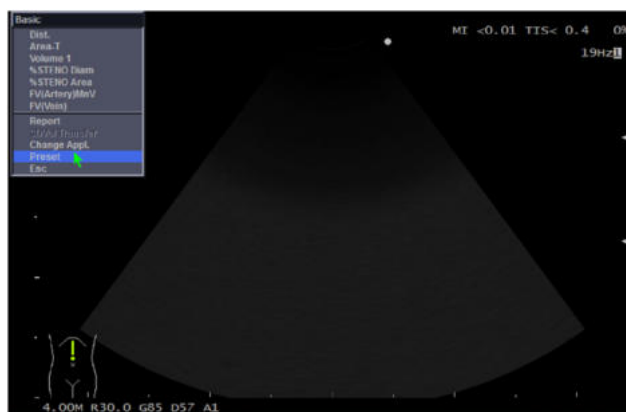
Buttons that are common to all Preset screens:

[Cancel]	Discards changes and closes the Preset screen.
[Exit]	Saves changes and closes the Preset screen.
[Next]	Goes to the next page.
[Prev.]	Goes to the previous page.

(b) Selecting Presets from the Measurement Menu.

Procedure

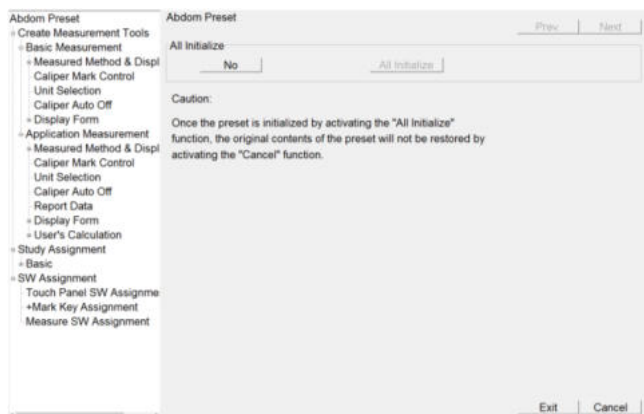
1. Press the [Measurement] button on the touch panel.



2. Select [Preset] from the measurement menu.

(2) Initializing presets

Returns the measurement application presets to their factory settings.



Top Page (Abdom Preset)

Procedure

1. Select the name of an application from the tree view on the left side of the presets screen.
The top page of the measurement preset is displayed.
2. Select [No] from the All Initialize field.
3. Select [All Initialize] when the "No" changes to "Yes".
All the presets of that measurement application are initialized.
Once presets are initialized, it is not possible to restore to the previous state, even by selecting [Cancel].

(3) Measurement-related Settings: Create Measurement Tools

Settings related to measurement methods, mark size, report display, and so on.

Create Measurement Tools are divided between basic measurements (basic measurement settings) and application measurements (applied measurement settings). Each type of measurement contains the following items.

Preset Items	Preset content
Measured Method & Display Items	Measurement methods and result display settings
Caliper Mark Control	Caliper mark display settings
Unit Selection	Result display unit settings
Caliper Auto Off	Display setting for measurement results and caliper marks after freeze is canceled
Report Data	Report display settings (Application Measurement only)
Display Form	Display settings for measurement results, and for caliper marks during measurement
Users Calculation	User index calculation formula settings (Application Measurement only)

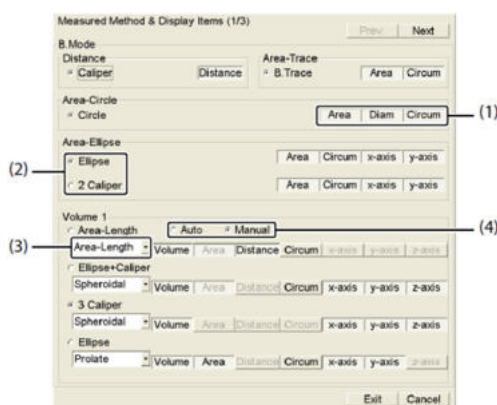
The Basic Measurement top page has the following settings.



Copy From	Copy to Application list
Copy	Batch copies the basic measurement settings for the application selected with Copy From.

(a) Measurement Method and Results Display Settings: Measured Method & Display Items

Settings for measurement methods, caliper mark auxiliary line display, and report display. There are settings pages for each mode, as well as for both basic measurements and applied measurements.



(1) Measurement results display settings

Options	Display example	Description
ON	Area	Displays data as measurement results
ON	Area	Does not display as measurement results.

(2) Measurement method settings

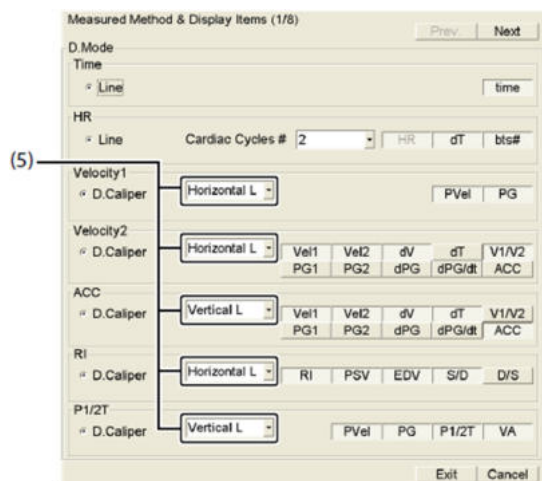
(3) Equation settings

(4) Measurement method auto/manual setting

Measurement parameters	Options	Description
Area-Length	Auto	Once 3 points are specified for the boundary region, it automatically traces it.
	Manual	Trace the boundary from the start point.

Measurement parameters	Options	Description
D mode measurement	Auto	Once the trace range is specified, it automatically traces along the Doppler waveform.
	Manual	Trace along the Doppler waveform from the start point.
Flow Profile Measurement Specify Wall Position	Auto	Automatically recognizes the interior wall of a blood vessel for the specified segment.
	Manual	Manually set the wall of the blood vessel.

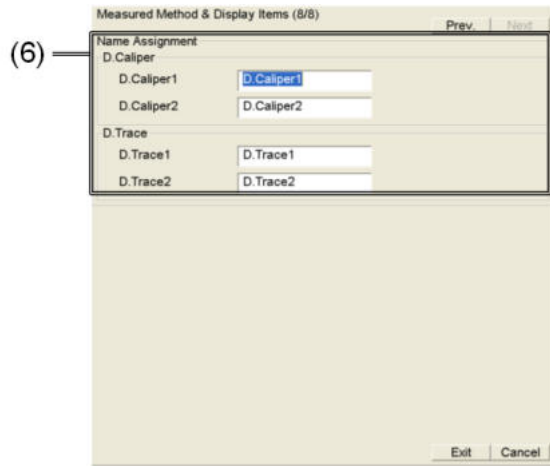
(5) Caliper mark auxiliary line settings



Options	Display example	Description
Horizontal L		Displays an auxiliary line parallel to the horizontal axis.
Vertical L		Displays an auxiliary line parallel to the vertical axis.
Line		Displays a line parallel to the vertical axis. Does not display the caliper marks.
Cross Line		Displays auxiliary lines parallel to both the vertical and horizontal axes.
Cross Point		Does not display auxiliary lines.

(6) Measurement name settings: Name Assignment

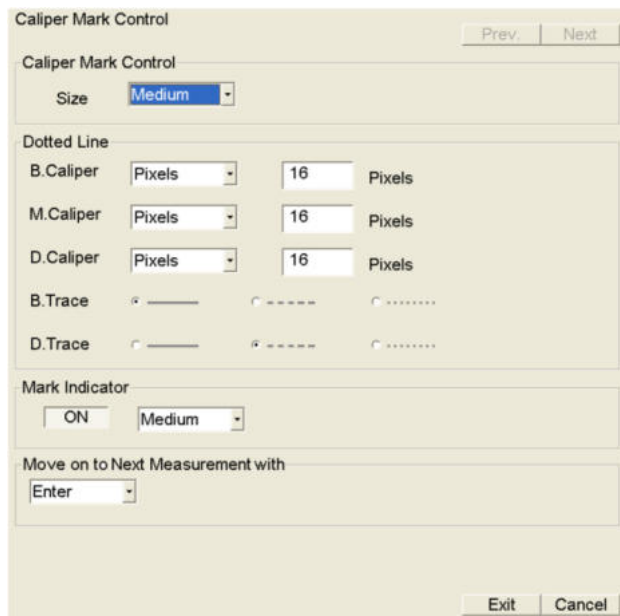




Changes the names of measurements built into the system. Names can be set up for the various application measurements, such as arterial blood flow, etc.

(b) Caliper Mark Display Settings: Caliper Mark Control

Settings for measurement mark size, dotted line display patterns, etc.



Caliper Mark Control

Sets the size to display the measurement mark (caliper mark).

Setting item	Options	Description
Size	Small	Displays small caliper marks.
	Medium	Displays medium caliper marks.
	Large	Displays large caliper marks.

Dotted Line

Settings for the line that connects the caliper mark start and end points. Make settings separately for caliper marks and for trace lines.

B Caliper, M Caliper, D Caliper

Options	Display example	Description
mm		(B mode only) Displays the line between the start and end points with a dotted line. Sets the space between points in mm units.
Pixels		Displays a dotted line between the start and end points. Set the space between points in pixel units.
Line		Displays the line between the start and end points with a straight line.
NA		Does not display any line between the start and end points.

Settings	Options	Description
B Trace D Trace		Displays a line between the start and end points.
		Displays a broken line between the start and end points.
		Displays a dotted line between the start and end points.

Mark Indicator

Options	Display example	Description
ON		Displays the measured number to the lower right of the caliper marks (corresponding to the measurement result).
OFF		Displays only the caliper marks.
Small		Displays the measurement number in a small size font to the lower right of the caliper marks.
Medium		Displays the measurement number in a medium size font to the lower right of the caliper marks.

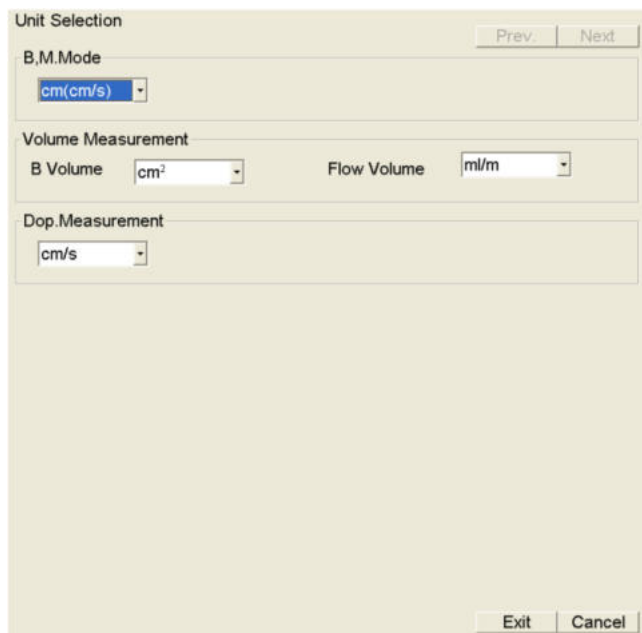
Move on to Next Measurement With

Options	Description
Enter	When you press [Enter] key, the position of the caliper mark is confirmed.
Enter & +	When you press [Enter] key, the active area of the caliper mark is switched (enables the other end to be modified).

(c) Display Unit Settings for Measurement Results: Unit Selection

Sets the units for displaying measurement results.

Select the display units from the list for both basic measurements and application measurements.



Unit Selection

Prev. Next

B,M.Mode
cm(cm/s)

Volume Measurement
B Volume cm² Flow Volume ml/m

Dop.Measurement
cm/s

Exit Cancel

(d) **Caliper Mark and Measurement Result Display Settings for When Freeze Is Canceled: Caliper Auto Off**

Sets whether to show or hide caliper marks and measurement results when freeze is canceled.

The options differ between basic measurements and applied measurements.

Basic Measurement



Caliper Auto Off

Prev. Next

Basic Meas.
OFF ON ON:Active

Volume 1
OFF ON ON:Active

Volume 2
OFF ON ON:Active

Rt/Lt Hip J Angle
OFF ON

Angle
OFF ON ON:Active

F Volume
OFF ON ON:Active

SV/CO
OFF ON ON:Active

Search Clear
Area-Length OFF SP Simpson OFF BP Simpson OFF

Exit Cancel

Application Measurement



Caliper Auto Off (1/6)

Prev. Next

Gallbladder
OFF ON All Mark Erase Remain Active Mark

Liver
OFF ON All Mark Erase Remain Active Mark

Pancreas
OFF ON All Mark Erase Remain Active Mark

Renal Volume
OFF ON All Mark Erase Remain Active Mark

SOL
OFF ON All Mark Erase Remain Active Mark

Exit Cancel

Basic Measurement

Settings	Options	Description
Measurement parameters	OFF	Keeps displaying caliper marks and measurement results even after freeze is canceled.
	ON	Clears the display of caliper marks and measurement results when freeze is canceled.
	ON:Active	Clears the caliper marks of the active image and measurement results.

Settings	Options	Description
Search Clear	ON	Clears caliper marks when using image search.
Area-Length	OFF	Leaves caliper marks displayed when using image search.
SP Simpson		
BP Simpson		

Application Measurement

Setting item	Options	Description
Measurement parameters	OFF	Keeps displaying caliper marks and measurement results even after freeze is canceled.
	ON	Clears the display of caliper marks and measurement results when freeze is canceled.
	All Mark Erase	Clears all caliper marks when freeze is canceled.
	Remain Active Mark	Clears all caliper marks other than those currently active when freeze is canceled.

(e) Report Display Settings: Report Data

Settings for the measurement results to be displayed in reports.

NOTE: It is not for basic measurements, or for applied measurements that cannot display reports.

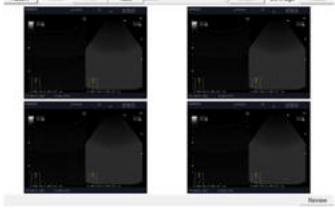
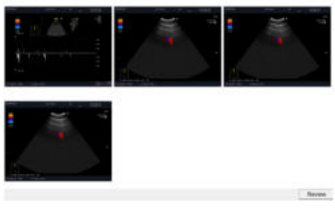
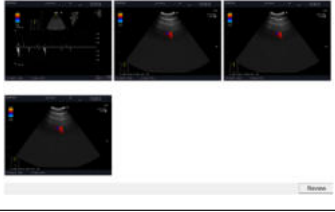
Settings	Options	Description
Display Data	Current	Displays the latest measurement results.
	Average	Displays average values for measurement results.

Settings	Options	Description
Transfer from Report Data	ON	Transfers data from reports to other measurement parameters.
	OFF	Does not transfer data from reports to other measurement parameters.
Storage Data Number	1 to 6	Sets the number of measurement results to display in the report if the same measurement is performed repeatedly.
Save Wave Trace	ON	Saves Doppler waveform trace lines.
	OFF	Does not save Doppler waveform trace lines.

Pasted US Image Screen

Sets the display conditions of ultrasonic images in reports.

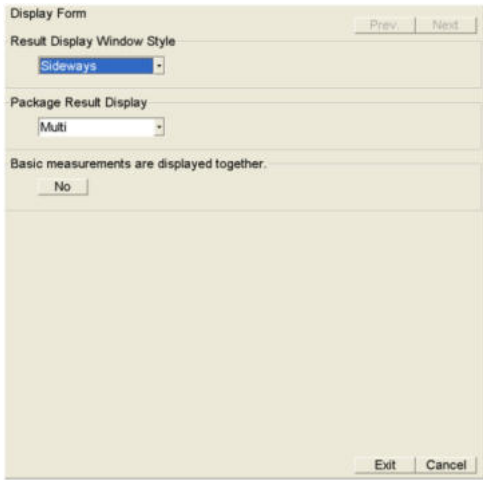
- Display Pasted US Image Form on the Screen
Settings for the layout of ultrasonic images displayed in reports. (Refer to the following.)

Options	Display example	Description
1X1		Displays one image on the report screen.
2X2		Displays images on the report screen in two rows x two columns.
3X2		Displays images on the report screen in three rows x two columns. In the example shown, there are 4 images.
3X3		Display images on the report screen in three rows x three columns. In the example shown, there are 8 images.

- Automatically be Displayed US Images Number
Sets the number of images to display in the US Image Block of reports.

(f) Measurement Results Display Setting: Display Form

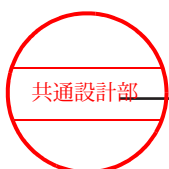
Sets the orientation to show measurement results.

Basic Measurement	
Application Measurement	

Settings	Options	Description
Results Display Window Style	Sideways	Displays measurement results sideways.
	Lengthwise	Displays measurement results lengthwise.
Package Result Display	Multi	Displays multiple measurement results.
	Single	Displays only the current measurement result.
Basic measurements are displayed together	No	Displays only basic measurement results or applied measurement results.
	Yes	Displays both basic measurement results and application measurement results.

Mark Display

Sets to show caliper marks during measurement.



Settings	Options	Description
Basic measurement items	Mark Display	Displays all caliper marks.
Application measurement items	Mark Active	Displays only the caliper marks currently used for measurement.

(g) User Index Formula: User's Calculation

This function is for creating measurement packages consisting of index calculation formulas that combine basic functions, such as distance, area, and flow velocity.

Up to four index formulas can be combined in one measurement package.

User index formulas (U-Calc.1 to U-Calc.30) can be created for each application.

Measurement parameters can be combined into formulas for calculating indices for each application on the system. Reserved words registered in advance by the user can be used for creating multiple formulas.

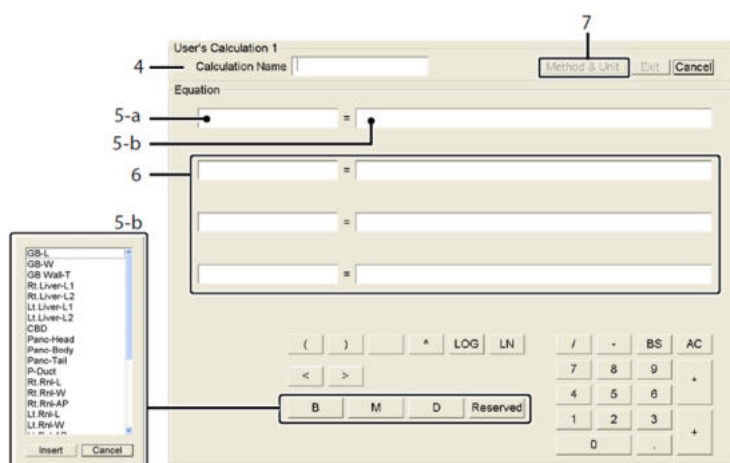
Settings	Options	Description
Equation Program	Create User's Calculation	Create measurement packages for index calculation.
	Delete User's Calculation	Deletes measurement packages and user index calculation equations.
User index calculation formula	U-Calc.1 to U-Calc.30	Select a user index calculation formula you want to create or delete. If there is a registered index calculation formula name, it is displayed.

Deleting User Index Calculation Formulas

1. Display [User's Calculation].
2. Select [Delete User's Calculation].
3. Select the index calculation to delete.

Registering User Index Calculation Formulas

1. Display [User's Calculation].
2. Select [Create User's Calculation].
3. Select index calculation formula to register.
An Equation input dialog box opens.



4. Enter the Calculation Name.
5. Input the first equation.
 - a. Use keyboard input for the left side of the first formula (answer variable), in up to 12 characters.
Input rules for the left side
 Input the first character with an alphabetic character. After that, alphanumeric characters can be input.
 - b. Input the right side of the first equation (the calculation equation), using up to 180 characters. Alternatively, input by selecting from a list of operators.
Input rules for the right side
 Input variables with up to 13 characters. Input constants with up to 20 characters.

When inputting measurement item names for applied measurements, or user-registered measurement names (reserved words)

Reserved word are measurement names for applied measurements, or user-registered measurement names.

I) Select from [B], [M], [D], [Reserved]. The list that can be registered is displayed.

II) Select measurement items from the list.

6. Input the second and subsequent equations in the same way as the first.

When using the left side of the above equations as the calculation formula

Enclose the left side with < >. Example: First equation "A"="B+C", 2nd equation <"D"="D"="<A>/F"

7. After inputting all equations, select [Method & Unit].
Method & Unit is displayed.

8

Variable	Display	Unit
ABC	ON	cm
FGH	ON	Type-in mm
	ON	
	ON	

9

Order	Variable	Mode	Method	Parameter	Unit
1	D	B	Area-T	Area	cm²
2	E	B	Volume-3	Vol.	cm³
3	J	M	M.Length		cm
4	K	D	D.Caliper1	v1	cm/s

8. Set the answer variables.

a. Set the Display field to On to display the answer variable. Set the field to Off to avoid displaying it.

b. Selecting the units for answer variables from the Unit list.

Setting units that are not in the list.

Select "Type-in" from the Unit list. Enter up to 5 characters in the unit field displayed on the right.

9. Make settings for measurement variables.

a. Select measurement sequence from the Order list.

b. Select measurement mode from the Mode list.

c. Select measurement method from the Method list.

d. Select parameters to use if there are multiple parameters for the measurement method.

10. Select [Exit].

The calculation is then registered.

Methods and Parameters Used in User Calculations

B mode Method	Parameter	Meaning	Unit
Dist	No options	Distance	cm
Area-T	Area	Area	cm ²
	Circ	Circumference	cm
Area-C	Area	Area	cm ²
	Circ	Circumference	cm
	Diam	Diameter	cm
Area-E	Area	Area	cm ²
	Circ	Circumference	cm
	x-ax	x-axis	cm
	y-ax	y-axis	cm
Volume-3 (3 caliper)	Vol.	Volume	cm ³
	x-ax	x-axis	cm
	y-ax	y-axis	cm
	z-ax	z-axis	cm
Volume-AL (Area-Length)	Vol.	Volume	cm ³
	Area	Area	cm ²
	Circ	Circumference	cm
	Dist	Distance	cm
Volume-EC (Ellipse-Caliper)	Vol.	Volume	cm ³
	Area	Area	cm ²
	Circ	Circumference	cm
	x-ax	x-axis	cm
	y-ax	y-axis	cm
	z-ax	z-axis	cm
Volume-E (Ellipse)	Vol.	Volume	cm ³
	Area	Area	cm ²
	Circ	Circumference	cm
	x-ax	x-axis	cm
	y-ax	y-axis	cm
Type-in	-	-	Input from the keyboard

M Mode Method	Parameter	Meaning	Unit
M Length	No options	Distance	cm
Time	No options	Time	s
Heart rate	No options	Heart rate	BPM
M.VEL	v	Velocity	cm/s
	dD	Distance	cm
	dt	Time	s

M Mode Method	Parameter	Meaning	Unit
Type-in	-	-	Input from the keyboard

D Mode Method	Parameter	Meaning	Unit
Time	No options	Time	s
Heart rate	No options	Heart rate	BPM
D.VEL	No options	Velocity	cm/s
ACCEL	v1	Velocity1	cm/s
	v2	Velocity2	cm/s
	dt	Time	s
	ACC	Accel	cm/s ²
RI	RI	Resistance Index	
	PSV	Peak Systolic Velocity	cm/s
	EDV	End Diastolic Velocity	cm/s
	S/D	S/D Ratio	
P1/2T	No options	Pressure half time	s
D.Caliper 1 and 2	v1	Velocity1	cm/s
	v2	Peak Systolic Velocity	cm/s
	dv	V1 - V2	cm/s
	dt	Time	s
	PG1	Peak pressure gradient 1	mmHg
	PG2	Peak pressure gradient 2	mmHg
	dPG	PG1 - PG2	mmHg
	ACC	Acceleration	cm/s ²
	P1/2T	Pressure half time	s
	VA	Valve Area	cm ²
Mean VEL	MnV	Mean Velocity	cm/s
	VTI	Velocity Time Integral	cm
PI	PI	Pulsatility Index	
	RI	Resistance Index	
	S/D	S/D Ratio	
	PSV	Peak Systolic Velocity	cm/s
	EDV	End Diastolic Velocity	cm/s
	MnV	Mean Velocity	cm/s
	Vm	Mean Velocity	cm/s

D Mode Method	Parameter	Meaning	Unit
Steno Flow Regurg Flow D.Trace1,2	PI	PI	Pulsatility Index
	RI	RI	Resistance Index
	PSV	Peak Systolic Velocity	cm/s
	EDV	End Diastolic Velocity	cm/s
	MnV	Mean Velocity	cm/s
	PG1	Peak pressure gradient 1	mmHg
	PG2	Peak pressure gradient 2	mmHg
	MPG	Mean pressure gradient	mmHg
	VTI	Velocity Time Integral	cm
	ACC	Acceleration	cm/s ²
	FlowT	Flow Time	s
	dt	Time	s
	AccT	Acceleration Time	s
Type-in	-	-	Input from the keyboard

Registration of Reserved Words: Reserved Word

This function sets the variables (reserved words) used in the user's calculation under Reserved Word. Up to 60 words can be set. Reserved words are measurement names for applied measurements, or user-registered measurement names.

The reserved words for a preset are those reserved words that are registered by the user because they do not exist in the applied measurement items.

NOTE: The measurement item names and measurement methods for applied measurements cannot be registered or changed.

Settings	Display example	Description
Reserved Word Registration	Create Reserve word	Creates a reserved word.
	Delete Reserve word	Deletes a reserved word.

Settings	Display example	Description
(Edit reserved words)	Reserved Word 1	Selects reserved words to create or delete. If there are any reserved words, they are displayed.

- Deleting registered reserved words
 - a. Display the [Reserved Word] for the preset.
 - b. Select [Delete Reserved Word].
 - c. Select reserved words to delete from the list.
- Setting reserved words
 - a. Display the [Reserved Word] for the preset.
 - b. Select [Create Reserve word].
 - c. Select reserved words to set.

- d. Use the keyboard to enter up to 7 digits for the name of the Variable.
- e. Select mode for finding the variables from Mode.
- f. Select the measurement method from Method.
- g. Up to four measurement items for use in User's Calculations can be selected under Parameter.
The words that can be used as reserved words are listed in the Reserved Name list.

(4) Study Assignment

Study Assignment is used to make settings for each ultrasound examination study.

Preset items	Preset content
Study Assignment	Registers, deletes or copies new studies.
Basic (Defined study name)	Displays the selected study content for [Menu Assign], [Combined Report Display] and [Other] presets.

Preset items	Preset content
Menu Assign	Measurement menu settings.
Combined Report Display	Settings for the information presented in reports.
Transfer List Assign	Sets the basic measurement results that can be transferred to applied measurement items
Other	Measurement operational guide message settings.

(a) Measurement Study Registration and Display Settings: Study Assignment

NOTE: Studies installed on the system cannot be deleted or renamed.

- Registering new measurement studies:
 - a. Input the study name in Select Study field.
 - b. Select the [Enter] key on the virtual keyboard.
- Copying and registering an existing study:
 - a. Input the copied study name in the Select Study field.
The study is registered as a new study if the name does not exist.
 - b. Select a study of a copy source from the Copy from Other Study list.
 - c. Select [Copy].
- Deleting measurement studies:
 - a. Select the study to delete from the Select Study list.
 - b. Select [Delete].
- Setting the studies to display in the menu:
 - a. Select a study to display in the menu from the Select Display Study on the Left Tree View list and then turn it [ON].
 - b. Select a study to hide in the menu from the Select Display Study on the Left Tree View list and then turn it [OFF].

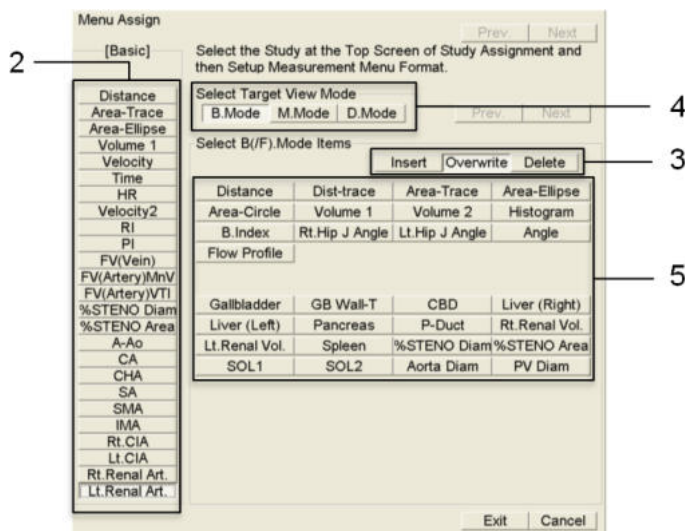
(b) Measurement Menu Settings: Menu Assign

Press [Measurement] button on the touch panel and then set the measurement menus to display.

Adding/swapping Measurement Menus

Procedure

1. Display [Menu Assign] for the set study.



2. Select the menu position to change.
3. Select [Insert], or [Overwrite]
 - [Insert]: Inserts at the menu position selected in step 2. The menus from below where you selected shift down one position.
NOTE: If there is no free space, delete unused menus or use [Overwrite] to replace them.
 - [Overwrite]: The menu selected in step 2 is overwritten.
4. Select the mode for measurement items from the Select Target View Mode field.
5. Select measurement items from Select Mode Items.

Deleting Menus

1. Display [Menu Assign] for the set study.
2. Select the menu position to change.
3. Select [Delete].

(c) Report Display Block Settings: Combined Report Display

Settings for the Block presented in reports.

Item	Block Name	Value
1.	Header Block	15
2.	Site Block	16
3.	Abdom Artery Doppler Block	17
4.	Renal Artery Block	18
5.	%Stenosis Block	19
6.	Abdom Ratio Block	20
7.		21
8.		22
9.		23
10.		24
11.		25
12.		26
13.		27
14.		28

Procedure

1. Display [Combined Report Display] for the set study.
2. Select [▼] on the right side of the change location.
3. Select the report block to set.
To make no setting (leave blank)
Select highest blank space in the list.
4. Repeat steps 2 and 3 to set the composition and display order for the report display.

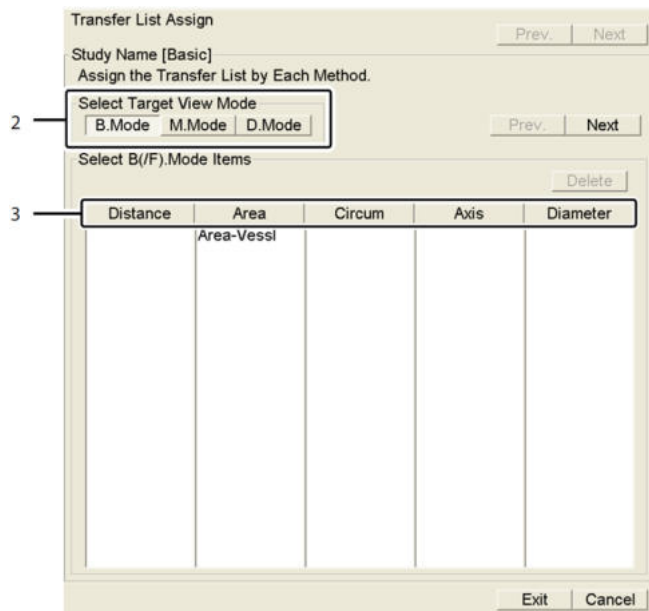
(d) Settings for Transferring Basic Measurement Results: Transfer List Assign

Adds Applied Measurements for the Transfer Destination

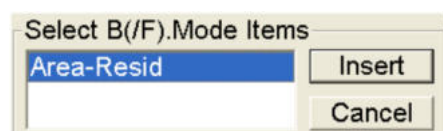
This sets up the basic measurement results that can be transferred to applied measurements that were set up in a measurement menu using the Menu Assign preset.

Procedure

1. Display [Transfer List Assign] for the set study.
2. Select a display mode from Select Target View Mode.



3. Select the basic measurement results you wish to transfer.
The following dialog box opens.

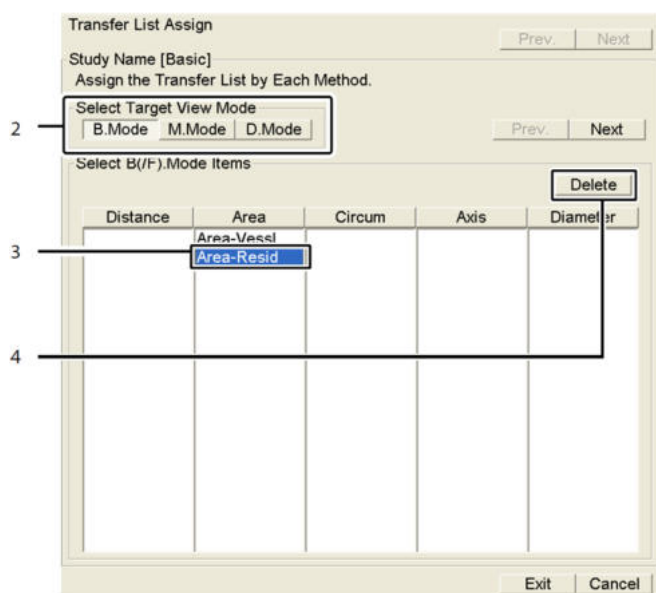


The list contains those applied measurements that were set up in a measurement menu using the Menu Assign preset which can use those basic measurement results.

4. Select the application measurements to be transferred to and then select [Insert].

Deleting Unnecessary Transfer Destinations

Fig.1: Deleting Area Residual from the transfer destination.



1. Display [Transfer List Assign] for the set study.
2. Select a display mode from Select Target View Mode.

3. Select application measurement name.
4. Select [Delete].

(e) Operational Guide Message Settings: Other

Set the display of operational guide messages (assist messages) during measurement.



Settings	Options	Description
Operational guide message display	ON	Displays operational guide messages during measurement.
	OFF	Does not display operational guide messages during measurement.

(5) SW Assignment

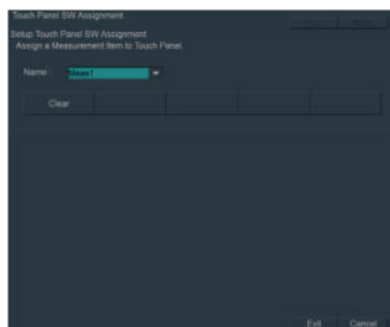
Sets the measurement function to start when a specific menu item is selected. SW Assignment is a setting that is common to all studies within an application.

SW Assignment has the following presets.

Preset name	Assigned to	Settings
Touch Panel SW Assignment	[Meas] tab on the function menu	Reports Presets
+Mark key Assignment	[Caliper] key	Basic measurement menu

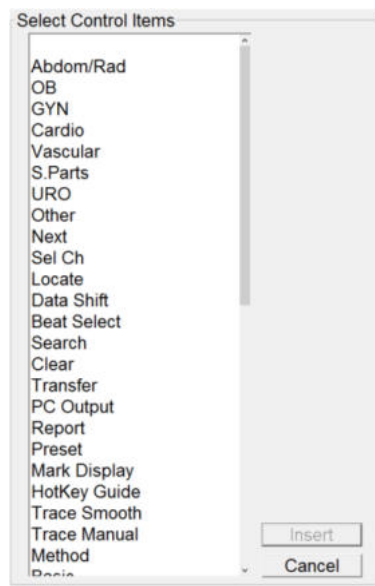
(a) [Meas] Tab Menu Settings: Touch Panel SW Assignment

Assigns functions such as reports, presets, etc. to the [Meas] tab in the function menu.



Procedure

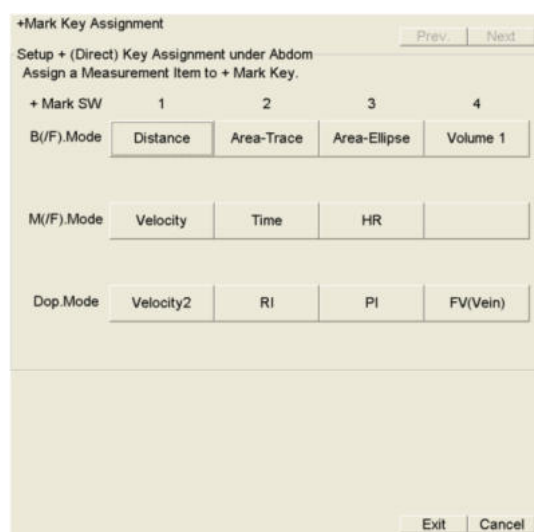
1. Display [Touch Panel SW Assignment].
2. Select the Name from the drop-down list of the page you want to change.
3. Select the menu position to change.
A dialog box is displayed.



4. Select the items to assign from the Select Control Items list.
5. Select the items to assign from the Select Control Items list.
The selected item is highlighted.
6. Select [Insert].

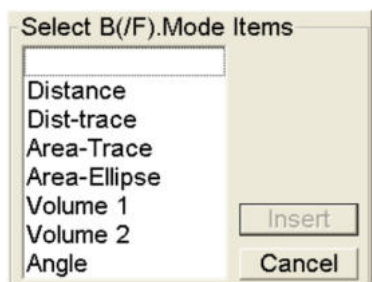
(b) Basic Measurement Menu Settings: +Mark key Assignment

Sets the measurement function to start when [Caliper] key is pressed. Up to four basic measurement menus can be set for each mode.



Procedure

1. Display [+Mark Key Assignment].
2. Select the position to change
The basic measurement list (example of B(F) mode below) is displayed.



3. Select the basic measurement to configure.
The selected basic measurement is highlighted.
4. Select [Insert].

2.2.8 References

(1) Formulas

(a) B mode

Measurement parameters	Formulas
Dist	$\text{Distance} = \sqrt{(X_2 - X_1)^2 + (Y_2 - Y_1)^2}$
Area-E	$\text{Area (cm}^2\text{)} = \pi / 4 \times \text{major} \times \text{minor}$ $\text{Circumference (cm)} = \pi \sqrt{(\text{major}^2 + \text{minor}^2) / 2}$ $\text{Axes (cm)} = \sqrt{(X_2 - X_1)^2 + (Y_2 - Y_1)^2}$
Area-C	$\text{Area (cm}^2\text{)} = \pi / 4 \times \text{Diameter}^2$ $\text{Circumference (cm)} = \pi \times \text{Diameter}$ $\text{Diameter (cm)} = \sqrt{(X_2 - X_1)^2 + (Y_2 - Y_1)^2}$
Volume	$\text{Area-Length} = 0.85 \times \text{Area}^2 / \text{Dist}$ $\text{BP Simpson} = \pi \times H / 4 \sum a_i \times b_i$ $\text{SP Simpson} = \pi \times H / 4 \sum a_i^2$ $\text{dist: max Length, } H = \text{Dist} / 20$ $3 \text{ Caliper} = \pi / 6 \times (x - ax) \times (y - ax) \times (z - ax)$ $\text{Ellipse} = \pi / 6 \times (x - ax) \times (y - ax)^2$ $x - ax > y - ax$
Histogram	$T \text{ (total \# of samples)} = \sum f_i$ $MN \text{ (Average gradation)} = 1/T \sum (X_i \times f_i)$ $S^2 \text{ (Dispersion)} = 1/T \sum (X_i - MN)^2 \times f_i$ $SD \text{ (Standard deviation)} = \sqrt{S^2}$ f_i : Number of pixels of brightness gradation i, X_i : Brightness gradation i, Σ : i = 0 - 63

Measurement parameters	Formulas
Color Histogram	$T = \sum f_i$ $CT = \sum f_i$ CT: Total number of samples of color Doppler, f_i : Number of pixels on flow memory $R = CT / T \times 100$ $A = CT / T \times \text{Area}$ Area: Area of the ROI
B.Index	$A/B = A / B$ $ A - B / A = A - B / A$

(b) M mode

Measurement parameters	Formulas
M.Length	distance (depth) = $Y_2 - Y_1$
M. VEL	Velocity = Distance / dt
Heart Rate	$HR = 60 \times @ / dt \text{ (sec)}$ @: cardiac cycle
M.Index	$A/B = A / B$ $ A - B / A = A - B / A$

(c) D mode

Measurement parameters	Formulas
PG	$PG \text{ (mmHg)} = 4 \times (\text{Peak } V \text{ (m/s)})^2$
P1/ 2T	$P1/2T \text{ (ms)} = V_{\max} \times (1 - 0.707) / (\text{Dec slope})$ $VA \text{ (cm}^2\text{)} = 220 / (P1/2T)$ $P1/2T \text{ (ms)} = t_b - t_a $ D.tracemethod: a: Peak blood flow velocity point, b: $1/\sqrt{2}$ point of peak blood flow velocity
Heart Rate	$HR = 60 \times @ / dt \text{ (sec)}$ @: cardiac cycle
ACCEL	$ACC = (peak V_2 - Peak V_1) / (dT \text{ or } AccT) $
PI, RI	$PI = (PSV - EDV) / MnV $ Must be $ PSV \geq EDV $. $RI = (PSV - EDV) / PSV $ Must be $ PSV \geq EDV $. $S/D = PSV / EDV $

Measurement parameters	Formulas
D.Index	$A/B = A / B$ $ A - B / A = A - B / A$ $MnV (m/s) = \int V(t) dt / FT$ $MPG (mmHg) = (4 / FT) \int V(t)^2 dt$ $VTI (cm) = \int V(t) dt$ $dV = V_2 - V_1 $ $FT (ms) = t_b - t_a$ $dT (ms) = TV_1 - TV_2 $ Time difference between V_1 and V_2 AccT (ms) Time from the trace starting point to the peak blood flow velocity value $ACC (m/s^2) = \text{max velocity} / \text{AccT} $ $\text{AccT}/FT = \text{AccT} / FT$
Flow Volume (MnV)	$FV(MnV) (ml/min) = MnV (cm/s) \times CSA (cm^2) \times 60 (sec) \times COEF$ $= MnV (cm/s) \times \pi/4 \times \text{Diameter}^2 \times 60 (sec) \times COEF$ $FVm(MnV) (ml/min) = Vm (cm/s) \times CSA (cm^2) \times 60 (sec)$ $= Vm (cm/s) \times \pi/4 \times \text{Diameter}^2 \times 60 (sec)$
Flow Volume (VTI)	$FV (ml/beat) = VTI (cm) \times CSA (cm^2)$ $= VTI (cm) \times \pi/4 \times \text{Diameter}^2$ $FV (ml/min) = FV (ml/beat) \times HR (BPM)$
SV/CO	$SV (ml) = VTI (cm) \times CSA (cm^2)$ $= VTI (cm) \times \pi/4 \times \text{Diameter}^2$ $CO (l/min) = SV (ml) \times HR (BPM)$

(2) Terms and Abbreviations

Abbreviation	Meaning	Meaning
%dif	long axis (at end diastole or end systole) length percentage difference	Percentage of difference of the left ventricular long-axis using ap4C and ap2C when performing a BP-Simpson measurement.
ACC	Acceleration	Acceleration
Area	Area	Area
Circ	Circumference	Circumference
CO	Cardiac output	Cardiac output
COEF	Coefficient with Flow volume	Coefficient with flow volume
CSA	Cross sectional area	Cross-sectional area
CSD	Cross sectional diameter	Cross-sectional diameter
D/S	D/S ratio	D/S ratio
dD	difference in distance	Difference in distance
DEC	Deceleration	Deceleration
Diam	Diameter	Diameter
Dist	Distance	Distance

Abbreviation	Meaning	Meaning
dt	difference in time	Difference in time
EDV	End diastolic velocity	End diastolic velocity
Flow T	Flow Time	Flow time
FV	Flow volume	Flow volume
HR	Heart Rate	Heart rate
L	Level	Gradation level, including the most frequent inside the ROI
M	MODE (Most frequent value in a data set)	Pixel count of L
Mn	Mean	Average gradation level of specimen inside the ROI
MnV	Mean velocity	Mean velocity
MPG	Mean pressure gradient	Mean pressure gradient
P1/2T	Pressure half time	Pressure half-time
PG	Peak pressure gradient	Peak pressure gradient
PI	Pulsatility Index	Pulsatility Index
PSV	Peak systolic velocity	Peak systolic velocity
pV	Peak Velocity	Peak velocity
Regurg flow	Regurgitant flow measurement	Regurgitant flow measurement
Regurg flow	Regurgitant flow measurement	Regurgitant flow measurement
RI	Resistance Index	Resistance index
S/D	S/D ratio	Systolic/Diastolic velocity ratio
SD	Standard deviation	Standard deviation
Steno flow	Stenosis flow measurement	Stenosis flow measurement
SV	Stroke volume	Stroke volume
T	Total sampled pixels number in the ROI	Total number in the ROI
VA	Valve area	Valve area
Vm	Mean Velocity	Mean velocity (Mean method)
Vol.	Volume	Volume
VTI	Velocity time integral	Velocity time integral
x-ax	x axis diameter	Long axis diameter
y-ax	y axis diameter	Short-axis diameter
z-ax	z axis diameter	Short-axis diameter



Abdominal Measurements

- 3.1 Abdominal Measurement Overview
- 3.2 Measurement Methods
- 3.3 Reports
- 3.4 Presets
- 3.5 References

3.1 Abdominal Measurement Overview

3.1.1 Abdominal Measurement Menus

The following measurement menus and parameters are available under abdominal measurements.

Table1: B Mode

Measurement name	Menu	Measurement parameters				
Gallbladder measurements	Gallbladder	GB-L	GB-W			
Gallbladder wall thickness measurements	GB Wall-T	GB Wall-T				
Common bile duct measurements	CBD	CBD				
Liver measurements	Liver (Right) Liver (Left)	L1	L2			
Pancreas measurements	Pancreas	Head	Body	Tail		
Pancreatic duct measurements	P-Duct	P-Duct				
Renal measurement	Rt. Renal Vol. Lt. Renal Vol.	Vol.	Rnl-L	Rnl-W	Rnl-AP	
Spleen measurements	Spleen	a	b	SI		
Stenosis percentage measurements	%STENO Diam	Vessel	Resid	%STENO		
	%STENO Area	Vessel	Resid	%STENO		
Space-occupying lesion measurements	SOL1 SOL2	d1	d2	d3	Area	Vol.
Blood vessel diameter measurements	Aorta Diam	Aorta Diam.				
	PV Diam	PV Diam.				

Table2: D mode

Measurement name	Menu	Measurement parameters				
Arterial flow measurements	A-Ao, CA, CHA, SMA, IMA, SA,	PI MnV	RI ACC	S/D AccT	PSV Vm	EDV
Hepatic arterial flow measurements	Rt.HA Lt.HA	PI MnV	RI ACC	S/D AccT	PSV Vm	EDV
Common iliac arterial blood flow measurements	Rt. CIA Lt. CIA	PI MnV	RI ACC	S/D AccT	PSV Vm	EDV
Superior mesenteric arterial blood flow measurements	Pre P.SMA PostP.SMA	PI MnV	RI ACC	S/D AccT	PSV Vm	EDV

Measurement name	Menu	Measurement parameters				
Arterial flow measurements (User settings)	Artery 1 Artery 2 Artery 3	PI MnV	RI ACC	S/D AccT	PSV Vm	EDV
Renal artery measurements	Rt. Renal Art., Lt. Renal Art.	PI MnV Vm	RI ACC	S/D AccT	PSV FlowT	EDV AccT/FT
Portal vein measurements	Main PV, Rt.PV, Lt.PV	pV				
Shunt blood vessel measurements	Pre Shunt PV, Prox Shunt, Mid Shunt, Distal Shunt	pV				

Table3: B/D Mode

Measurement name	Menu	Measurement parameters				
Blood flow volume measurements (for arterial blood flow.)	FV(Artery) Ab MnV	MnV VTI ACC FVm(MnV)	PSV PI AccT/FT CSD	EDV RI S/D CSA	dv FT Vm	dt AccT FV(MnV)
Blood flow volume measurements (for arterial blood flow, peripheral blood vessels)	FV(Artery) Ab VTI	MnV VTI ACC FV(min)	PSV PI AccT/FT CSD	EDV RI S/D CSA	dv FT Vm HR	dt AccT FV(beat)
Steady state blood flow measurements	FV(Vein) Abdom	MnV FV	pV CSD	VTI CSA	AccT	ACC

3.1.2 Abdominal Measurement Studies

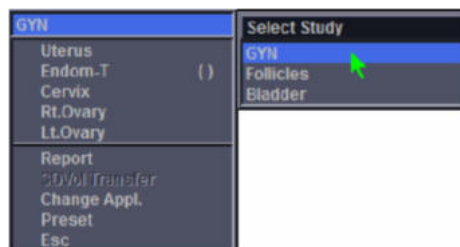
The abdominal measurement study includes Basic study.

(1) Switching the Study

Switches the Study within the same application.

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select the very top (current study name) from the measurement menu.



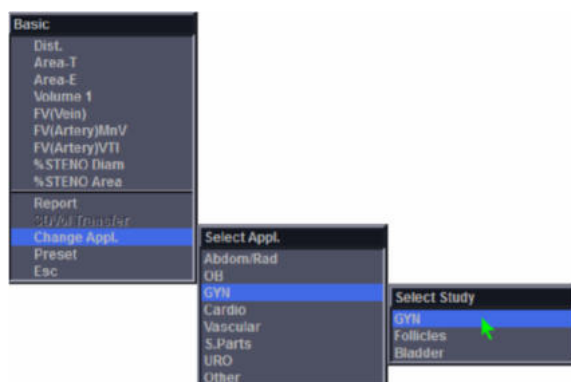
3. Select Study.

(2) Switch the Study Using a Different Application

Switch from a study in a different application to an abdominal measurement study.

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select [Change Appl.].
3. Select the application.
4. Select Study.



Example of menu display: Switching from Basic under Abdomen
Switches to the study of the selected application.

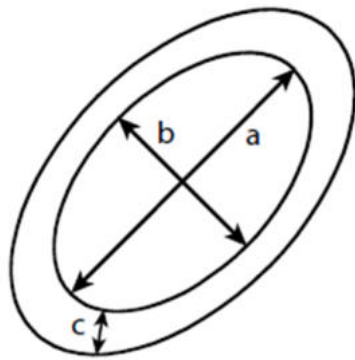
3.2 Measurement Methods

This chapter explains measurement methods

3.2.1 B Mode

(1) Gallbladder Measurements

This function measures the length and width of the vertical cross-section of the gallbladder.



a: Length
b: Width
c: Wall thickness

Procedure

1. Record a tomographic image of the gallbladder in the B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [Gallbladder] from the measurement menu.
4. Measure the Length and Width using the Caliper method.

Example of Measurement Results Display

Gallbladder	
GB-L: cm	: Length of the gallbladder (Length)
GB-W: cm	: Width of the gallbladder (Width)

Reference information

1.2.1 *Caliper Method* on page 27

(2) GB Wall Thickness Measurement

This function measures the thickness of the gallbladder wall.

Procedure

1. Record a tomographic image of the gallbladder in the B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [GB Wall-T]] from the measurement menu.
4. Measure the thickness of the gallbladder wall using the caliper method.

Example of Measurement Results Display

GB Wall-T: cm	: Gallbladder wall thickness
---------------------	------------------------------

Reference information

1.2.1 *Caliper Method* on page 27

(3) CBD (Common Bile Duct) Measurement

This function measures the diameter of the common bile duct.



Procedure

1. Record a tomographic image of the common bile duct in the B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [CBD]] from the measurement menu.
4. Measure the diameter of the common bile duct using the caliper method.

Example of Measurement Results Display

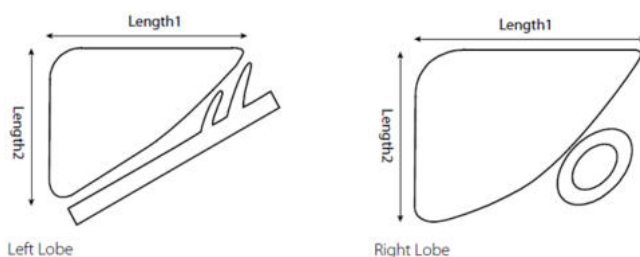
CBD:	cm	: Common bile duct diameter
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Reference information

1.2.1 Caliper Method on page 27

(4) Liver Measurement

This function measures the diameter of the left or right lobe of the liver.



Procedure

1. Record a tomographic image of the right (or left) lobe in the B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [Liver (Right)] or [Liver (Left)] from the measurement menu.
 - Select [Liver (Right)] for the right lobe.
 - Select [Liver (Left)] for the left lobe.
4. Measure Length1 and Length2 using the Caliper method.

Example of Measurement Results Display

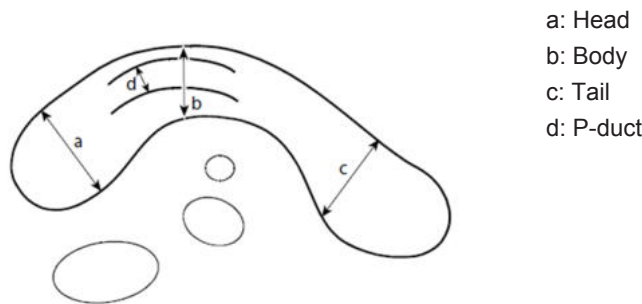
Liver (Right)	Liver (Left)	
L1: cm	L1: cm	: Length 1 of the right or left lobe of the liver (Length1)
L2: cm	L2: cm	: Length 2 of the right or left lobe of the liver (Length2)

Reference information

1.2.1 Caliper Method on page 27

(5) Pancreas Measurement

This function measures the head, body and tail of the pancreas from its cross-section.



Procedure

1. Display a tomographic image showing the head of the pancreas.
2. Press the [Measurement] button on the touch panel.
3. Select [Pancreas] from the measurement menu.
4. Measure the head of the pancreas.
 - a. Measure the Head (a in the figure above) by using the caliper method.
5. Measure the body of the pancreas.
 - a. Measure the Body (b in the above figure) using the caliper method.
6. Measure the tail of the pancreas.
 - a. Measure the Tail (c in the above figure) using the caliper method.

To select the head, body, or tail of the pancreas, use the [Pointer] rotary encoder to switch between them.

Example of Measurement Results Display

Pancreas		
Head:	cm	: Diameter of head of pancreas
Body:	cm	: Diameter of body of pancreas
Tail:	cm	: Diameter of tail of pancreas

Reference information

1.2.1 Caliper Method on page 27

(6) P-Duct Measurement

This function measures the diameter of the pancreatic duct.



Procedure

1. Record a tomographic image of the pancreas showing the pancreatic duct in the B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [P-Duct] from the measurement menu.
4. Measure the pancreatic duct diameter using the caliper method.

Example of Measurement Results Display

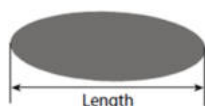
P-Duct :	cm	: Pancreatic duct diameter
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Reference information

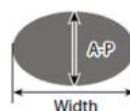
1.2.1 Caliper Method on page 27

(7) Renal Volume Measurement

Approximate each of the left and right renal volumes to a spheroid (ellipsoid), measure the long and short axes of the transverse image (Width, A-P) and the length of the long axis of the longitudinal image (Length), and calculate the volume of each kidney.



Longitudinal Image (longitudinal section)



Transverse Image (transverse section)

Set the length, width, and A-P so they are orthogonal to each other.

Procedure

1. Record the longitudinal and transverse images of the right or left kidney in the B/B mode.
2. Press the [Measurement] button on the touch panel.
3. From the measurement menu, select [Rt.Renal Volume] for the right kidney and [Lt.Renal Volume] for the left kidney.
4. Measure the Length, Width, and A-P using the caliper method
The renal volume (Vol.) is displayed once all 3 axes are measured.

Example of Measurement Results Display

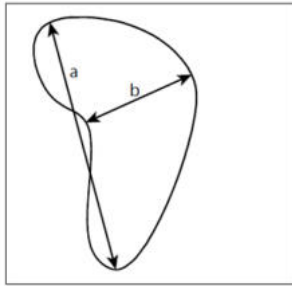
Rt. Renal Vol.		: Right Renal Volume
Vol.:	cm ³	: Volume of Renal
Rnl-L:	cm	: Renal Length (Length)
Rnl-W:	cm	: Width of Renal (Width)
Rnl-AP:	cm	: Anteroposterior of Renal (A-P)

Reference information

1.2.1 Caliper Method on page 27

(8) Spleen Measurements

This measurement is for obtaining the Spleen Index ($SI = a \times b$) from the major diameter (a) and the thickness (b) of the spleen.



Procedure

1. Record a tomographic image of the spleen in the B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [Spleen] from the measurement menu.
4. Measure the major diameter a and the thickness b using the caliper method.
The Spleen Index is calculated once a and b are measured.

Example of Measurement Results Display

Spleen		
a :	cm	: Major diameter of spleen
b :	cm	: Thickness of spleen
SI :	cm ²	: Spleen Index (= a × b)

Reference information

1.2.1 Caliper Method on page 27

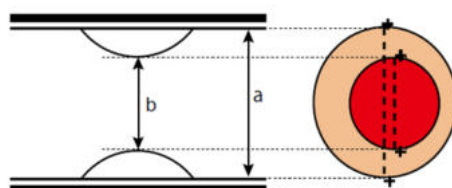
(9) Stenosis Percentage Measurements

One of the following two methods can be used to evaluate stenosis percentage.

- Evaluation by calculation from the diameter ([%STENO Diam])
- Calculation from the cross-sectional area ([%STENO Area])

% STENO-Diameter Measurements

Measure the blood vessel lumen diameter and the residual lumen diameter of the stenosis using a tomographic image. Use those measurement values to obtain the stenosis percentage of the blood vessel.



$$\%STENO = (a - b) / a \times 100$$

a: The blood vessel lumen diameter (Vessel lumen)

b: Residual lumen diameter of the stenosis (Residual), ($a > b$)

Procedure

1. Record the transverse image of the short axis that intersects in the direction perpendicular to the stenosis.
2. Press the [Measurement] button on the touch panel.
3. Select [%STENO Diam] from the measurement menu.
4. Measure the lumen diameter of the original blood vessel (Vessel) using the caliper method.
5. Measure the residual lumen diameter of the stenosis (Residual) using the caliper method.

The stenosis percentage is calculated once Vessel and Residual are measured.

Example of Measurement Results Display

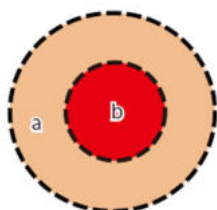
STENO-Diam		
Vessl:	mm	: Lumen diameter of the original blood vessel (Vessel)
Resid:	mm	: Residual lumen diameter of the stenosis (Residual)
%STENO:	%	: Stenosis percentage

Reference information

1.2.1 Caliper Method on page 27

% STENO-Area Measurements

Measures the cross-sectional areas of the lumen of a blood vessel and the residual lumen of stenosis using a tomographic image. The stenosis percentage of the blood vessel is derived from these measurements.



$$\%STENO = (a - b) / a \times 100$$

a: Area of the lumen of the vessel (Vessel lumen)

b: Area of the residual lumen of the stenosis part (Residual), ($a > b$)

You can specify the Vessel and Residual measurement methods to either [Trace] (B Trace method), [Ellipse] or [Circle].

Use %STENO-Area in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > B.Mode]) to select a method.

Procedure

1. Record the transverse image of the short axis that intersects in the direction perpendicular to the stenosis.
 2. Press the [Measurement] button on the touch panel.
 3. Select [%STENO Area] from the measurement menu.
 4. Measure the cross-sectional area of the original blood vessel lumen (Vessel).
 5. Measure the residual cross-sectional area (Residual) of the lumen of the stenosis.
- The stenosis percentage is calculated once Vessel and Residual are measured.

Example of Measurement Results Display

STENO-Area		
Vessl:	cm ²	: The area of the lumen of the original blood vessel (Vessel)
Resid:	cm ²	: The area of the lumen of the stenosis part of the blood vessel (Residual)
%STENO:	%	: Stenosis percentage

Reference information

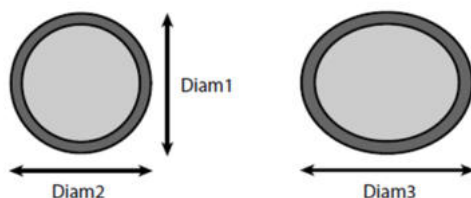
1.2.2 Ellipse Method on page 29

1.2.4 B Trace Method on page 30

1.2.3 Circle Method on page 29

(10) SOL (Space Occupying Lesions) Measurements

Measures the 3 axes of a space-occupying lesion, such as a tumor (Diam1, Diam2 and Diam3). Obtain the volume assuming that it is closely related to an ellipse.



SOL1 and SOL2 are available for SOL measurement. Follow the steps below for both methods.

Procedure

1. Record a tomographic image showing the SOL in the B/B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [SOL1] or [SOL2] in the Measurement menu.
4. Measure the Diam1, Diam2, and Diam3 using the caliper method.
Once all 3 axes are measured, the volume and area are calculated.

Example of Measurement Results Display

SOL1		
Vol.:	cm ³	: Volume
Area:	cm ²	: Area
d1:	cm	: Diameter of the first axis (Diam1)
d2:	cm	: Diameter of the second axis (Diam2)
d3:	cm	: Diameter of the third axis (Diam3)

Reference information

1.2.1 Caliper Method on page 27

(11) Blood Vessel Diameter Measurements

Measures the diameter of the aorta or portal vein.

Procedure

1. Record a tomographic image of the aorta or portal vein in the B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [Aorta Diam] or [PV Diam] from the measurement menu.
 - Select [Aorta Diam] for the aorta.
 - Select [PV Diam] for the portal vein.
4. Measure the diameter of the blood vessel using the caliper method.

Example of Measurement Results Display

Aorta Diam: cm	: Diameter of aorta
PV Diam: cm	: Diameter of portal vein

Reference information

1.2.1 Caliper Method on page 27

3.2.2 D mode Measurements

When taking measurements in the D mode, it is important to note the following.

- When recording an arterial blood flow Doppler waveform (pulse method), set the Doppler angle of incidence as low as possible. If the Doppler angle of incidence exceeds 60°, the blood velocity measurement error increases.
- When measuring the blood velocity using multiple blood flow waveform images, use identical recording conditions (forward and reverse flow directions) for all of the blood flow waveforms. The blood flow measurement values of the system are recorded as real numbers but the $\pm$ sign is not displayed on the screen.
Completely different values might be displayed, particularly when the display of measurement values of reports is set at average value (Display Data is set at "Average" in the measurement preset ([Create Measurement Tools > Application Measurement > Report Data])).

(1) Abdominal Region Arterial Blood Flow Measurements

Obtains the PSV (peak systolic velocity) and EDV (end diastolic velocity) or minimum diastolic velocity, and S/D for arterial blood flow in the abdomen.

The following measurement menus are available for abdominal region arterial blood flow measurement. Measurement menus are displayed by vessel name.

- A-Ao
- CA

- CHA
- SA
- SMA
- IMA
- CIA (Rt. CIA, Lt. CIA)
- Renal-A (Rt. Renal Art., Lt. Renal Art.)
- HA (Rt.HA, Lt.HA)
- Prandinal SMA (Pre P.SMA, Post P.SMA)
- User settings (Artery 1, Artery 2, Artery 3)

Names can be set using Name Assignment under the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods and Display Items > D.Mode]).

The following 2 points can be set for these measurements.

- Peak systolic velocity (PSV)
- End diastolic velocity (EDV) or minimum diastolic velocity
NOTE: End-diastolic blood velocity (EDV) and the minimum diastolic velocity are not necessarily identical. Set the EDV time phase to match the blood velocity to be used for the measurement.

A blood flow measurement that traces the Doppler waveform (Dop.Trace) and another that directly points to the Doppler waveform (Dop.Caliper) are available.

The factory default measurement method is set to "Auto" in Dop. Trace. The measurement method can be changed for each measurement parameter of the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods and Display Items > D.Mode]).

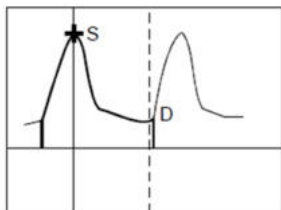
Using Dop Tracefor Measurements

Trace the Doppler waveform to detect the points for Peak Systolic Velocity (PSV) and End Diastolic Velocity (EDV).

The Doppler Trace method consists of [Auto] (Auto Trace) and [Manual] (Manual Trace). Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to set the measurement method for each measurement parameter.

Procedure

1. Record the blood flow Doppler waveform of the celiac artery.
2. Press the [Measurement] button on the touch panel.
3. Select the name of the blood vessel to be measured from the measurement menu.
A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.
4. Trace the blood flow Doppler waveform.
When the blood flow Doppler waveform is traced, a line cursor accompanied by "S" (peak systolic velocity point) and "D" (end diastolic velocity point) is displayed.



5. Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

CA	:	Celiac Artery (selected blood vessel name)
PI:	:	Pulsatility Index
RI:	:	Resistance Index
S/D:	:	PSV/EDV ratio
PSV:	cm/s	: Peak Systolic Velocity
EDV:	cm/s	: End Diastolic Velocity
MnV:	cm/s	: Mean Velocity
[1Beat avg.]	:	Detected Heartbeats

Reference information

1.2.5 Doppler Trace Method on page 31

Using Dop Caliper for Measuring

Directly specify 2 points for the peak systolic velocity (PSV) and end diastolic velocity (EDV). Set each measurement parameter to [Caliper] in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods and Display Items > D.Mode]).

Procedure

1. Record the blood flow Doppler waveform of the celiac artery.
2. Press the [Measurement] button on the touch panel.
3. Select the name of the blood vessel to be measured from the measurement menu.
4. Set the peak systolic velocity (PSV) point.

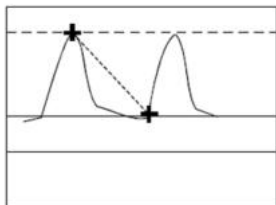
- a. Move the caliper mark to the PSV position.
- b. Press the Enterkey.

5. Set the end diastolic velocity (EDV) point.

EDV time phase

Select the blood flow velocity (end-diastolic velocity or minimum diastolic velocity) you want to use for the measurement.

- a. Move the caliper mark to the EDV position.
- b. Press the Enterkey.



Set PSV or EDV to display "S/D" and other values.

Example of Measurement Results Display

CA		: Celiac Artery (selected blood vessel name)
RI :		: Resistance Index
S/D :	.	: PSV/EDV ratio
PSV :	. cm/s	: Peak Systolic Velocity
EDV :	. cm/s	: End Diastolic Velocity

(2) Measurement of the Portal Vein and Shunt Blood Flow

Measures the maximum portal vein or shunt blood flow velocity.

The following measurement menus are available for portal vein blood flow.

- Main PV
- Rt.PV
- Lt.PV

The following measurement menus are available for shunt blood flow.

- Pre Shunt PV
- Prox Shunt
- Mid Shunt
- Distal Shunt

Measurement menus are displayed by vessel name.

A blood flow measurement that traces the Doppler waveform (Doppler Trace) and another for directly specifying points on the Doppler waveform (Dop.Caliper) are available.

Measuring with the Dop.Trace

Trace the Doppler waveform to detect the maximum velocity point.

The Doppler Trace method consists of [Auto] (Auto Trace) and [Manual] (Manual Trace). The measurement method is selected from each measurement parameter of the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]).

Procedure

1. Record the blood flow Doppler waveform for the target blood vessel.
2. Press the [Measurement] button on the touch panel and then select name of the vessel to be measured from the measurement menu.

A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.

- Trace the blood flow Doppler waveform.
Once the tracing is completed, the traced waveform is displayed. The + mark is displayed at the pV position.
- If necessary, adjust the pV position.

Example of Measurement Results Display

Main PV	
pV: cm/s	: Peak Velocity

Reference information

1.2.5 Doppler Trace Method on page 31

Using Dop.Caliper for Measuring

This function directly points to the peak flow velocity point.

Set each measurement parameter to [Caliper] in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods and Display Items > D.Mode]).

Procedure

- Record the blood flow Doppler waveform for the target blood vessel.
- Press the [Measurement] button on the touch panel.
A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.
- Select the name of the blood vessel to be measured from the measurement menu.
- Move the + mark to the peak velocity (pV) point, and press [Enter] key.

Example of Measurement Results Display

Main PV	
pV: cm/s	: Peak Velocity

3.2.3 B/D Mode

The following blood flow volume measurements are available for B/D mode measurements.

- FV(Vein) Abdom: Measures the flow volume of blood flowing at a constant velocity such as during steady state.
- FV(Artery) Ab MnV: Calculates the flow volume of a pulsatile blood flow from the time average maximum velocity.
- FV(Artery) Ab VTI: Calculates the flow volume of a pulsatile blood flow from the velocity time integral value.

(1) [FV (Vein) Abdom] Measurements

Measures the blood velocity and the cross-sectional area and calculates the blood flow volume of a constant flow.

Use FV(Vein) Ab in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to specify the following parameters.

- Blood velocity value
You can change it to "Peak" or "MnV" under the [Trace Position] preset. The factory default is "Peak".
- Coefficient (COEF)
Enter a value for the COEF preset. The factory default is 1.00.
Some literature indicates using 0.57 for portal vein blood volume.
- Setting for the method for measuring the cross-sectional diameter (CSD) or cross-sectional area (CSA)
Set the preset CSA Method to one of the following 4 methods.
 - "Caliper": Calculates CSA by assuming the area to be a true circle whose diameter is CSD, as measured using the caliper method.
 - "Trace": Measures the CSA with the B Trace method.
 - "Ellipse": Measures the CSA with the Ellipse method.
 - "Circle": Measures the CSA with the Circle method.

Procedure

1. Display the B/D mode image and freeze it.
To improve measurement accuracy
Expand the cross-section image in the B mode. Accuracy will improve, especially when measuring the cross-sectional area (CSA) by using the caliper method.
2. Press the [Measurement] button on the touch panel and then select [FV(Vein) Abdom] from the measurement menu.
A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.
3. Measure for an appropriate interval with the Doppler Trace method.
4. Press the [Caliper]key.
The + mark is displayed on the B mode image.
5. Measure the cross sectional diameter (CSD) or the cross sectional area (CSA).
The cross-sectional area (CSA) and blood flow volume are displayed.

Example of Measurement Results Display

FV (Vein)		
MnV:	cm/s	: Mean Velocity
CSA:	cm ²	: Cross-sectional area
CSD:	cm	:Cross-sectional diameter
FV (MnV) :		: Flow Volume
ml/m		
COEF:	1.00	: Coefficient

Reference information

1.2.5 Doppler Trace Method on page 31

1.2.1 Caliper Method on page 27

1.2.2 Ellipse Method on page 29

1.2.4 B Trace Method on page 30

1.2.3 Circle Method on page 29

(2) FV(Artery) MnV Measurement

This function calculates the blood flow volume of a pulsatile blood flow from the time average maximum velocity (MnV) of a single heartbeat and the cross-sectional area (CSA).

Navigate the measurement preset to [Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode] and set the following in Application Measurement > Measured Method & Display Items > D.Mode/> F.Volume(MnV) in F.Volume(Artery).

- Coefficient setting
Correction using a coefficient may be required with peripheral arteries or portal veins.
Set the coefficient via COEF in the presets.
The default coefficient (COEF) is 1.00. When calculating flow volume using an animal or a phantom, the coefficient is between 0.5 and 0.7. There are reports to the effect that the coefficient is 0.655 in the case of the radial artery.
- Setting for the method for measuring the cross-sectional diameter (CSD) or cross-sectional area (CSA)
Set via CSA Method in the presets.
 - "Caliper": Calculates CSA by assuming the area to be a true circle whose diameter is CSD, as measured using the caliper method.
 - "Trace": Measures the CSA with the B Trace method.
 - "Ellipse": Measures the CSA with the Ellipse method.
 - "Circle": Measures the CSA with the Circle method.

Procedure

1. Display the B/D mode image and freeze it.
To improve measurement accuracy
Expand the cross-section image in the B mode. Accuracy will improve, especially when measuring the cross-sectional area (CSA) by using the caliper method.
2. Press the [Measurement] button on the touch panel.
3. Select [FV(Artery) MnV] from the measurement menu.
4. Measure the interval of 1 heartbeat with the Doppler Trace method.
5. Press the [Caliper]key.
6. Measure the cross sectional diameter (CSD) or the cross sectional area (CSA).
The cross-sectional area (CSA) and blood flow volume are displayed.

Example of Measurement Results Display

FV (Artery) MnV	
MnV: cm/s	: Mean Velocity
CSA: cm ²	: Cross-sectional area
CSD: cm	: Cross-sectional diameter
FV (MnV) : ml/m	: Flow Volume
COEF: 1.00	: Coefficient
[1Beat avg.]	: Detected Heartbeats

(3) FV (Artery) Ab VTI Measurements

Calculates the blood flow volume of a pulsatile blood flow from the velocity-time integral (VTI) of a single heartbeat, the cross-sectional area (CSA) and the heart rate.

Navigate the measurement preset to [Create Measurement Tools > Application Measurement > Measured Methods and Display Items > D.Mode] and specify the following in [Application Measurement > Measured Methods and Display Items > D.Mode/ >F.Volume(VTI)] in [F.Volume(Artery)] setting.

- Setting for the method for measuring the cross-sectional diameter (CSD) or cross-sectional area (CSA) Select CSA Method in the measurement preset ([Create Measurement Tools > Basic Measurement > Measured Methods & Display Items > D.Mode]).
 - "Caliper": Calculates CSA by assuming the area to be a true circle whose diameter is CSD, as measured using the caliper method.
 - "Trace": Measures the CSA with the B Trace method.
 - "Ellipse": Measures the CSA with the Ellipse method.
 - "Circle": Measures the CSA with the Circle method.

Procedure

- Display the B/D mode image and freeze it.
To improve measurement accuracy
Expand the cross-section image in the B mode. Accuracy will improve, especially when measuring the cross-sectional area (CSA) by using the caliper method.
- Press the [Measurement] button on the touch panel.
- Select [FV(Artery)Ab VTI] from the measurement menu.
- Measure the interval of 1 heartbeat with the Doppler Trace method.
The velocity-time integral value (VTI) and HR are calculated.
- Press the [Caliper]key.
- Measure the cross sectional diameter (CSD) or the cross sectional area (CSA).
The cross-sectional area (CSA) and blood flow volume are displayed.

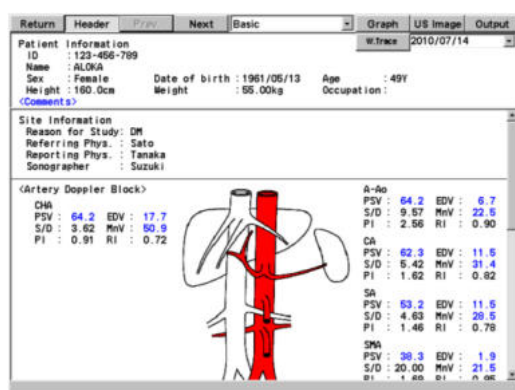
Example of Measurement Results Display

FV (Artery) VTI	
-----------------	--

VTI:	cm	: Velocity-time integral value
HR:	BPM	: Heart rate
CSA:	cm ²	: Cross-sectional area
CSD:	cm	: Cross-sectional diameter
FV:	ml/b	: Blood flow volume corresponding to 1 beat
FV: ml/m		: Blood flow volume for one minute
[1Beat avg.]		: Detected Heartbeats

3.3 Reports

Measurement results and obtained index values are sorted and displayed in the report.



The following operations are available using the report.

I) Displaying measurement results and images

- Measurement results
- Graph display (SOL measurement results only)
- Doppler waveform (blood flow measurement results using Dop Trace method only)
- Recorded ultrasonograms
- Past results

II) Editing results, comments and findings

III) Outputting reports (printing and saving)

3.3.1 Displaying a Report

NOTE: Report display requires patient data input. Enter patient data on the ID screen.

(1) Displaying a Report

Procedure

1. Display the report.
 - Press the [Measurement] button on the touch panel and then select [Report] from the measurement menu.

- Select [Report] from the [Accessories] tab in the function menu.

The following buttons will appear at the top of the report:

[Return]	Closes the report.
[Header]	Switches the Header Block display (patient data display) between Long Form and Short Form.
[Prev.]	Displays the previous page.
[Next]	Displays the next page.
[(Study list)]	Switches the Study in the report.
[Graph]	Displays a graph showing changes in measurement results.
[W.Trace]	Displays the Doppler trace line as the result of the abdominal region arterial measurement.
[US Image]	Displays an ultrasonic image in the report.
[Output]	Outputs report data to a personal computer, storage media, printer or other destination.

Switching from Report Screen to the Scanning Screen

- Select [Return] button on the upper corner of the report screen.

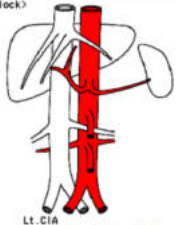
(2) Information Blocks Displayed in a Report

Reports are displayed in Study units.

The abdominal measurement Study includes Basic Study. This basic study displays the following information classified into blocks. The header block and the site information block are displayed in studies in every report. Other blocks are set in the measurement preset ([Study Assignment > Basic > Combined Report Display]) while blocks that include measurement results registered in a report are displayed.

Table4: Basic Study Report

	Header Block Patient information that was entered in the ID screen. [<Comment>] Show/hide the comment input field.
	Site Information Block Facility information, doctor in charge, and other information

<Gallbladder> Length : 5.7cm Width : 3.8cm Wall Thickness : 0.7cm GB :	Gallbladder Block Gallbladder measurement and GB Wall-T measurement results
<Common Bile Duct> CBD Diam : 1.4cm CBD :	Common Bile Duct Block CBD measurement results
<Liver> Right Lobe L1 : 23.8cm L2 : 8.6cm Left Lobe L1 : 9.2cm L2 : 8.0cm Findings :	Liver Block Liver (Left Lobe/Right Lobe) measurement results
<Pancreas> Head : 2.7cm Body : 3.3cm Tail : 1.7cm P-Duct : 0.3cm Pancreas : P-Duct :	Pancreas Block Pancreas measurement results and P-duct measurement results
<Spleen> a : 8.4cm b : 3.0cm SI(axb) : 24.81cm² Spleen :	Spleen Block Spleen measurement results
<Renal Volume> Right Volume : 72.03cm³ Length : 7.6cm Width : 4.1cm A-P : 4.7cm Left Volume : 80.89cm³ Length : 7.0cm Width : 2.7cm A-P : 8.5cm Findings :	Renal Volume Block Renal Volume measurement results
<Space-Occupying Lesion(SOL) 1> Diam 1 : 2.6cm Diam 2 : 1.8cm Diam 3 : 1.5cm Area : 3.66cm² Volume : 3.68cm³ Location : Type :	SOL Block SOL1 to SOL3 measurement results
<Aorta> Aorta Diam : 2.0cm Aorta :	Aorta Block Aortic diameter measurement results
<Portal Vein> PV Diam : 1.5cm PV :	Portal Vein Block Portal vein diameter measurement results
<Stenosis> Vessel : 2.1cm Residual : 1.5cm %Diam STENO : 29.1% Vessel : 9.6cm² Residual : 4.35cm² %Area STENO : 55.0%	%Stenosis Block Stenosis percentage (%STENO Diam/ %STENO Area) measurement results
<Abdominal Artery Doppler Block>  CHA PSV : 61.7 EDV : 20.0 S/D : 2.89 MnV : 42.1 PI : 0.75 RI : 0.61 Rt. CIA PSV : 67.5 EDV : 14.4 S/D : 4.70 MnV : 46.4 PI : 1.15 RI : 0.79 Lt. CIA PSV : 42.0 EDV : 6.7 S/D : 6.36 MnV : 20.4 PI : 1.25 RI : 0.84 A-Ao PSV : 64.2 EDV : 6.7 S/D : 9.57 MnV : 22.5 PI : 2.56 RI : 0.90 CA PSV : 62.3 EDV : 11.5 S/D : 5.42 MnV : 31.4 PI : 1.62 RI : 0.82 SA PSV : 63.2 EDV : 11.5 S/D : 4.63 MnV : 20.5 PI : 1.46 RI : 0.78 SMA PSV : 38.3 EDV : 1.9 S/D : 20.00 MnV : 21.5 PI : 1.69 RI : 0.95 IMA PSV : 43.1 EDV : 8.1 S/D : 5.29 MnV : 28.7 PI : 1.22 RI : 0.81	Abdom Artery Doppler Block Abdominal region arterial blood flow measurement results
<Renal Artery> RIGHT RI : 0.67 PI : 1.46 S/D : 7.62 PSV : 75.6cm/s EDV : 10.1cm/s LEFT RI : 0.92 PI : 1.60 S/D : 5.57 PSV : 80.0cm/s EDV : 14.4cm/s Findings :	Renal Artery Block Measurement results of renal arterial blood flow

	Hepatic Doppler Block This block consists of the following three items: • Hepatic Artery Hepatic arterial blood flow measurement (CHA, HA) results • Portal Vein Portal vein blood flow measurement results • Hepatic Findings Liver findings reports
	Shunt Doppler Block This block consists of the following two items: • Transjugular Intrahepatic Portosystemic Shunt Doppler Shunt blood flow measurement results • Hepatic Findings Shunt findings report
	Mesenteric Doppler Block Other than CA and A-Ao measurement results, this block consists of the following two items: • Superior Mesenteric Doppler Superior mesenteric arterial blood flow measurement results • Mesenteric Findings Mesenterium findings reports
	Abdom Ratio Block Displays the ratio of two arterial blood flows configured in the measurement preset ([Create Measurement Tools > Basic Measurement > Measured Method & Display Items > D.Mode]).

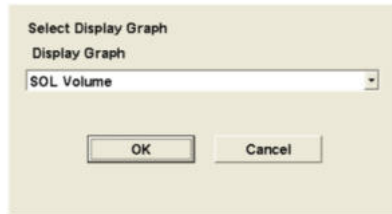
Other than the above, the following exist: the Flow Volume Block, which displays blood flow volume, and the US Image Block, which displays ultrasonic images.

(3) To Display a Graph

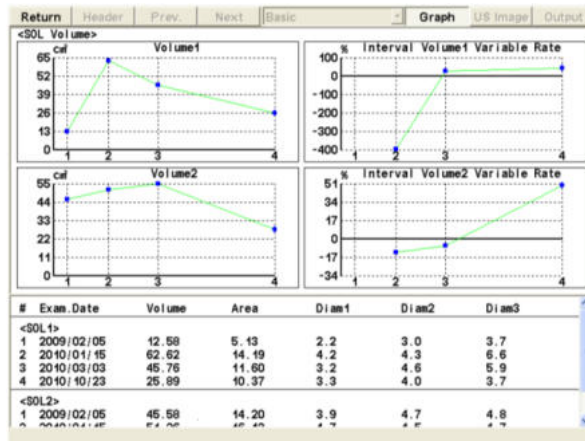
Display the change in the cross-sectional area or the volume of the SOL measurement results in a graph.

Procedure

1. Select [Graph] on the upper corner of the report screen.
The following dialog box is displayed.



2. Select the item to display in graph from the drop-down list.
3. Select [OK].
The graph is displayed.

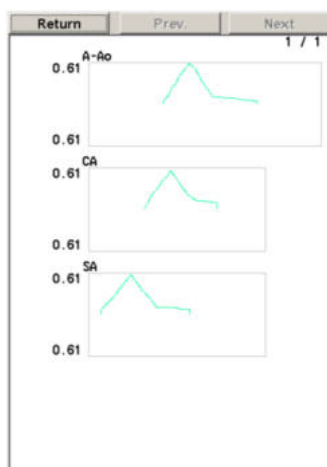


4. To close the graph display, select [Graph] on the upper corner of the report screen.

(4) Displaying the Blood Flow Waveform

The abdominal region arterial measurement report (Artery Doppler Block) can display the Doppler trace line to obtain various blood flow measurement values. The waveform patterns before and after the stenosis can be compared.

NOTE: The appearance of a blood flow waveform will vary with the display format used during measurement. Use the same B/D mode display format (right and left, upper and lower B/D, DopWide, Normal) to make measurements for each artery blood flow. Measurements made using different display formats are displayed as follows.

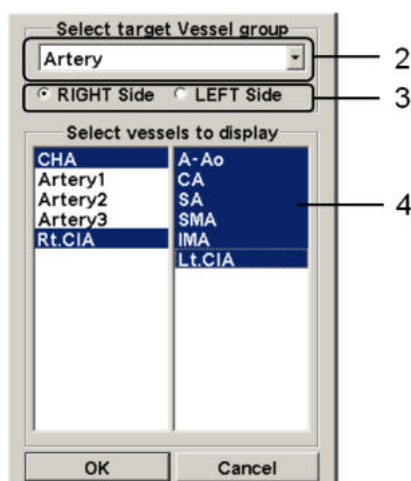


From the top:

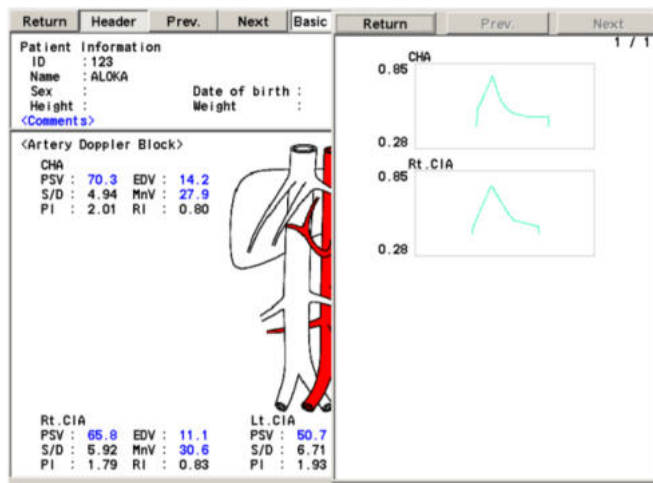
- Measurements made in the B/D mode using UL/Normal
- Measurements made in the B/D mode using UL/Wide
- Measurements made in the B/D mode using LRWide or LR Normal

Procedure

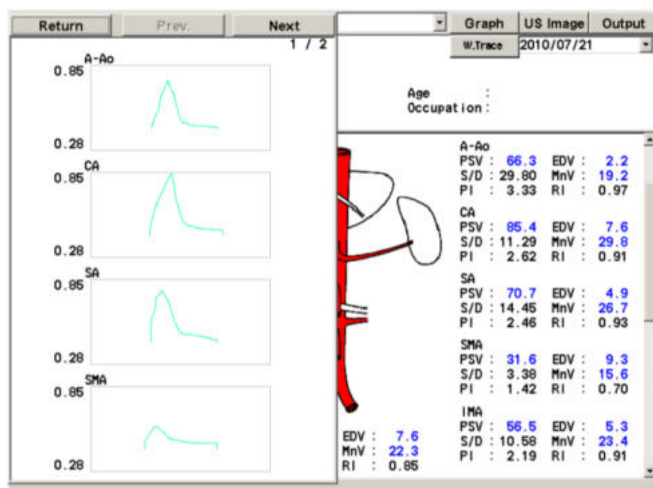
1. Select [W.Trace] on the upper corner of the report screen.
The following dialog box is displayed.



2. Select the Vessel group from the drop-down list.
The Select vessels to display field displays a list of blood vessels that can be displayed.
3. Select the display position of the Doppler pattern.
 - [RIGHT Side]: Displays the pattern on the right side of the screen.
 - [LEFT Side]: Displays the pattern on the left side of the screen.
4. Select the blood vessel to display.
Highlighted blood vessels will be displayed.
5. Select [OK].
If you select [RIGHT Side], the waveform will be displayed on the right side of the screen.



If you select [LEFT Side], the waveform will be displayed on the left side of the screen.



6. To return to the report page, select [Return].

(5) Attaching Ultrasonic Images

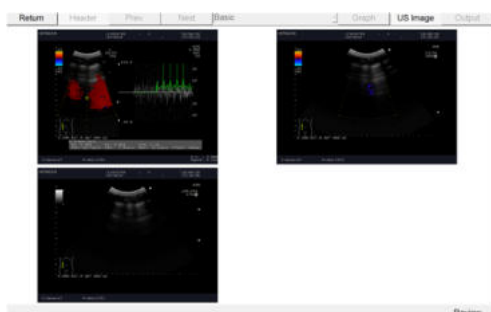
You can attach ultrasonic images to reports. The attached ultrasonic images will be displayed in the US Image Block. You can add stored images of the patient whose report is being displayed from the system hard disk or a USB flash drive.

Use the following options in [Report Data] under preset to select images to display in the US Image Block.

- Use Display Pasted US Image Form on the Screen to set the display format.
- Set the number of images to display immediately after selecting US Image Block in [Automatically be Displayed US Images Number].

Procedure

1. Select [US Image] on the upper corner of the report screen.
The US Image Block is displayed. The number of images configured with the preset are displayed in the order of top-left, top-right, etc., from the latest image saved to the system's hard disc or connected media, such as USB flash drive.
Images will be displayed as shown below when [Display Pasted US Image Form on the Screen] is set to [2×2] and [4] is selected in [Automatically be Displayed US Images Number].



When 3 images are stored

2. If needed, change the number of images displayed.
 - a. Select [Review] at the bottom of the screen.

Images on the system hard disk or connected media are displayed as thumbnails. Only today's images of the current patient are displayed. The "Current Exam.View" is displayed at the top right of the screen.



- b. Select an image to display.
Selected images will be displayed with a blue frame.
- c. After selecting all the images to display, select [Paste Desired US].
Only the selected images are displayed in the US Image Block.

Displaying images from past examination dates

Select [Change View] under the thumbnails.

Images from past examinations of the current patient are displayed. "Current&Past Exam.View" is displayed in the upper right of the screen. You can also select images from past examinations to display in the US Image Block.

When you re-select [Change View], the screen switches to display the images of the day only (Current Exam.View). The "Current Exam.View" is displayed at the top right of the screen.

3. To return to the report page, select [Return].

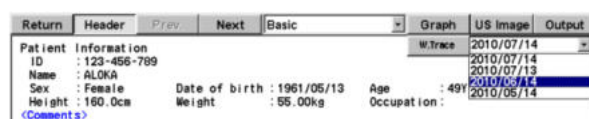
(6) Displaying Past Reports

Displays past reports.

NOTE: You cannot modify the data in the past reports.

Procedure

1. Select the arrow [▼] for the date on the top right of the report screen.
When past reports are available, a list of the report dates is displayed.



2. Select the date of the reports to display.
Reports for the selected date are displayed.

3.3.2 Editing Reports

You can edit the following contents in the report.

- Comments
- Findings

- Measurement results

(1) Entering Comments

Enter comments, such as on ultrasound findings results in the Comments field in the Header Block.

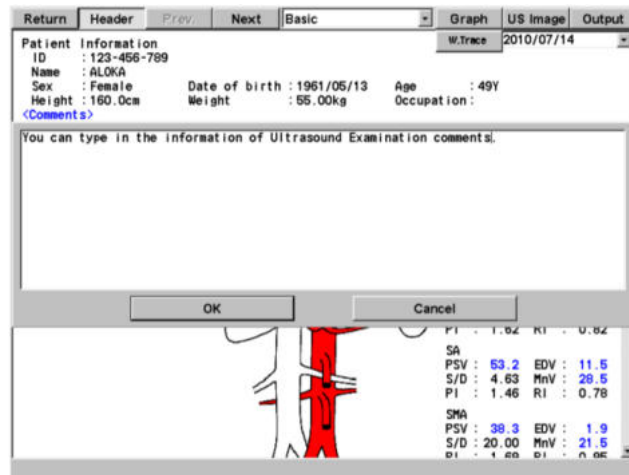
Procedure

1. Select <[<Comments>]>.

When the <Comments> are hidden

Select [Header] on the upper corner of the report screen and select <[<Comments>]>.

A text box is displayed.



2. Enter a comment using the keyboard.
3. Select [OK] when you finish entering the comments.
The entry is confirmed.
To cancel the entry, select [Cancel].

(2) Entering Findings

Enter the ultrasound findings of the organ concisely. Enter the findings in the list box in each block or the [Findings] field.

Procedure

1. Select the findings from the list. Or enter from the keyboard.

Selecting from the list

- a. Select [▼] on the list.
- b. Select the appropriate finding.

Entering directly

What you enter will be added to the list.

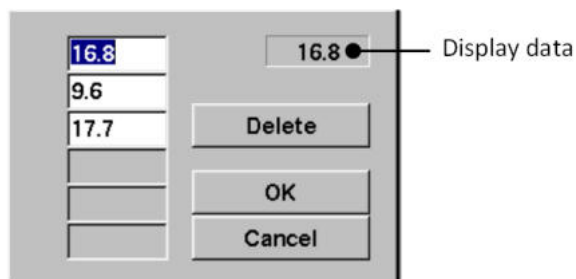
- a. Select a box.
- b. Enter via the keyboard.
The content that is entered is added to the list as user-defined content.

To delete such content from the list, highlight the content with the trackball and select the [Delete] key.

(3) Editing the Measurement Results

Procedure

1. Select the measurement value to be modified.
The dialog box with the measurement value opens.



If the Display Data of the [Report Data] preset is "Current", the latest data is displayed in the report screen. If it is set to "Average", an average value is displayed.

2. Revise the data.

Deleting data

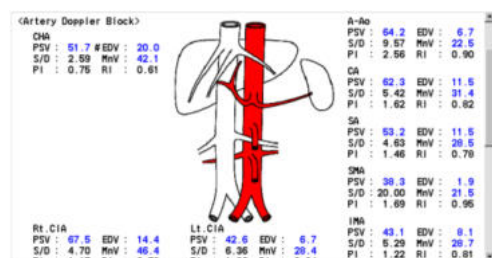
- a. Select the measurement value from the dialog box.
- b. Select [Delete] from the dialog box.
- c. Select [OK] from the dialog box.

Revising data

Some measurement results, such as PI and RI, correlate to 2 blood flow velocities (EDV and PSV) within the same heartbeat cycle. Modify as necessary to maintain the mutual time-phase relationship.

- a. Select the measurement value from the dialog box.
- b. Enter values from the keyboard.
- c. Select [OK] from the dialog box.

A # mark will be added to the name of the modified item.



Selecting the data to be displayed

If [Display Data] of [Report Data] in the preset has been set to "Current", you can change the measurement value to be displayed on the report screen.

- a. Select the measurement value from the dialog box.
- b. Select [OK] from the dialog box.

3.3.3 Outputting Reports

There are 3 ways to output a report.

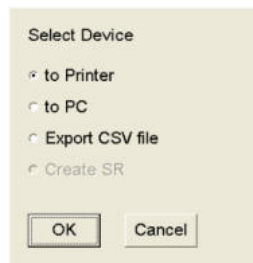
- Outputting to a local printer: Select the Block to output.
- Outputting as a CSV file: Output the values registered to the report to a connected media or device.
- Creating a DICOM SR file: Create a DICOM SR file.

(1) Printing

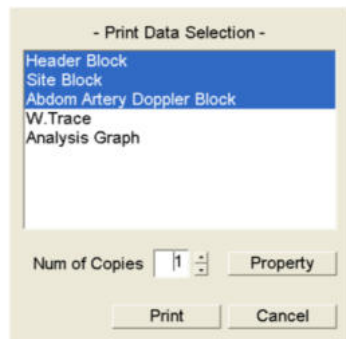
Print a report to the local printer (printer connected to the system).

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.



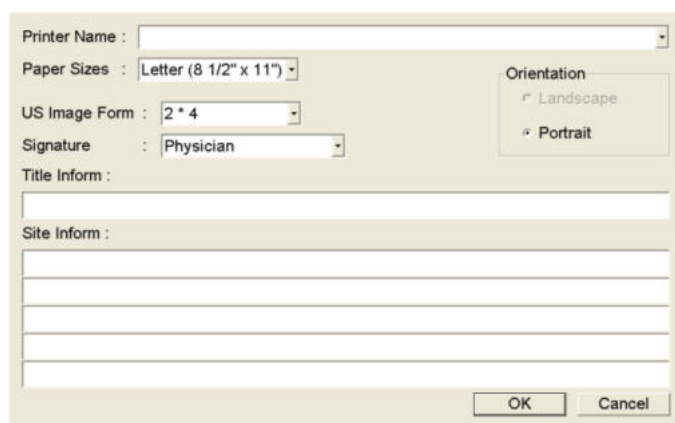
2. Select [to Printer], and press [OK].
The following dialog box is displayed.



3. Select the blocks to be printed.
 - a. Select one of the blocks to print.
 - b. Repeat this step and highlight all the blocks to print.To cancel a selected block, select that block again.
4. Use Num of Copies to set the number of copies to print.
5. Configure printer properties if necessary.
 - a. Select [Property].
 - b. See the next section to configure the printer property.
6. Select [Print].

Printer Properties

You can set the advanced printer properties.



Item	Options	Description
Printer Name		Select the printer model.
Paper Sizes	US Letter	Prints on US letter size paper.
	A4	Prints on A4 size paper.
Orientation	Portrait	Sets the direction of the paper to the vertical orientation (there is no other option).
US Image Form	1x2	Prints a US Image block with 1 row of 2 images per sheet.
	1×3	Prints a US Image block with 1 row of 3 images per sheet.
	2 x 2	Prints a US Image block with 2 rows of 2 images per page.
	2×4	Prints a US Image block with 2 rows of 4 images per page.
Signature	Physician	Sets the Physician signature field.
	Phys. & Sonographer	Sets the Physician and Sonographer signature fields.
	None	Hides the signature field.
Title Inform		You can enter a report title using no more than 80 characters.
Site Inform		You can enter facility information (hospital department, address, telephone number, FAX number, etc.).

(2) Outputting as a CSV File

You can output data registered in the report as a CSV file.

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.



2. Add a check mark next to [Export CSV file] and select [OK].
The dialog box is displayed.



The file name is displayed in the format ID_Date_Application.
Select [Cancel] to return to the report screen.

3. Select the storage destination from the Target Medium list.
4. Change the file name if necessary.
5. Select [OK].
The selected CSV file is saved in the specified media.
A CSV file contains patient information, numerical values and comments.

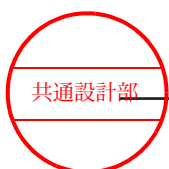
(3) Creating a DICOM SR File

You can create a DICOM SR file from the data displayed in the reports.

NOTE: The optional DICOM SR compatible software (SOP-AR50-21) is necessary for creating DICOM SR files.

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.





2. Select [Create SR], and press [OK].

A DICOM SR file is created for the examination date shown on the report. Any existing file will be overwritten.

The DICOM SR file is not sent at this time.

Sending a DICOM SR File

NOTE: The optional DICOM networking software (SOP-AR50-10) is necessary for connecting to a DICOM SR server.

The DICOM SR file you have created is sent to the DICOM SR server when you select [New Patient] or [End Study] to complete an examination.

If [SR Auto Creation] is "On" in preset ([Common Preset > DICOM SR]) and today's DICOM SR/>DICOM SR file has not yet been created, an SR file containing the current examination will be created and sent together with other created DICOM SR files to the DICOM SR server.

3.4 Presets

Abdominal Measurement presets (Abdom preset) can be broadly divided into 3 types.

- **Create Measurement Tools**
Settings for measurement methods, caliper mark display, and report display.
Settings for basic measurements, and for applied measurements.
- **Study Assignment**
Enables you to configure the menu, transferred items and report view in the study.
These are set for each study.
- **SW Assignment**
Assigns measurement functions to menu items.
Table5: Abdom preset configuration

Create Measurement Tools	Basic Measurement	Measured Method & Display Items	B.Mode		
			M.Mode		
			D.Mode		
			F.Mode		
		Caliper Mark Control			
		Unit Selection			
		Caliper Auto Off			
		Display Form		Mark Display	
	Application Measurement	Measured Method & Display Items	B.Mode		
			D.Mode		
		Caliper Mark Control			
		Unit Selection			
		Caliper Auto Off			
		Report Data			
		Display Form		Mark Display	
		User's Calculation		Reserved Word	
Study Assignment	Basic	Menu Assign			
		Combined Report Display			
		Transfer List Assign			
		Other			
SW Assignment	Touch Panel SW Assignment				
	+Mark Key Assignment				

3.4.1 Abdom Presets

The pages of the preset are displayed as shown below.



[Abdom Preset]
Abdom Preset top page

(1) Create Measurement Tools

Settings for measurement methods, caliper marks, and report display.

Basic Measurement

Refer to the presets for basic measurements.

Reference information

2.2.7(3) Measurement-related Settings: Create Measurement Tools on page 82

Application Measurement

Settings for applied measurements (Abdom measurement).

[Measured Method & Display Items > B.Mode]
(1/3): B mode measurement settings

Measured Method & Display Items (1/3)

B Mode

Gallbladder

Caliper

Length Width

GB Wall-T

Caliper

Wall-T

Liver

Caliper

Length1 Length2

CBD

Caliper

CBD

Pancreas

Caliper

Head Body Tail

Exit Cancel

[Measured Method & Display Items > B.Mode]
(2/3): B mode measurement settings

Measured Method & Display Items (2/3)

B Mode

P-Duct

Caliper

P-Duct

Renal Volume

Caliper

Length Width A-P Volume

Spleen

Caliper

a b Sl(axb)

SOL1

Caliper

Diam1 Diam2 Diam3

Area Volume

SOL2

Caliper

Diam1 Diam2 Diam3

Area Volume

Exit Cancel

[Measured Method & Display Items > B.Mode]
(3/3): B mode measurement settings

Measured Method & Display Items (3/3)

B Mode

%STENO Diam

Caliper

%STENO Vessel Residual

%STENO Area

Vessel Ellipse

Residual Trace

%STENO Vessel Residual

Aorta Diam

Caliper

Aorta

PV Diam

Caliper

PV

Exit Cancel

[Measured Method & Display Items > D.Mode]
(1/11): D mode measurement settings

[Measured Method & Display Items > D.Mode]
(2/11): D mode measurement settings



Measured Method & Display Items (1/11) Prev. Next

D.Mode

A-Ao

Auto Vertical L PI RI S/D PSV EDV
MnV ACC AccT Vm

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

CA

Auto Vertical L PI RI S/D PSV EDV
MnV ACC AccT Vm

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(3/11): D mode measurement settings

Measured Method & Display Items (2/11) Prev. Next

D.Mode

CHA

Auto Vertical L PI RI S/D PSV EDV
MnV ACC AccT Vm

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

SA

Auto Vertical L PI RI S/D PSV EDV
MnV ACC AccT Vm

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(4/11): D mode measurement settings

Measured Method & Display Items (3/11) Prev. Next

D.Mode

SMA

Auto Vertical L PI RI S/D PSV EDV
MnV ACC AccT Vm

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

IMA

Auto Vertical L PI RI S/D PSV EDV
MnV ACC AccT Vm

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(5/11): D mode measurement settings

Measured Method & Display Items (4/11) Prev. Next

D.Mode

CIA

Auto Vertical L PI RI S/D PSV EDV
MnV ACC AccT Vm

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

Renal-A

Auto Vertical L PI RI S/D PSV EDV
MnV ACC AccT FlowT AccT/FT Vm

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(6/11): D mode measurement settings

Measured Method & Display Items (5/11) Prev. Next

D.Mode

HA

Auto Vertical L PI RI S/D PSV EDV
MnV ACC AccT Vm

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

PV

Auto Vertical L pV

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(7/11): D mode measurement settings

Measured Method & Display Items (6/11) Prev. Next

D.Mode

Shunt

Auto Vertical L pV

Manual Cross Point

Caliper Horizontal L

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(8/11): D mode measurement settings

Measured Method & Display Items (7/11) Prev. Next

D.Mode

Artery1

Auto Vertical L PI RI S/D PSV EDV
Manual Cross Point MnV ACC AccT Vm
Caliper Horizontal L

Trace Condition
Position Peak Level -18 dB Smooth No

Artery2

Auto Vertical L PI RI S/D PSV EDV
Manual Cross Point MnV ACC AccT Vm
Caliper Horizontal L

Trace Condition
Position Peak Level -18 dB Smooth No

Artery3

Auto Vertical L PI RI S/D PSV EDV
Manual Cross Point MnV ACC AccT Vm
Caliper Horizontal L

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(9/11): D mode measurement settings

Measured Method & Display Items (8/11) Prev. Next

D.Mode

F.Volume(Artery)

F.Volume(MnV)

Auto Vertical L MnV PSV EDV dV dT
Manual Cross Point VTI PI RI FT AccT
ACC AccT/FT S/D Vm FV(MnV)
FVm(MnV) CSD CSA

Trace Condition
Position Peak Level -18 dB Smooth No

COEF FV(MnV) 1.00 CSA Method Caliper

F.Volume(VTI)

Auto Vertical L MnV PSV EDV dV dT
Manual Cross Point VTI PI RI FT AccT
ACC AccT/FT S/D Vm FV(beat)
FV(min) CSD CSA HR

Trace Condition
Position Peak Level -18 dB Smooth No

CSA Method Caliper

Exit Cancel

[Measured Method & Display Items > D.Mode]
(10/11): D mode measurement settings

Measured Method & Display Items (9/11) Prev. Next

D.Mode

F.Volume(Vein)

Auto Vertical L MnV PVel VTI AccT ACC
Manual Cross Point FV CSD CSA

Trace Condition
Position Peak Level -18 dB Smooth No

COEF FV 1.00 CSA Method Caliper

Exit Cancel

[Measured Method & Display Items > D.Mode]
(11/11): D mode measurement settings

Measured Method & Display Items (10/11) Prev. Next

Name Assignment

Artery1 Artery1
Artery2 Artery2
Artery3 Artery3

Exit Cancel

Measured Method & Display Items (11/11) Prev. Next

Abdom Artery

Ratio 0.00 - 0.00 Ratio 0.00 - 0.00
Ratio 0.00 - 0.00 Ratio 0.00 - 0.00
Ratio 0.00 - 0.00 Ratio 0.00 - 0.00
Ratio 0.00 - 0.00 Ratio 0.00 - 0.00
Ratio 0.00 - 0.00 Ratio 0.00 - 0.00

Ratio 0.00 - 99.99

Exit Cancel

[Caliper Auto Off]: Caliper mark and
measurement result display settings for when
freeze is canceled

[Report Data]
Report display data settings

Caliper Auto Off (1/6) [Prev] [Next]

Gallbladder

Liver

Pancreas

Renal Volume

SOL

[Exit] [Cancel]

Report Data (1/1) [Prev] [Next]

Display Data

Transfer from Report Data

Storage Data Number

Pasted US Image Screen
 Display Pasted US Image Form on the Screen

Automatically be Displayed US Images Number

Save Wave Trace

[Exit] [Cancel]

[Display Form]: Vertical and horizontal display of measurement results, display of multiple results, settings for simultaneous display with basic measurement

[Display Form > Mark Display]
 Caliper mark display settings

Display Form [Prev] [Next]

Result Display Window Style

Package Result Display

Basic measurements are displayed together.

[Exit] [Cancel]

Mark Display (1/6) [Prev] [Next]

Gallbladder

Liver

Pancreas

Renal Volume

SOL

[Exit] [Cancel]

[User's Calculation]
 User index calculation formula settings

[User's Calculation > Reserved Word]
 Reserved word settings for user index calculation formulas

User's Calculation [Prev] [Next]

Equation Program
☒ Create User's Calculation
☐ Delete User's Calculation

U-Calc. 1	U-Calc. 16
U-Calc. 2	U-Calc. 17
U-Calc. 3	U-Calc. 18
U-Calc. 4	U-Calc. 19
U-Calc. 5	U-Calc. 20
U-Calc. 6	U-Calc. 21
U-Calc. 7	U-Calc. 22
U-Calc. 8	U-Calc. 23
U-Calc. 9	U-Calc. 24
U-Calc. 10	U-Calc. 25
U-Calc. 11	U-Calc. 26
U-Calc. 12	U-Calc. 27
U-Calc. 13	U-Calc. 28
U-Calc. 14	U-Calc. 29
U-Calc. 15	U-Calc. 30

[Exit] [Cancel]

User's Calculation: Reserved Word (1/2) [Prev] [Next]

Reserved Word Registration
☒ Create Reserved Word
☐ Delete Reserved Word

Reserved Word 1	Reserved Word 16
Reserved Word 2	Reserved Word 17
Reserved Word 3	Reserved Word 18
Reserved Word 4	Reserved Word 19
Reserved Word 5	Reserved Word 20
Reserved Word 6	Reserved Word 21
Reserved Word 7	Reserved Word 22
Reserved Word 8	Reserved Word 23
Reserved Word 9	Reserved Word 24
Reserved Word 10	Reserved Word 25
Reserved Word 11	Reserved Word 26
Reserved Word 12	Reserved Word 27
Reserved Word 13	Reserved Word 28
Reserved Word 14	Reserved Word 29
Reserved Word 15	Reserved Word 30

[Exit] [Cancel]

(2) Study Assignment

You can configure the menu, transferred items and report view in each study.

[Study Assignment]

Tree view display settings of Study and user-defined Study

[Menu Assign]

Settings for measurement items to display in measurement menus

[Transfer List Assign]

Setting measurement parameters whose basic measurement results can be transferred

[Combined Report Display]

Settings for blocks to display in a report

[Other]

Measurement guide message display settings

(3) SW Assignment

Assigns measurement menus to the [Meas] tab in the function menu or select the basic measurement menu that will appear when you press the [Caliper] key.

[Touch Panel SW Assignment]

Configures the items that can be assigned to the [Meas] tab in the function menu.

[+Mark Key Assignment]

Sets the measurement item to launch when the [Caliper] key is pressed.

3.5 References

3.5.1 Formulas

Table6: B Mode Calculation Formula

Calculated parameters	Formulas
%STENO Diam	$\%STENO = 100 \times (A - B) \div A$ A: Vessel lumen diameter, B: Residual diameter
%STENO Area	$\%STENO = 100 \times (A - B) \div A$ A: Vessel lumen diameter, B: Residual diameter
Spleen Index	$SI = a \times b$

Calculated parameters	Formulas
SOL Area	Area = $\pi \div 4 \times d1 \times d2$ Volume = $\pi \div 6 \times d1 \times d2 \times d3$
Renal Volume	Vol. = $0.49 \times \text{Length} \times \text{Width} \times \text{AP}$
F. Volume (MnV)	FV (MnV) [ml/min] = MnV (cm/s) $\times$ CSA (cm ²) $\times$ 60 (sec) $\times$ COEF FVm (MnV) [ml/min] = Vm (cm/s) $\times$ CSA (cm ²) $\times$ 60 (sec)
F. Volume (VTI)	FV [ml/beat] = VTI (cm) $\times$ CSA (cm ²) FV [ml/min] = FV (ml/beat) $\times$ HR(BPM)

3.5.2 References

(1) D Mode Measurement

I) Arteries

Michael Hennerici, Doris Neuerburg-Heusler

Vascular Diagnosis with Ultrasound Clinical References with Case Studies

Thieme ISBN: 0-86577-603-2

II) Hepatic Artery

John Herbetko. et al.

Venoocclusive Liver Disease After Bone Marrow Transplantation: Findings at Duplex Sonography

AJR: 158, May 1992

III) CHA, SPA, SMA

Takefumi Nakamura, MD et al.

Quantitative Measurement of Abdominal Arterial Blood Flow Using Image-Directed Doppler Ultrasonography: Superior Mesenteric, Splenic and Common Hepatic Arterial Blood Flow in Normal Adults

J Clin Ultrasound 17, 264-268, May 1989

3.5.3 Terms and Abbreviations

Abbreviation	Meaning	Meaning
%STENO	%Stenosis	Stenosis Percentage
%STENO Area	%Stenosis by area	%Stenosis by Area
%STENO Diam	%Stenosis by Diameter	%Stenosis by Diameter
A-Ao	Abdominal Aorta	Abdominal Aorta
ACC	Acceleration	Acceleration
AccT	Acceleration Time	Acceleration Time
AccT/FT	AccT/FT	Acceleration Time/Flow Time
CA	Celiac Artery	Celiac Artery
CBD	Common Bile Duct	Common Bile Duct
CHA	Common Hepatic Artery	Common Iliac Artery
CIA	Common Iliac Artery	Common Hepatic Artery
Distal	Distal	Distal Portion

Abbreviation	Meaning	Meaning
EDV	End Diastolic Velocity	End Diastolic Velocity
FlowT	Flow time	Flow Time
F.Volume	Flow Volume	Flow Volume
GB	Gallbladder	Gallbladder
GB Wall - T	Gallbladder Wall Thickness	Gallbladder Wall Thickness
HA	Hepatic Artery	Hepatic Artery
IMA	Inferior Mensenteric Artry	Inferior Mesenteric Artery
Mid	Middle	Middle
MnV	Mean Velocity	Mean Velocity
Pancreas	Pancreas	Pancreas
PI	Pulsatility Index	Pulsatility Index
PSV	Peak Systolic Velocity	Peak Systolic Velocity
Pre Prand	Pre Prandial	Pre Prandial
Post Prand	Post Prandial	Post Prandial
Prox	Proximal	Proximal
PV	Portal Vein	Portal Vein
Renal-A	Renal Artery	Renal Artery
Renal Vol.	Renal Volume	Renal Volume
Resid	Residual	Residual diameter and residual cross-sectional area
RI	Resistance Index	Vascular resistance
SA	Splenic Artery	Splenic Artery
SMA	Superior Mesenteric Artery	Superior Mesenteric Artery
SOL	Space Occupying Lesions	Space Occupying Lesions
S/D	Systolic/Diastolic velocity Ratio	Systolic/Diastolic Velocity Ratio
Vessl	Vessel	Internal diameter of the blood vessel and cross-sectional area
Vm	Mean Velocity	Mean velocity (Mean method)

Urological Measurement

- 4.1 Overview of Urological Measurement Functions
- 4.2 Measurement Methods
- 4.3 Reports
- 4.4 Presets
- 4.5 References

4.1 Overview of Urological Measurement Functions

4.1.1 Urological Measurement Menus

The following measurement menus and parameters are available under urological measurements.

Table1: B Mode

Measurement name	Menu	Measurement parameters			
Prostate measurement Prostate & SV study	PSA Volume	Vol.	PR-H	PR-L	PR-W
		PSA	mPSA	PSAD	COEF
	PRS Slice Vol.	Vol.	PCAR	Area	Circ
Seminal vesicle measurement Prostate & SV Study	Rt. Seminal V, Lt. Seminal V	SV-AP	SV-RL	SV-SI	
Bladder measurement Bladder & Testis Study Prostate & SV Study	Pre Bldr Vol., Pst Bldr Vol.	Vol.	BI-L	BI-W	BI-AP
Testicular measurement Bladder & Testis Study	Rt. Testis Vol., Lt. Testis Vol.	Vol.	Tst-L	Tst-W	Tst-AP
Renal measurement Kidney Study	Rt. Renal Vol., Lt. Renal Vol.	Vol.	Rnl-L	Rnl-W	Rnl-AP
	Rt. Cortex T, Lt. Cortex T	T1	T2	T3	
	Rt. Adrenal, Lt. Adrenal	L	W	AP	

Table2: B/D Mode

Measurement name	Menu	Measurement parameters				
Renal artery measurement Kidney study	Rt. Renal Art., Lt. Renal Art.	PI MnV Vm	RI ACC	S/D AccT	PSV FlowT	EDV AccT/FT
	UroDop1, UroDop2, UroDop3, UroDop4	PI MnV Vm	RI ACC	S/D AccT	PSV FlowT	EDV AccT/FT

4.1.2 Urological Measurement Study

Urological measurement has the following studies.

- Prostate & SV: For prostate, seminal vesicle
- Bladder & Testis: For bladder, testis
- Kidney: For kidney

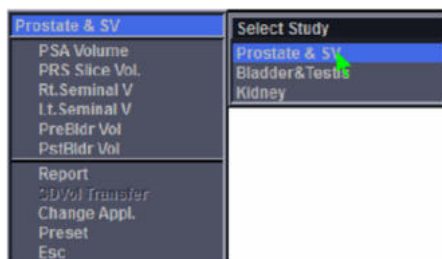
The measurement menu and report display differ with the selected study.

(1) Switching the Study

Switches the Study within the same application.

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select the item at the very top (current study name) from the Measurement menu.

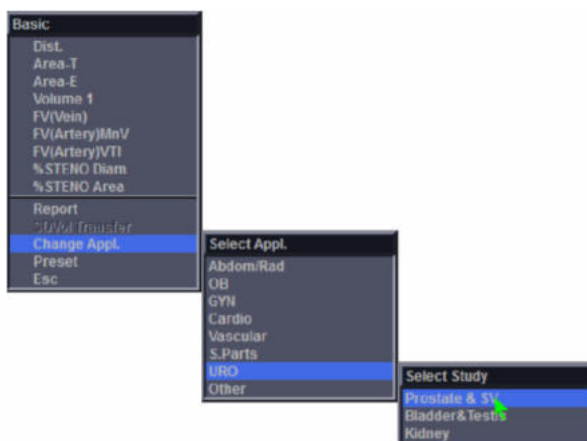


3. Select the Study you want to change.

(2) Switching from a Different Study of an Application

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select [Change Appl.].
3. Select the application.
4. Select Study.



Example of menu display: Switching from Basic under Abdomen
The study in the selected application appears.

4.2 Measurement Methods

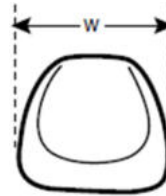
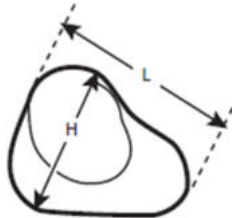
This chapter explains measurement methods.

4.2.1 B mode

(1) PSA Volume Measurement

Measure the three dimensions (Height, Length, Width) from two orthogonally intersecting cross-sections drawn using a per rectum biplane probe, and obtain the volume of the prostate.

Calculate the prostate specific antigen density (PSA Density) with respect to the volume of the prostate, using the prostate specific antigen (PSA) value entered from the ID screen.



If necessary, set up a correction coefficient so the Tandem-R kit is 1.00.

The factory default setting is 1.00.

If the kit used is other than Tandem-R, the PSA sensitivity and detection performance may differ, even for the same patient. Contact the pharmaceutical company regarding the correction coefficient for Tandem-R.

Procedure

1. Switch the measurement study to [Prostate & SV].
2. Record the longitudinal and transverse images of the prostate in the B/B mode.
3. Press the [Measurement] button on the touch panel.
4. Select [PSA Volume] from the measurement menu.
5. Measure the Height, Length and Width using the Caliper method.
The prostate volume is displayed. If the serum PSA value is entered on the ID screen, the PSAD is displayed.

Example of Measurement Results Display

PRS Volume		
Vol.:	cm ³	Volume of prostate
PR-H:	cm	Height of prostate
PR-L:	cm	Length of prostate
PR-W:	cm	Width of prostate
Predicted		
PSA Value		
PSA:	ng/ml	Serum PSA value input on the ID screen.
mPSA:	ng/ml	monoclonal PSA value
PSAD:		PSA Density value
PSA COEF:	1.00	Coefficient with flow volume

Reference information

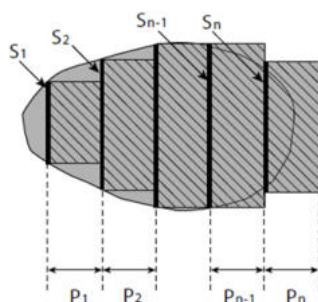
1.2.1 Caliper Method on page 27

(2) PRS Slice Volume Measurement

Use Step Planimetry to record the transverse sections at specified intervals and measure the area. Integrate these areas by multiplying by the specified value of the pitch and find the prostate volume.

By tracing the circumference of the prostate at each transverse image (Slice) drawn with a per rectum radial probe, it is possible to obtain the presumed circle area ratio (PCAR).

Volume calculation method



Calculation Formula Volume = $\{S1 \times P1 + S2 \times P2 + \dots + Sn \times Pn\}$

S1, S2, ...: Transverse image area of each slice.

There is no limit on the number of slices.

P1, P2, ...: Slice pitch (1 mm to 999 mm)

PCAR

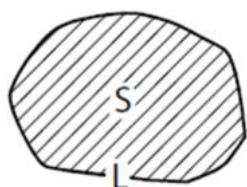
The ratio S/S' of the area of the largest cross section of the prostate S and a circle with the same circumference S' is referred to as PCAR (presumed circle area ratio), which is an index that indicates how closely the cross section of the prostate resembles a circle.

S : Maximum area of the prostate found via the B Trace method

L : Circumference of maximum area S of prostate

S' : Presumed circle area with the same length circumference L $S' = \pi (L/\pi)^2$

Area of the maximum horizontal cross-section image



Formula: Volume(cm^3) = $\sum Si \times \text{Pitch}$

Circumference L of presumed circle



PCAR = S/S'

Procedure

1. Switch the measurement study to [Prostate & SV].
2. Save each transverse image of the prostate to the internal hard disk.
 - a. Display a transverse image of the prostate, and freeze it.
 - b. Press the assigned [Store] SW.
 - c. Unfreeze the image and withdraw the radial rectal probe the specified distance.
 - d. Display and freeze the transverse view of the prostate with the probe withdrawn.
 - e. Press the assigned [Store] SW.

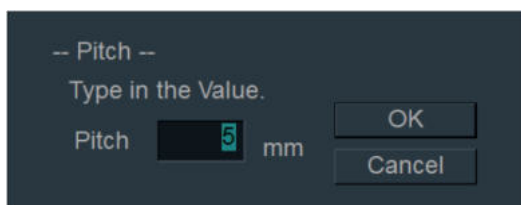
- f. Repeat steps c to e until you reach the edge of the prostate.
3. Replay each transverse image of the prostate that is stored in the memory of the equipment.
 - a. Select [Review] from the [Accessories] tab of the function menu.
All of the images stored in the memory are displayed.
 - b. Select image in Full Screen to playback.
 - c. Under [Window], select "Image Layout".
 - d. Select "Full Screen".
4. Press the [Measurement] button on the touch panel.
5. Select [PRS Slice Vol.] from the measurement menu.
6. Use the B Trace method to trace around the part of the prostate to be measured.
7. Measure the prostate measurement sites recorded from the 2nd one on.
 - a. Select [Image Prev/Next] in the function menu.
 - b. Press the [Caliper]key.
 - c. Use the B Trace method to trace around the prostate.
 - d. Measure the remaining prostate sites in the same way as in steps a to c.

Changing the width of the pitch

The factory default setting is 5 mm.

I) Rotate [Pointer] rotary encoder clockwise/counter-clockwise to highlight Pitch.

II) Enter values from the keyboard in the Pitch input dialog box that appears and select [OK].



Example of Measurement Results Display

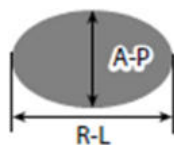
PRS Slice Vol	Prostate Slice Volume
Slice # 01	Slice number of image slices during current measurement
Pitch: 5.0 mm	Probe withdrawal distance
Vol. (#01 ~#01) cm ³	Number of images used to calculate the volume of the prostate Volume of prostate
PCAR:	Presumed circle area ratio (Presumed Circle Area Ratio)
Area: cm ²	Area of transverse view of prostate during current measurement
Circ: cm	Circumference of prostate during current measurement

Reference information

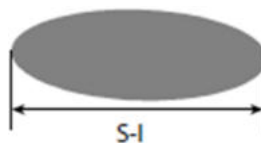
1.2.4 B Trace Method on page 30

(3) Seminal Vesicle Measurement

Measure the size of the left and right seminal vesicles (A-P: Anteroposterior diameter, R-L: Right-left diameter, S-I: Superoinferior diameter) from the longitudinal and transverse images of the seminal vesicles.



Longitudinal View



Transverse View

Procedure

1. Switch the measurement study to [Prostate & SV].
2. Record the longitudinal and transverse images of each seminal vesicle in the B/B mode.
3. Press the [Measurement] button on the touch panel.
4. Select [Rt. Seminal V] or [Lt. Seminal V] from the measurement menu.
 - For the right seminal vesicle, select [Rt. Seminal V].
 - For the left seminal vesicle, select [Lt. Seminal V].
5. Use the caliper method to measure SV-AP (A-P), SV-RL (R-L) and SV-SI (S-I).

Example of Measurement Results Display

Rt.Seminal V		: Right Seminal Vesicles
SV-AP:	cm	: Anteroposterior of Seminal Vesicle
SV-RL:	cm	:Right left of Seminal Vesicle
SV-SI:	cm	:Superoinferior of Seminal Vesicle

Reference information

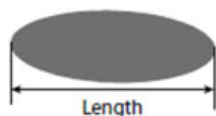
1.2.1 Caliper Method on page 27

(4) Bladder Volume Measurement

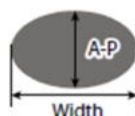
Obtain the volume of the bladder before and after it is full, and calculate the amount of urine discharged from the difference between these figures.

Approximate the bladder to an ellipsoid, measure the long and short axes of the transverse image (Width, A-P) and the length of the long axis of the longitudinal image (Length), and calculate the volume of the bladder.

Configure so the Width, A-P and Length are orthogonal to each other.



Longitudinal View



Transverse View

Procedure

1. Switch the measurement study to [Prostate & SV] or to [Bladder & Testis].
2. Record the vertical and transverse images of the bladder before and after urination in the B/B mode.
3. Press the [Measurement] button on the touch panel.
4. Select [Pre Bldr Vol.] from the Measurement menu.
5. Measure the Length, Width and A-P using the Caliper method.
 - a. Display the longitudinal section and measure the Length.
 - b. Display the transverse section and measure the Width and A-P.
The volume (Pre Bldr Vol.) is displayed.
6. Measure the bladder after urination.
 - a. Press the [Measurement] button on the touch panel and then select [Pst Bldr Vol.] from the measurement menu.
 - b. Calculate the Length, Width, A-P in the same way before urination.
The volume (Vol.) and the void volume (Void Volume) are displayed

Example of Measurement Results Display

PreBldr Vol.		: Measurement of bladder volume before urination
Vol.:	ml	: Volume of Bladder
Bl-L:	cm	: Bladder Length (Length)
Bl-W:	cm	: Width of Bladder (Width)
Bl-AP:	cm	: Bladder Anteroposterior (A-P)

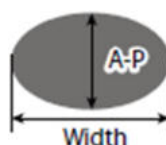
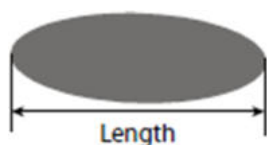
PstBldr Vol.		: Measurement of bladder volume after urination
Vol.:	ml	: Volume of Bladder
Bl-L:	cm	: Bladder Length (Length)
Bl-W:	cm	: Width of Bladder (Width)
Bl-AP:	cm	: Bladder Anteroposterior (A-P)
Void Volume:	ml	: Void Volume

Reference information

1.2.1 Caliper Method on page 27

(5) Testicle Volume Measurement

Approximate the left and right testes to an ellipsoid, measure the long and short axes of the transverse image (Width, A-P) and the length of the long axis of the longitudinal image (Length), and calculate the volume of each testicle.



Configure so the Width, A-P and Length are orthogonal to each other.

Procedure

1. Switch the study to [Bladder & Testis].
2. Record the longitudinal and transverse images of the testes in the B/B mode.
3. Press the [Measurement] button on the touch panel.
4. Select [Rt. Testis Vol] or [Rt. Testis Vol] from the measurement menu.
5. Measure the Length, Width, and A-P using the caliper method.
The volume (Vol.) is calculated.

Example of Measurement Results Display

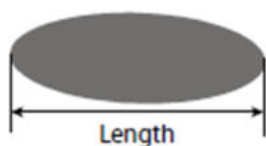
Rt. Testis Vol		
Vol.:	cc	: Volume of Testicle
Tst-L:	cm	: Testicle Length (Length)
Tst-W:	cm	: Width of Testicle (Width)
Tst-AP:	cm	: Anteroposterior of Testicle (A-P)

Reference information

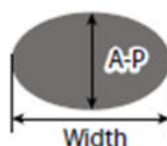
1.2.1 Caliper Method on page 27

4.2.2 Renal Volume Measurement

Approximate the left and right kidneys to an ellipsoid, measure the long and short axes of the transverse image (Width, A-P) and the length of the long axis of the longitudinal image (Length), and calculate the volume of each kidney.



Longitudinal View



Transverse View

Configure so the Width, A-P and Length are orthogonal to each other.

Procedure

1. Switch the study to [Kidney].
2. Record the longitudinal and transverse images of each kidney in the B/B mode.
3. Press the [Measurement] button on the touch panel.
4. Select [Rt. Renal Vol] or [Lt. Renal Vol] from the measurement menu.
5. Measure the Length, Width and A-P using the Caliper method.

Example of Measurement Results Display

Rt. Renal Vol		
---------------	--	--

Vol.:	cc	: Renal Volume
Rnl-L:	cm	: Renal Length (Length)
Rnl-W:	cm	: Width of Renal (Width)
Rnl-AP:	cm	: Anteroposterior of Renal (A-P)

Reference information

1.2.1 Caliper Method on page 27

4.2.3 Cortex Thickness Measurement

Measure the thickness of the left and right renal cortexes. Such measurements can be taken up to 3 times.

Procedure

1. Switch the study of [Kidney].
2. Record an image of a kidney in the B mode.
3. Press the [Measurement] button on the touch panel.
4. Select [Rt. Cortex T] or [Lt. Cortex T] from the measurement menu.
5. Measure the Thickness1 using the Caliper method.
6. If needed, take measurements of Thickness2 and Thickness3.

Example of Measurement Results Display

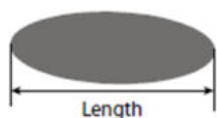
Rt. Cortex T	
T1:	cm : Thickness1
T2:	cm : Thickness2
T3:	cm : Thickness3

Reference information

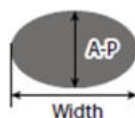
1.2.1 Caliper Method on page 27

4.2.4 Adrenal Measurement

Measure the long axis (Length) of the longitudinal section of the adrenal gland and the long and short axes of the transverse view (Width, A-P).



Longitudinal View



Transverse View

Procedure

1. Switch the study of [Kidney].
2. Record the longitudinal and transverse images of the adrenal gland in the B/B mode.

3. Select [Rt. Adrenal] or [Lt. Adrenal] from the measurement menu.
4. Measure the Length, Width and A-P using the Caliper method.

Example of Measurement Results Display

Rt. Adrenal		
L:	cm	:Length of Adrenal (Length)
W:	cm	:Width of Adrenal (Width)
AP:	cm	: Anteroposterior of Adrenal (A-P)

Reference information

1.2.1 Caliper Method on page 27

4.2.5 D Mode

The following precautions are necessary when taking measurements in D mode.

- When recording an arterial blood flow Doppler waveform (pulse method), set the Doppler incident angle as low as possible. If the Doppler angle of incidence exceeds 60°, the blood velocity measurement error increases.
- When measuring the blood velocity using multiple blood flow waveform images, use identical recording conditions (forward and reverse flow directions) for all blood flow waveforms. The blood flow measurement values of the system are recorded as real numbers but the $\pm$ sign is not displayed on the screen.
Completely different values might be displayed, particularly when the display of measurement values of reports is set at average value ([Display Data] is set at "Average" in the measurement preset ([Create Measurement Tools > Application Measurement > Report Data])).

(1) Renal Artery Measurements

Trace the renal artery flow Doppler waveforms and obtain the blood flow measurement data (PI, RI, S/D), and so on.

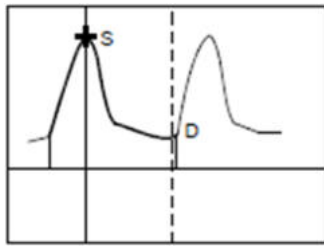
Dop Trace is comprised of [Auto](Auto Trace) and [Manual](Manual Trace). Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode)] to set the measurement method for each measurement parameter.

Procedure

1. Switch the study to [Kidney].
2. Record the renal artery blood flow Doppler waveform.
3. Press the [Measurement] button on the touch panel.
4. Select [Rt.Renal Art.] from the measurement menu for the right artery blood flow or [Lt. Renal Art.] for the left.

In Auto Trace the line cursor (perpendicular) is displayed, while for Manual Trace, the + mark is displayed.

5. Trace the blood flow Doppler waveform.
Once you trace the blood flow Doppler waveform, the line cursor is displayed along "S" (peak-systolic flow velocity point) and "D" (end-diastolic flow velocity point).



6. Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

Rt.Renal Art.	Selected menu
PI:	Pulsatility Index
RI:	Resistance Index
S/D:	PSV/EDV ratio
PSV: cm/s	Peak Systolic Velocity
EDV: cm/s	End Diastolic Velocity
MnV: cm/s	Mean Velocity
[1Beat avg.]	Detected Heartbeats

Reference information

1.2.5 Doppler Trace Method on page 31

(2) UroDop Measurements

Obtains the PSV (peak systolic velocity) and EDV or minimum diastolic velocity, and S/D from blood flow in arteries.

Four user measurements can be configured for the measurement of urological arterial flow.

Urological flow	UroDop1
measurement	UroDop2
	UroDop3
	UroDop4

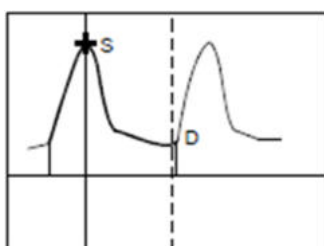
Use Name Assignment in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to change a measurement name.

The following 2 points can be set for these measurements.

- Peak systolic velocity (PSV)
- End diastolic velocity (EDV) or minimum diastolic velocity
NOTE: End-diastolic blood velocity (EDV) and the minimum diastolic velocity are not necessarily identical. Set the EDV time phase to match the blood velocity to be used for the measurement.

The Doppler Tracemethod consists of [Auto](Auto Trace) and [Manual](Manual Trace).. Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to set the measurement method for each measurement parameter.

1. Record the pulsating blood flow Doppler waveform.
2. Press the [Measurement] button on the touch panel.
3. Select any of the methods from the measurement menu:[UroDop1], [UroDop2], [UroDop3], [UroDop4].
In Auto Trace the line cursor (perpendicular) is displayed, while for Manual Trace, the + mark is displayed.
4. Trace the blood flow Doppler waveform.



When the blood flow Doppler waveform is traced, a line cursor accompanied by "S" (peak systolic velocity point) and "D" (end diastolic velocity point) is displayed.

5. Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

UroDop1	
PI:	Pulsatility Index
RI:	Resistance Index
S/D:	PSV/EDV ratio
PSV: cm/s	Peak Systolic Velocity
EDV: cm/s	End Diastolic Velocity
MnV: cm/s	Mean Velocity
[1Beat avg.]	Detected Heartbeats

4.3 Reports

Measurement results and obtained index values are sorted and displayed in the report.

Return	Header	Prev	Next	Prostate & SV	Graph	US Image	Output
Patient Information ID : 123-456-7890 Name : ALOKA Sex : Male Date of birth : 1960/06/11 Age : 50Y Height : Weight : Occupation : <Comments>							2011/02/01
Site Information Study Description : Referring Phys. : Reporting Phys. : Sonographer :							
<Prostate> Volume : 17.20cm ³ Length : 4.3cm Height : 3.4cm Width : 2.3cm PSA : 6.0ng/ml PSAD : 0.35 m-PSA : 2.1ng/ml PSA COEF : 1.00 <Digital findings>							
<Findings> Mass : Symmetry : Echogenicity : Capsule : Prostatitis : Lesion Location Zone : RIGHT LEFT Biopsy Location : RIGHT CENTER LEFT							

The following operations are available using the report.

I) Displaying measurement results and images

- Measurement results
- Displaying Graphs
- Recorded ultrasonic images
- Past exam results

II) Editing results, comments and findings

III) Printing reports (print, save)

4.3.1 Displaying a Report

NOTE: Report display requires patient data input. Enter patient data on the ID screen.

(1) Displaying a Report

Procedure

1. Display the report.
 - Press the [Measurement] button on the touch panel and then select [Report] from the measurement menu.
 - Select [Report] from the [Accessories] tab of the function menu.

Return	Header	Prev	Next	Prostate & SV	Graph	US Image	Output
Patient Information ID : 123-456-7890 Name : ALOKA Sex : Male Date of birth : 1960/06/11 Age : 50Y Height : Weight : Occupation : <Comments>							2011/02/01
Site Information Study Description : Referring Phys. : Reporting Phys. : Sonographer :							
<Prostate> Volume : 17.20cm ³ Length : 4.3cm Height : 3.4cm Width : 2.3cm PSA : 6.0ng/ml PSAD : 0.35 m-PSA : 2.1ng/ml PSA COEF : 1.00 <Digital findings>							
<Findings> Mass : Symmetry : Echogenicity : Capsule : Prostatitis : Lesion Location Zone : RIGHT LEFT Biopsy Location : RIGHT CENTER LEFT							

The following switches are located at the top of the report.

[Return]	Closes the report.
[Header]	Switches the Header Block display (patient data display) between Long Form and Short Form.
[Prev.]	Displays the previous page.
[Next]	Displays the next page.
[(Study list)]	Switches the Study in the report.
[Graph]	Displays a graph showing changes in measurement results.
[US Image]	Displays an ultrasonic image in the report.
[Output]	Outputs report data to a personal computer, storage media, printer or other destination.

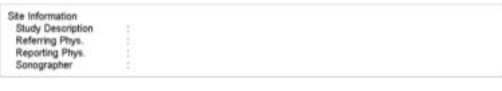
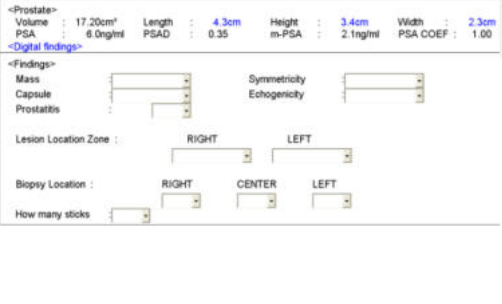
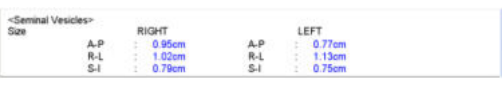
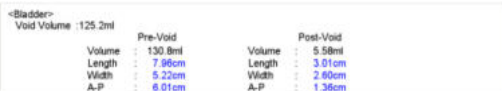
Switching from Report Screen to the Scanning Screen

- Select [Return] on the upper corner of the report screen.

(2) Information Blocks Displayed in a Report

Reports are displayed in Study units.

The urological Measurement studies are Prostate& SV, Bladder& Testis, and Kidney. All studies divide information into blocks for display. The Header Block and Site Information Block are always displayed in reports. Other blocks are set in the measurement preset ([Study Assignment > (Study name) > Combined Report Display]) while blocks that include measurement results registered in a report are displayed.

	Header Block Patient information that was entered in the ID screen. [<Comment>] Show/hide the comment input field.
	Site Information Block Facility information, doctor in charge, and other information
	Prostate Block Displays PSA Volume and PRS Slice V measurement results. [<Digital Findings>] You can enter comments in the results of a digital examination. [<Findings>] Ultrasonic image finding input field for the prostate.
	Seminal Vesicles Block Displays seminal vesicles measurement results.
	Bladder Block Displays Bladder Volume measurement results.

<<Testicles>> <table> <tr> <td></td> <td>RIGHT</td> <td></td> <td>LEFT</td> </tr> <tr> <td>Volume</td> <td>: 20.85cc</td> <td>Volume</td> <td>: 18.30cc</td> </tr> <tr> <td>Length</td> <td>: 4.42cm</td> <td>Length</td> <td>: 4.30cm</td> </tr> <tr> <td>Width</td> <td>: 2.48cm</td> <td>Width</td> <td>: 2.27cm</td> </tr> <tr> <td>A-P</td> <td>: 2.92cm</td> <td>A-P</td> <td>: 2.89cm</td> </tr> </table>		RIGHT		LEFT	Volume	: 20.85cc	Volume	: 18.30cc	Length	: 4.42cm	Length	: 4.30cm	Width	: 2.48cm	Width	: 2.27cm	A-P	: 2.92cm	A-P	: 2.89cm	Testicles Block Displays testis volume measurement results.																																				
	RIGHT		LEFT																																																						
Volume	: 20.85cc	Volume	: 18.30cc																																																						
Length	: 4.42cm	Length	: 4.30cm																																																						
Width	: 2.48cm	Width	: 2.27cm																																																						
A-P	: 2.92cm	A-P	: 2.89cm																																																						
<<Kidney>> <table> <tr> <td></td> <td>RIGHT</td> <td></td> <td>LEFT</td> </tr> <tr> <td>Volume</td> <td>: 106.5cc</td> <td>Volume</td> <td>: 103.2cc</td> </tr> <tr> <td>Length</td> <td>: 9.60cm</td> <td>Length</td> <td>: 9.55cm</td> </tr> <tr> <td>Width</td> <td>: 5.02cm</td> <td>Width</td> <td>: 5.08cm</td> </tr> <tr> <td>A-P</td> <td>: 4.48cm</td> <td>A-P</td> <td>: 4.34cm</td> </tr> </table> Cortical thickness <table> <tr> <td>1</td> <td>: 1.55cm</td> <td>1</td> <td>: 2.06cm</td> </tr> <tr> <td>2</td> <td>: 1.87cm</td> <td>2</td> <td>: 1.55cm</td> </tr> <tr> <td>3</td> <td>: 1.54cm</td> <td>3</td> <td>: 1.82cm</td> </tr> </table> Renal Artery <table> <tr> <td>RI</td> <td>: 0.81</td> <td>RI</td> <td>: 0.80</td> </tr> <tr> <td>PI</td> <td>: 1.34</td> <td>PI</td> <td>: 1.11</td> </tr> <tr> <td>S/D</td> <td>: 2.55</td> <td>S/D</td> <td>: 2.51</td> </tr> <tr> <td>PSV</td> <td>: 56.4cm/s</td> <td>PSV</td> <td>: 58.1cm/s</td> </tr> <tr> <td>EDV</td> <td>: 22.1cm/s</td> <td>EDV</td> <td>: 23.2cm/s</td> </tr> <tr> <td>MeV</td> <td>: 25.5cm/s</td> <td>MeV</td> <td>: 31.5cm/s</td> </tr> </table> Findings		RIGHT		LEFT	Volume	: 106.5cc	Volume	: 103.2cc	Length	: 9.60cm	Length	: 9.55cm	Width	: 5.02cm	Width	: 5.08cm	A-P	: 4.48cm	A-P	: 4.34cm	1	: 1.55cm	1	: 2.06cm	2	: 1.87cm	2	: 1.55cm	3	: 1.54cm	3	: 1.82cm	RI	: 0.81	RI	: 0.80	PI	: 1.34	PI	: 1.11	S/D	: 2.55	S/D	: 2.51	PSV	: 56.4cm/s	PSV	: 58.1cm/s	EDV	: 22.1cm/s	EDV	: 23.2cm/s	MeV	: 25.5cm/s	MeV	: 31.5cm/s	Kidney Block Displays measurement results for renal volume, cortical thickness, and renal artery.
	RIGHT		LEFT																																																						
Volume	: 106.5cc	Volume	: 103.2cc																																																						
Length	: 9.60cm	Length	: 9.55cm																																																						
Width	: 5.02cm	Width	: 5.08cm																																																						
A-P	: 4.48cm	A-P	: 4.34cm																																																						
1	: 1.55cm	1	: 2.06cm																																																						
2	: 1.87cm	2	: 1.55cm																																																						
3	: 1.54cm	3	: 1.82cm																																																						
RI	: 0.81	RI	: 0.80																																																						
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PSV	: 56.4cm/s	PSV	: 58.1cm/s																																																						
EDV	: 22.1cm/s	EDV	: 23.2cm/s																																																						
MeV	: 25.5cm/s	MeV	: 31.5cm/s																																																						
<<Adrenal>> <table> <tr> <td></td> <td>RIGHT</td> <td></td> <td>LEFT</td> </tr> <tr> <td>Length</td> <td>: 1.28cm</td> <td>Length</td> <td>: 1.14cm</td> </tr> <tr> <td>Width</td> <td>: 1.34cm</td> <td>Width</td> <td>: 1.02cm</td> </tr> <tr> <td>A-P</td> <td>: 0.92cm</td> <td>A-P</td> <td>: 0.90cm</td> </tr> </table>		RIGHT		LEFT	Length	: 1.28cm	Length	: 1.14cm	Width	: 1.34cm	Width	: 1.02cm	A-P	: 0.92cm	A-P	: 0.90cm	Adrenal Block Displays adrenal measurement results.																																								
	RIGHT		LEFT																																																						
Length	: 1.28cm	Length	: 1.14cm																																																						
Width	: 1.34cm	Width	: 1.02cm																																																						
A-P	: 0.92cm	A-P	: 0.90cm																																																						
<<Uro. Doppler Measurement>> <table> <tr> <td></td> <td>RI</td> <td>S/D</td> <td>PSV</td> <td>EDV</td> <td>MeV</td> </tr> <tr> <td>UroDop1</td> <td>: 0.81</td> <td>: 1.34</td> <td>: 56.4cm/s</td> <td>: 22.1cm/s</td> <td>: 25.5cm/s</td> </tr> <tr> <td>UroDop2</td> <td>: 0.80</td> <td>: 1.11</td> <td>: 58.1cm/s</td> <td>: 23.2cm/s</td> <td>: 31.5cm/s</td> </tr> </table>		RI	S/D	PSV	EDV	MeV	UroDop1	: 0.81	: 1.34	: 56.4cm/s	: 22.1cm/s	: 25.5cm/s	UroDop2	: 0.80	: 1.11	: 58.1cm/s	: 23.2cm/s	: 31.5cm/s	Uro. Doppler Measurement Block Displays the measurement results for Uro Dop1 to Uro Dop4.																																						
	RI	S/D	PSV	EDV	MeV																																																				
UroDop1	: 0.81	: 1.34	: 56.4cm/s	: 22.1cm/s	: 25.5cm/s																																																				
UroDop2	: 0.80	: 1.11	: 58.1cm/s	: 23.2cm/s	: 31.5cm/s																																																				

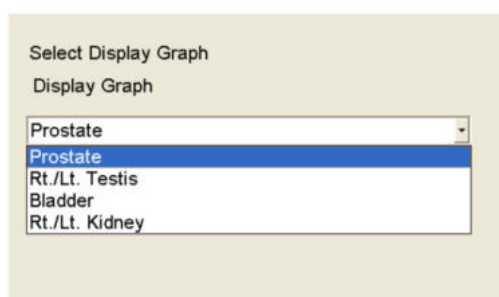
Other than the above, there is the US Image Block that displays ultrasonic images.

To Display a Graph

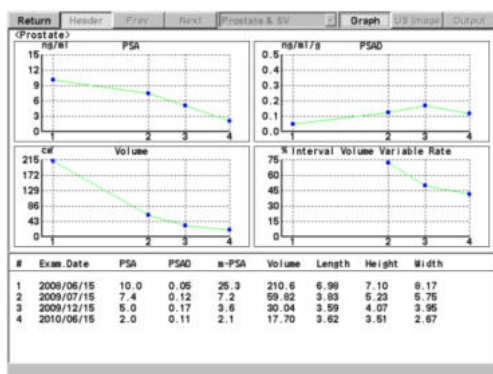
Displays the changes in the measurement results and/or index values for prostate, testes, bladder or kidneys as a graph.

Procedure

1. Select [Graph] on the upper corner of the report screen.
The following dialog box is displayed.



2. Select the parameter to display in the graph.
3. Select [OK].
The graph is displayed.



4. To close the graph display, select [Graph] on the upper corner of the report screen.

(3) Attaching an Ultrasonic Image

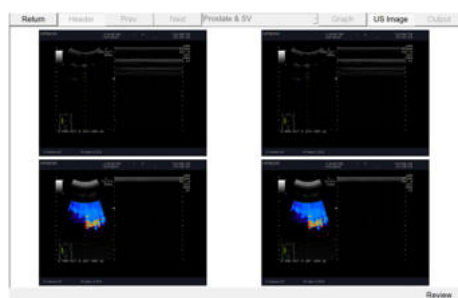
You can attach ultrasonic images to reports. The attached ultrasonic images will be displayed in the US Image Block. You can add stored images of the patient whose report is being displayed from the system hard disk or a USB flash drive.

Use the following options in [Report Data] under preset to select images to display in the US Image Block.

- Use Display Pasted US Image Form on the Screen to set the display format.
- Set the number of images to display immediately after selecting US Image Block in [Automatically be Displayed US Images Number].

Procedure

1. Select [US Image] on the upper corner of the report screen.
The US Image Block is displayed. The number of images configured with the preset are displayed in the order of top-left, top-right, etc., from the latest image saved to the system's hard disc or connected media, such as USB flash drive.
Images will be displayed as shown below when [Display Pasted US Image Form on the Screen] is set to [2×2] and [4] is selected in [Automatically be Displayed US Images Number.].



When 4 images are stored

2. If necessary, change the displayed images.
 - a. Select [Review] at the bottom of the screen.
Images on the system hard disk and connected media are displayed as thumbnails. Only today's images of the current patient are displayed. "Current Exam.View" is displayed at the top right of the screen.



- b. Select an image to display.
- c. After selecting all the images to display, select [Paste Desired US].
Only the selected images are displayed in the US Image block.

Displaying images from past examination dates

Select [Change View] under the thumbnails. "Current&Past Exam View" is displayed in the upper right corner of the screen and past exam images of the current patient are displayed. You can also select images from past examinations to display in the US Image Block.

When you re-select [Change View], the screen switches to display the images of the day only (Current Exam.View). "Current Exam.View " is displayed at the top right of the screen.

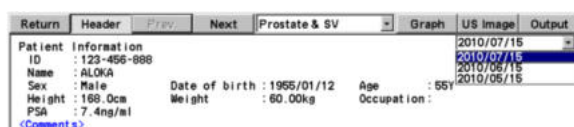
3. To return to the report page, select [Return].

(4) Displaying Past Reports

NOTE: You cannot modify the data in the past reports.

Procedure

1. Select [▼] for the date on the top right of the report screen.
When past reports are available, a list of the report dates is displayed.



The screenshot shows a software interface for a medical report. At the top, there are tabs: 'Return', 'Header', 'Prev', 'Next', 'Prostate & SV', 'Graph', 'US Image', and 'Output'. Below these, the 'Header' tab is active, displaying 'Patient Information'. The information includes: ID: 123-456-888, Name: ALOKA, Sex: Male, Date of birth: 1955/01/12, Age: 55Y, Height: 168.0cm, Weight: 60.00kg, PSA: 7.4ng/ml, and Occupation: . On the right side, there is a dropdown menu for dates, with '2010/07/15' selected. Below the patient information, there is a link labeled '<Comments>'.

2. Select the date of the report you want to open.
The report of the selected date opens.

4.3.2 Editing Reports

You can edit the following contents in the report.

- Comments
- Findings
- Measurement results

(1) Entering Comments

Enter comments including ultrasound comments in the Comments field in Header Block.

Procedure

1. Select [<Comments>].
When the [<Comments>] are hidden
Select [Header] on the upper corner of the report screen and select [<Comments>].
A text box is displayed.

2. Enter a comment using the keyboard.
3. Select [OK] when you finish entering the comments.
The entry is confirmed.
To cancel the entry, select [Cancel].

(2) Entering Findings

Urology reports have fields for entering findings in the Prostrate Block and in the Kidney Block. The Prostate Block has fields for Digital Findings as well as for Findings. The Kidney Block has a field for Findings.

Entering Digital Findings: Prostate & SV Block

Enter the results of your manual exam.

Procedure

1. Under Prostate Block, select [<Digital Findings>].
A text box is displayed.

2. Enter a comment using the keyboard.
3. Select [OK] when you finish entering the comments.
The entry is confirmed.
To cancel the entry, select [Cancel].

Entering Findings

Enter your ultrasound findings for the prostate in the different Findings fields of the Prostate Block. Enter your ultrasound findings for the kidneys in the different Findings fields of the Kidney Block.

Procedure

1. Select the findings from the Findings list. Or enter from the keyboard.

Selecting from the list

- a. Select [▼] on the list
- b. Select the appropriate finding.

Entering via the keyboard

What you enter will be added to the list.

- a. Select a box.
- b. Enter via the keyboard.

The content that is entered is added to the list as user-defined content.

To delete such content from the list, highlight the content with the trackball and select the [Delete] key.

Findings List

Findings have the following parameters. If the desired parameter is not found below, enter info directly in the List field.

I) Prostste & SV Block

<Prostate>
 Volume : 17.20cm³ Length : 4.3cm Height : 3.4cm Width : 2.3cm
 PSA : 6.0ng/ml PSAD : 0.35 m-PSA : 2.1ng/ml PSA COEF : 1.00
 <Digital findings>
 <Findings>
 Mass : [] Symmetry : []
 Capsule : [] Echogenicity : []
 Prostatitis : []
 Lesion Location Zone : [] RIGHT [] LEFT []
 Biopsy Location : [] RIGHT [] CENTER [] LEFT []
 How many sticks : []

<Findings>	Options				
Mass	Cystic	Solid	Mixed		
Symmetry	Symmetric	Asymmetric	R>L	L>R	
Capsule	Intact	Disrupted	TURP		
Echogenicity	Normal	Hypoechoic	Isoechoic	Hyperechoic	Diffuse
Prostatitis	Yes	No			
Lesion Location Zone	Peripheral	Central	Transition		
Biopsy Location	Yes	SNo			
How many sticks	1 to 10				

II) Kidney Block

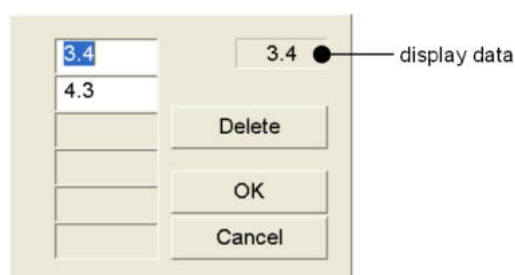
<Kidney>
 RIGHT LEFT
 Volume : 106.5cc Volume : 103.2cc
 Length : 9.69cm Length : 9.55cm
 Width : 5.02cm Width : 5.08cm
 A-P : 4.48cm A-P : 4.34cm
 Cortical thickness
 1 : 1.55cm 1 : 2.06cm
 2 : 1.87cm 2 : 1.55cm
 3 : 1.54cm 3 : 1.82cm
 Renal Artery
 RI : 0.61 RI : 0.60
 PI : 1.34 PI : 1.11
 S/D : 2.55 S/D : 2.51
 PSV : 56.4cm/s PSV : 58.1cm/s
 EDV : 22.1cm/s EDV : 23.2cm/s
 MnV : 25.5cm/s MnV : 31.5cm/s
 Findings : []

<Findings> Options
Agenesis Kidney
Supernumerary Kidney
Horseshoe Kidney
Cake Kidney
Pelvic Kidney
Hydronephrosis
Polycystic Kidney
Mass-Cystic
Mass-Solid
Mass-Mixed

(3) Editing the Measurement Results

Procedure

1. Select the measurement value to be modified.
The dialog box with the measurement value opens.



If [Display Data] of the [Report Data] preset is "Current", the latest data is displayed in the report screen. If set to "Average", an average value is displayed.

2. Revise the data.

Deleting data

- I) Select the measurement value from the dialog box.
- II) Select [Delete] from the dialog box.
- III) Select [OK] from the dialog box.

Revising data

Measurement results, such as PI and RI, correlate to two blood flow velocities (EDV and PSV) within the same heartbeat cycle. For that reason, any revisions that are made must be made to both to ensure that a mutual time phase relationship is maintained.

- I) Select the measurement value from the dialog box.
- II) Enter values from the keyboard.
- III) Select [OK] from the dialog box.

Selecting the data to be displayed

You can change the measured values displayed in the report screen if the Display Data in the preset[Report Data] is "Current" .

- I) Select the measurement value from the dialog box.
- II) Select [OK] from the dialog box.

Displaying a modified report

A # mark will be added to the name of the modified item.

The screenshot shows a medical report interface. At the top, under the heading "<Prostate>", various measurements are listed: Volume (16.78cm³), Length (4.3cm), #Height (3.3cm), Width (2.3cm), PSA (6.0ng/ml), PSAD (0.36), m-PSA (2.0ng/ml), and PSA COEF (1.00). Below this, under the heading "<Digital findings>", there is a section for "<Findings>" with dropdown menus for Mass, Capsule, Prostatitis, Symmetry, and Echogenicity. Further down, there are sections for "Lesion Location Zone" with "RIGHT" and "LEFT" options, "Biopsy Location" with "RIGHT", "CENTER", and "LEFT" options, and "How many sticks" with a dropdown menu.

4.3.3 Outputting Reports

There are 2 ways to output reports.

- Outputting to a local printer: Select the Block to output.
- Outputting as a CSV file: Output the values registered to the report to a connected media or device.

(1) Printing

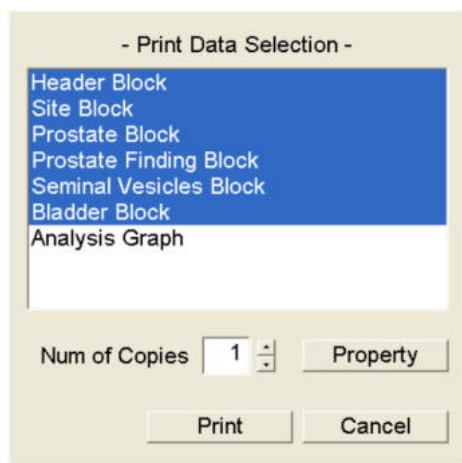
Print a report to the local printer (printer connected to the system).

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.

The screenshot shows a dialog box titled "Select Device". It contains three radio button options: "to Printer", "to PC", and "Export CSV file". The "Export CSV file" option is currently selected. At the bottom of the dialog box, there are two buttons: "OK" and "Cancel".

2. Select [to Printer], and press [OK].
The dialog box is displayed.

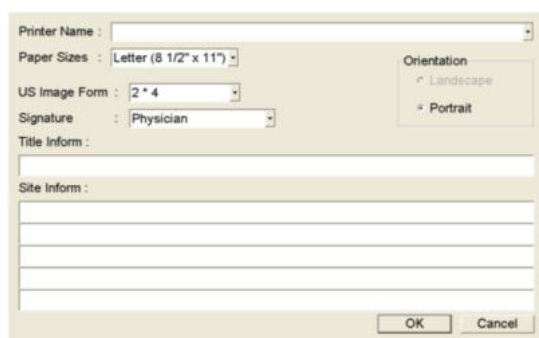


3. Select the blocks to be printed.
 - a. Select one of the blocks to print.
 - b. Repeat this step and highlight all the blocks to print.

To cancel a selected block, select that block again.
4. Use Num of Copies to set the number of copies to print.
5. Configure printer properties if necessary.
 - a. Select [Property].
 - b. See the next section to configure the printer property.
6. Select [Print].

Printer Properties

You can set the advanced printer properties.



Item	Options	Description
Printer Name		Select the printer model.
Paper Sizes	US Letter	Prints on US letter size paper.
	A4	Prints on A4 size paper.
Orientation	Portrait	Sets the direction of the paper to the vertical orientation (there is no other option).

Item	Options	Description
US Image Form	1x2	Prints a US Image block with 1 row of 2 images per sheet.
	1x3	Prints a US Image block with 1 row of 3 images per sheet.
	2x2	Prints a US Image block with 2 rows of 2 images per page.
	2x4	Prints a US Image block with 2 rows of 4 images per page.
Signature	Physician	Sets the Physician signature field.
	Phys. & Sonographer	Sets the Physician and Sonographer signature fields.
	None	Hides the signature field.
Title Inform		You can enter a report title using no more than 80 characters.
Site Inform		You can enter facility information (hospital department, address, telephone number, FAX number, etc.).

(2) Outputting as a CSV File

You can output data registered in the report as a CSV file.

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.



2. Select [Export CSV file], and press [OK].
The dialog box is displayed.

The file name is displayed in the format ID_Date_Application.
Select [Cancel] to return to the report screen.

3. Select the storage destination from the Target Medium list.
4. Change the file name if necessary.
5. Select [OK].

The selected CSV file is saved in the specified media.

The patient information, numerical values and comments appear in the CSV file in that sequence.

4.4 Presets

Urological measurement presets (Urology preset) can be broadly divided into 3 types.

- Create Measurement Tools
Settings for measurement methods, caliper mark display, and report display.
Settings for basic measurement, and for applied measurement.
- Study Assignment
Enables you to set menus, transfer items and report view in the study.
These are set for each study.
- SW Assignment
Assigns measurement functions to menu items.

Table3: Urology preset configuration

Create Measurement Tools	Basic Measurement	Measured Method & Display Items	B.Mode		
			M.Mode		
			D.Mode		
			F.Mode		
		Caliper Mark Control			
		Unit Selection			
		Caliper Auto Off			
		Display Form		Mark Display	
	Application Measurement	Measured Method & Display Items	B.Mode		
			D.Mode		
		Caliper Mark Control			
		Unit Selection			
		Caliper Auto Off			
		Report Data			
		Display Form		Mark Display	
		User's Calculation		Reserved Word	
Study Assignment	Prostate & SV Bladder & Testis Kidney	Menu Assign			
		Combined Report Display			
		Transfer List Assign			
		Other			
SW Assignment	Touch Panel SW Assignment				
	+Mark Key Assignment				

4.4.1 Urology Presets

The pages of the preset are displayed as shown below.



[URO Preset]
Urology Preset top page

(1) Create Measurement Tools

Settings for measurement methods, caliper marks, and report display.

Basic Measurement

Refer to the presets for basic measurements.

Reference information

2.2.7(3) Measurement-related Settings: Create Measurement Tools on page 82

Application Measurement

Settings for applied measurement (urology measurement).

[Measured Method & Display Items > B.Mode]
(1/2): B mode measurement settings

[Measured Method & Display Items > B.Mode]
(2/2): B mode measurement settings

[Measured Method & Display Items > D.Mode]
(1/3): D mode measurement settings

[Measured Method & Display Items > D.Mode]
(2/3): D mode measurement settings

[Measured Method & Display Items > D.Mode]
(3/3): D mode measurement settings



[Caliper Auto Off]: Caliper mark and measurement result display settings for when freeze is canceled

[Unit Selection]: Display unit settings for measurement results

[Report Data]: Report display data settings

[Display Form]: Vertical and horizontal display of measurement results, display of multiple results, settings for simultaneous display with basic measurement

[Display Form > Mark Display]: Caliper mark display settings

[User's Calculation]: User index calculation formula settings

[User's Calculation > Reserved Word]: Reserved word settings for user index calculation formulas

User's Calculation

Equation Program

Create User's Calculation

Delete User's Calculation

U-Calc. 1	U-Calc. 16
U-Calc. 2	U-Calc. 17
U-Calc. 3	U-Calc. 18
U-Calc. 4	U-Calc. 19
U-Calc. 5	U-Calc. 20
U-Calc. 6	U-Calc. 21
U-Calc. 7	U-Calc. 22
U-Calc. 8	U-Calc. 23
U-Calc. 9	U-Calc. 24
U-Calc. 10	U-Calc. 25
U-Calc. 11	U-Calc. 26
U-Calc. 12	U-Calc. 27
U-Calc. 13	U-Calc. 28
U-Calc. 14	U-Calc. 29
U-Calc. 15	U-Calc. 30

Exit Cancel

User's Calculation: Reserved Word (1/2)

Reserved Word Registration

Create Reserved Word

Delete Reserved Word

Reserved Word 1	Reserved Word 16
Reserved Word 2	Reserved Word 17
Reserved Word 3	Reserved Word 18
Reserved Word 4	Reserved Word 19
Reserved Word 5	Reserved Word 20
Reserved Word 6	Reserved Word 21
Reserved Word 7	Reserved Word 22
Reserved Word 8	Reserved Word 23
Reserved Word 9	Reserved Word 24
Reserved Word 10	Reserved Word 25
Reserved Word 11	Reserved Word 26
Reserved Word 12	Reserved Word 27
Reserved Word 13	Reserved Word 28
Reserved Word 14	Reserved Word 29
Reserved Word 15	Reserved Word 30

Exit Cancel

(2) Study Assignment

You can configure the menu, transferred items and report view in each study.

[Study Assignment]: Tree view display settings of Study and user-defined Study

Study Assignment

Select Study

Copy from Other Study

Select Display Study on the Left Tree View

Study Name	Study Name	Study Name	Study Name
Prostate & SV	ON	User8	OFF
Bladder&Testis	ON	User9	OFF
Kidney	ON	User10	OFF
User1	OFF	User11	OFF
User2	OFF	User12	OFF
User3	OFF	User13	OFF
User4	OFF	User14	OFF
User5	OFF	User15	OFF
User6	OFF	User16	OFF
User7	OFF	User17	OFF
		User18	OFF
		User19	OFF
		User20	OFF
		User21	OFF
		User22	OFF

Exit Cancel

[Menu Assign]

Measurement menu parameter settings

Menu Assign

[Prostate & SV]

Select the Study at the Top Screen of Study Assignment and then Setup Measurement Menu Format.

Select Target View Mode

Select B(F) Mode Items

Distance	Dist-trace	Area-Trace	Area-Ellipse
Area-Circle	Volume 1	Volume 2	Histogram
B Index	Rt Hip J Angle	Lt Hip J Angle	Angle
Flow Profile			

PSA Volume PRS Slice Vol. Rt Seminal V Lt Seminal V
PreBldr Vol. PstBldr Vol. Rt Testis Vol Lt Testis Vol
Rt Renal Vol Lt Renal Vol Rt Cortex T Lt Cortex T
Rt Adrenal Lt Adrenal

Exit Cancel

[Combined Report Display]

Report display block settings

Combined Report Display

Study Name [Prostate & SV]

1. Header Block	
2. Site Block	
3. Prostate Block	15
4. Prostate Finding Block	16
5. Seminal Vesicles Block	17
6. Bladder Block	18
7.	19
8.	20
9.	21
10.	22
11.	23
12.	24
13.	25
14.	26

Exit Cancel

[Transfer List Assign]

Settings for transferring basic measurement results

[Other]

Measurement guide message display settings

(3) SW Assignment

Assigns measurement menus to the [Meas] tab in the function menu or select the basic measurement menu that will appear when you press the [Caliper] key.

[Touch Panel SW Assignment]

Configures the items that can be assigned to the [Meas] tab in the function menu.

[+Mark Key Assignment]

Sets the measurement item to launch when the [Caliper] key is pressed.

4.5 References

4.5.1 Formulas

Measurement menu	Formulas
PSA Volume	Volume (cm ³) = 0.52 × Height × Width × Length
	mPSA(ng/ml) = 0.12 × Volume × PSA Coefficient
	PSAD(ng/ml/g) = PSA × PSA Coefficient/Volume

Measurement menu	Formulas
PRS Slice Vol.	Volume (cm ³) = $\Sigma S_i \times \text{Pitch}$
	PCAR = S/S'
	S: Maximum area of the prostate measured using the B Trace method
	L: Circumference of maximum area S of prostate
	S': Presumed circle area with the same length circumference L ($S' = \pi \times (L/2\pi)^2$)
Bladder Volume	Volume (ml) = $\pi/6 \times \text{Length} \times \text{Width} \times (A-P)$
Testis Volume	Volume (cc) = $0.65 \times \text{Length} \times \text{Width} \times (A-P)$
Renal Volume	Volume (cc) = $0.49 \times \text{Length} \times \text{Width} \times (A-P)$

4.5.2 References

(1) B mode

I) PSA Volume

Benson MC, Whang IS, Olsson CA, McMahon DJ, Cooner WH. "The use of prostate specific antigen density to enhance the predictive value of intermediate levels of serum prostate specific antigen." J Urol. 1992 March, 147 (3 Pt 2), 817-821

II) mPSA

Littrup PJ, Lee F, Mettlin C. "Prostate cancer screening: current trends and future implications." CA Cancer J Clin. 1992 July-August, 42 (4), 198-211.

III) PRS Slice Volume

Watanabe H, Igari D, Tanahashi Y, Harada K, Saitoh M. " Transrectal ultrasonotomography of the prostate," J Urol. 1975 November, 114 (5), 734-739.

IV) PCAR

Hiroshi Oe, Masato Saito et al., "32-61 Ultrasonic diagnosis of benign prostatic hyperplasia, (Part 2), " Proceedings from the Japan Society of Ultrasonics in Medicine, November 1977, 121-122,

V) Seminal Vesicles

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VI) Bladder Volume

Barry B. Goldberg, M. D., Alfred B. Kurtz, M. D., "Atlas of Ultrasound Measurements, " Mosby Year Book Medical Publishers, INC., 1990, 165-170, ISBN: 0815135416

VII) Testis Volume

- Barry B. Goldberg, M. D., Alfred B. Kurtz, M. D., "Atlas of Ultrasound Measurements," Mosby Year Book Medical Publishers, INC., 1990, 185-187, ISBN: 0815135416
- V. Dornberger, G. Dornberger, M. Eggstein, "Volumetrie des Hodens mittels Real-time-Sonographie," Ultrascall, 7, 300-303, 1986

VIII) Renal Volume

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- Hricak H, Lieto RP. "Sonographic Determination of Renal Volume," Radiology, 1983 July, 148 (1), 311-312

(2) D mode

I) Renal Artery

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- Nazzal MM, Hoballah JJ, Miller EV, Sharp WJ, Kresowik TF, Corson J. "Renal Hilar Doppler Analysis Is of Value in the Management of Patients with Renovascular Disease," Am J Surg., 1997 August, 174 (2), 164-168.

4.5.3 Terms and Abbreviations

Abbreviation	Meaning	Meaning
ACC	Acceleration	Acceleration
AccT	Acceleration Time	Acceleration Time
AccT/FT	AccT/FT	
Adrenal	Adrenal	Adrenal
AP	Antero posterior diameter	Anteroposterior diameter
Area	Area	Area
Bl	Bladder	Bladder
Circ	Circumference	Circumference
Cortex	Cortical	Cortical
EDV	End Diastolic Velocity	End Diastolic Velocity
FlowT	Flow time	Flow time
L	Length	Length
MnV	Mean Velocity	Mean Velocity
mPSA	monoclonal PSA	Monoclonal PSA value
PCAR	Presumed Circle Area Ratio	Presumed Circle Area Ratio
PI	Pulsatility Index	Pulsatility Index
Pitch	Slice Pitch(interval)	Slice Pitch(interval)
PRS	Prostate	Prostate
Pre.Bldr Vol.	Pre Bladder Volume	Pre Bladder Volume
PRS Slice Volume	Prostate Slice Volume by stepper method	Volume of prostate
PSA	Prostate Specific Antigen	Prostate Specific Antigen
PSA COEF.	PSA Coefficient	PSA Coefficient
PSA Volume	Prostate Specific Antigen Volume	Volume of prostate
PSAD	PSA Density	PSA Density

Abbreviation	Meaning	Meaning
Pst.Bldr Vol.	Post Bladder Volume	Post Bladder Volume
PSV	Peak Systolic Velocity	Peak Systolic Velocity
Renal Art	Renal Artery	Renal Artery
Renal Vol.	Renal Volume	Renal Volume
RI	Resistance Index	Vascular resistance
RL	Right-Left diameter	Right-Left diameter
Rnl	Renal	Renal
Rt./Lt.	Right/Left	Right/Left
S/D	Systolic/Diastolic velocity Ratio	Systolic/Diastolic velocity ratio
SI	Supero inferior diameter	Superoinferior diameter
Slice #	Slice Number	
SV	Seminal Vesicles	Seminal Vesicles
T1	Cortex Thickness1	Cortex Thickness1
T2	Cortex Thickness2	Cortex Thickness2
T3	Cortex Thickness3	Cortex Thickness3
Testis Vol.	Testicular Volume	Testicular Volume
Tst	Testis	Testis
Uro Dop1	Uro Doppler	
Vm	Mean Velocity	Mean velocity (Mean method)
Vol.	Volume	Volume
W	Width	Width



Superficial Organ Measurement

- 5.1 Superficial Organ Measurement Overview
- 5.2 Measurement Methods
- 5.3 Reports
- 5.4 Presets
- 5.5 References

5.1 Superficial Organ Measurement Overview

5.1.1 Superficial Organ Measurement Menus

The following measurement menus and items are available for superficial organ measurements.

Table1: B Mode

Measurement name, Menu	Measurement parameters			
Lesion measurement (for breast use) Rt.Lesion(Breast)1 through Rt.Lesion(Breast)6 Lt.Lesion(Breast)1 through Lt.Lesion(Breast)6	Diam1	Diam2	Diam3	Vol.
Aspect ratio measurements Rt.D/W ratio1 through Rt.D/W ratio6 Lt.D/W ratio1 through Lt.D/W ratio6	Depth	Width	D/W	
Nipple-tumor distance measurement Rt.NT dist1 through Rt.NT dist6 Lt.NT dist1 through Lt.NT dist6	NT dist			
Thyroid gland volume measurement Rt.Thyroid Vol. Lt.Thyroid Vol.	L	A-P	W	Vol.
Thyroid isthmus thickness measurements Isthmus Thickness	Isthmus T			

Table2: D Mode

Menu	Measurement parameters				
Artery blood flow measurements (for breast use)	PI	RI	S/D	PSV	EDV
BreDop1, BreDop2, BreDop3	MnV	Vm			
Artery blood flow measurements (for thyroid gland use)	PI	RI	S/D	PSV	EDV
ThyDop1, ThyDop2, ThyDop3	MnV	Vm			

5.1.2 Superficial Organ Measurement Studies

Superficial organ measurement offers the following studies.

- Breast: For mammary gland use
- Thyroid: For thyroid gland use

The measurement menu and report display differ with the selected study.

(1) Switching the Study

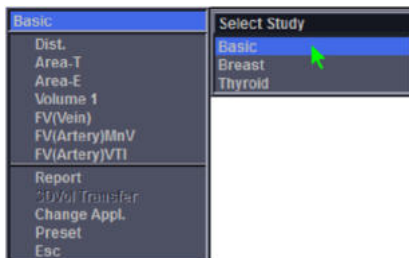
Switches the Study within the same application.

Procedure

1. Press the [Measurement] button on the touch panel.

The measurement menu corresponding to the screen mode is displayed.

2. Select the item at the very top (current study name) from the Measurement menu.

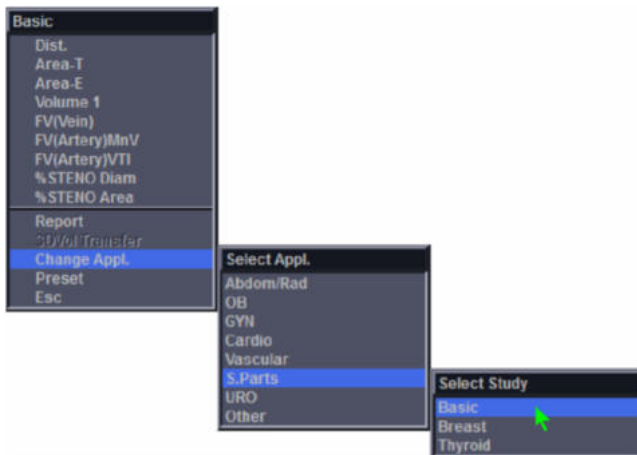


3. Select the Study you want to change.

(2) Switching from a Different Study of an Application

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select [Change Appl.].
3. Select the application.
4. Select Study.



Example of menu display: Switching from Basic under Abdomen
Switches to the study of the selected application.

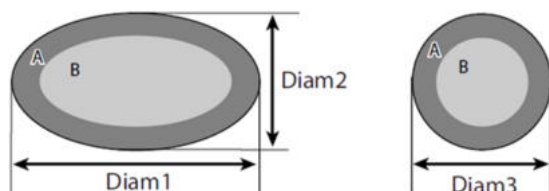
5. Select the Study you want to change.

5.2 Measurement Methods

5.2.1 B Mode Measurement

(1) Lesion Breast Measurements

Calculates the volume of the lesion by approximating the image of the measurement target as a rotated ellipsoid. Measure the lengths of the 3 axes at the largest cross section including the high-echo boundary region image.



Schematic of lesion
A: High-echo region
B: Low-echo region

Procedure

1. Use B/B mode to record the maximum diameter (Diam1) of the lesion and the diameter (Diam3) that is orthogonal to it.
2. Press the [Measurement] button on the touch panel.
3. Select ([Lesion Breast]) from the Measurement menu.
Lesion Breast Measurement Menu
The measurement menu contains [Rt.Lesion(Breast)1] through [Rt.Lesion(Breast)6] for the right breast and [Lt.Lesion(Breast)1] through [Lt.Lesion(Breast)6] for the left breast.
4. Measure the maximum diameter (Diam1) using the + mark that is displayed.
5. Measure the height (Diam2) of the largest diameter.
6. Measure the maximum diameter (Diam3) of the cross section that intersects orthogonally with the section with the largest diameter.

Example of Measurement Results Display

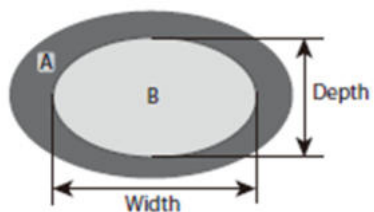
Rt.Lesion1	
Diam1: mm	: Diameter of first axis
Diam2: mm	: Diameter of second axis
Diam3: mm	: Diameter of third axis

Reference information

1.2.1 Caliper Method on page 27

(2) D/W Ratio Measurements

Use this function to measure the maximum longitudinal (Depth) and transverse (Width) diameters in the largest cross-section through the lesion that does not include high-echo boundary regions (the measurement target image), and to calculate the D/W ratio.



Schematic of lesion
A: High-echo region
B: Low-echo region

Procedure

1. Record the largest cross section through the lesion.
2. Press the [Measurement] button on the touch panel.
3. Select ([D/W ratio]) from the Measurement menu.
D/W ratio Measurement Menu
The measurement menu contains [Rt.D/W ratio1] through [Rt.D/W ratio6] for the right breast and [Lt.D/W ratio1] through [Lt.D/W ratio6] for the left breast.
4. Measure the maximum longitudinal diameter (Depth) using the caliper method.
5. Measure the maximum transverse diameter (Width) using the caliper method.
The D/W ratio is calculated.

Example of Measurement Results Display

Rt.D/W ratio1		
D/W:		: Depth/Width Ratio
Depth:	mm	: Maximum longitudinal diameter
Width:	mm	: Maximum transverse diameter

Reference information

1.2.1 Caliper Method on page 27

(3) NT Distance Measurements

This measures the shortest distance between the edge of the lesion and the midpoint of the straight line joining the underside of the peripapillary skin.

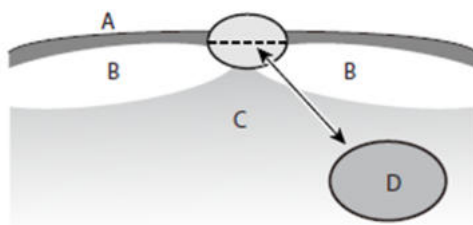


Diagram of papilla of breast
A: skin
B: fat
C: mammary gland
D: tumor

Procedure

1. Record an image that includes the nipple and the lesion.

2. Press the [Measurement] button on the touch panel.
3. Select ([NT dist]) from the Measurement menu.
NT dist Measurement Menu
 The measurement menu contains [Rt.NT dist1] through [Rt.NT dist6] for the right breast and [Lt.NT dist1] through [Lt.NT dist6] for the left breast.
4. Use this function to measure the shortest distance between the edge of the lesion and the midpoint of the straight line joining the underside of the peripapillary skin using the caliper method.

Example of Measurement Results Display

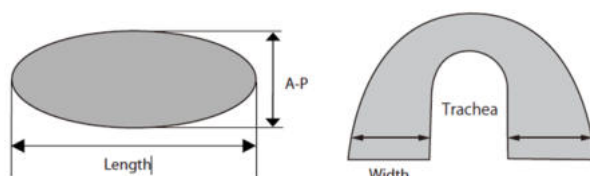
Rt. NT dist1:	
mm	: Nipple-tumor distance

Reference information

1.2.1 Caliper Method on page 27

(4) Thyroid Volume Measurements

Calculates the volume by measuring the length of the longitudinal section (Length), the anteroposterior distance (A-P), and the width of the transverse section (Width), approximating the lobes of the thyroid gland (left and right) to spheroids.



NOTE: The factory default coefficient is set to 0.479 for the calculation to determine the volume of the thyroid lobes. Use COEF under Thyroid Volume in the measurement preset ([Create Measurement Tools>Application Measurement > Measured Method & Display Items >B.Mode]) to set the coefficient.

Procedure

1. Record the longitudinal and transverse images of the left or right thyroid lobe in the B/B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [Thyroid Volume] from the measurement menu.
 - To measure the left thyroid lobe, select [Lt.Thyroid Vol].
 - To measure the right thyroid lobe, select [Rt.Thyroid Vol].
4. Display the longitudinal image and measure the Length using the caliper method.
5. Measure A-P using the caliper method.
6. Display the transverse image and measure the Width using the caliper method.
 The volume (Thyroid V) is calculated.

Example of Measurement Results Display

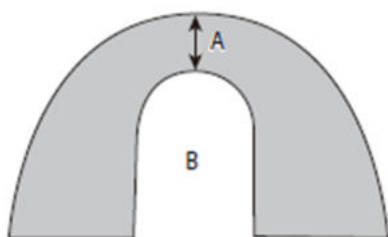
Rt. Thyroid V		
Vol.:	cm ³	: Volume of the right thyroid lobe
L:	mm	: Length of the right thyroid lobe
A-P:	mm	: Anteroposterior diameter of the right thyroid lobe
W:	mm	: Width of the right thyroid lobe

Reference information

1.2.1 Caliper Method on page 27

(5) Isthmus Thickness Measurements

This measures the thickness of the thyroid isthmus.



A: Thyroid isthmus

B: Trachea

Procedure

1. Record the longitudinal and transverse images of the left or right thyroid lobe in the B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [Isthmus T] from the measurement menu.
4. Measure the isthmus thickness of the thyroid using the caliper method.

Example of Measurement Results Display

Isthmus T:		
	mm	: Thyroid isthmus thickness

Reference information

1.2.1 Caliper Method on page 27

5.2.2 D Mode

The following precautions are necessary when taking measurements in D mode.

- When recording an arterial blood flow Doppler waveform (pulse method), set the Doppler angle of incidence as low as possible. If the Doppler angle of incidence 60°, the blood velocity measurement error increases.

- When measuring the blood velocity using multiple blood flow waveform images, use identical recording conditions (forward and reverse flow directions) for all of the blood flow waveforms. The blood flow measurement values of the system are recorded as real numbers but the $\pm$ sign is not displayed on the screen.
Completely different values might be displayed, particularly when the display of measurement values of reports is set at average value (Display Data is set at "Average" in the measurement preset ([Create Measurement Tools> Application Measurement > Report Data])).

(1) BreDop Measurements and ThyDop Measurements

The following measurement menus are available for superficial organ region arterial blood flow measurement.

Breast blood flow measurement	BreDop1
	BreDop2
	BreDop3
Thyroid blood flow measurement	ThyDop1
	ThyDop2
	ThyDop3

Use Name Assignment in the measurement preset ([Create Measurement Tools> Application Measurement > Measured Method & Display Items > D.Mode]) to change a measurement name.

In this measurement, set the following 2 points:

- Peak Systolic Velocity (PSV)
- End-diastolic velocity (EDV) or minimum diastolic velocity
NOTE End-diastolic flow velocity (EDV) and minimum diastolic blood flow velocity are not necessarily identical. Set the EDV time phase to match the blood velocity to be used for the measurement.

A blood flow measurement that traces the Doppler waveform (Dop.Trace) and another that directly points to the Doppler waveform (Dop.Caliper) are available.

Measurements Using the Doppler Trace Method

Trace the Doppler waveform to detect the points for Peak Systolic Velocity (PSV) and End Diastolic Velocity (EDV).

The Doppler Trace method consists of [Auto] (Auto Trace) and [Manual] (Manual Trace).

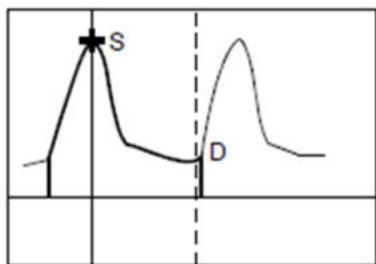
Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods and Display Items > D.Mode]) to set the measurement method for each measurement parameter.

Procedure

- Record the pulsating blood flow Doppler waveform.
- Press the [Measurement] button on the touch panel.
- In the measurement menu, select one of the options from [BreDop1] to [BreDop3], or from [ThyDop1] to [ThyDop3].

A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.

- Trace the blood flow Doppler waveform.



When the blood flow Doppler waveform is traced, a line cursor accompanied by S (peak systolic velocity point) and D (end diastolic velocity point) is displayed.

- Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

BreDop1	
PI:	: Pulsatility Index
RI:	: Resistance Index
S/D:	: PSV/EDV ratio
PSV: cm/s	: Peak Systolic Velocity
EDV: cm/s	: End Diastolic Velocity
MnV: cm/s	: Mean Velocity
[1Beat avg.]	: Detected Heartbeats

Reference information

1.2.5 Doppler Trace Method on page 31

Measurement Using the Points (Caliper)

Directly specify 2 points for the Peak Systolic Velocity (PSV) and the End Diastolic Velocity (EDV).

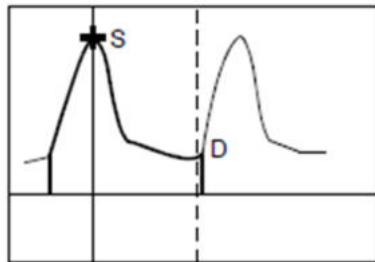
Set the measurement parameter of the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods and Display Items > D.Mode]) to [Caliper].

Procedure

- Record the pulsating blood flow Doppler waveform.
- Press the [Measurement] button on the touch panel.
- In the measurement menu, select one of the options from [BreDop1] to [BreDop3], or from [ThyDop1] to [ThyDop3].
- Set the peak systolic velocity (PSV) point.
 - Move the caliper mark to the PSV position.
 - Press the [Enter]key.
- Set the end diastolic velocity (EDV) point.
EDV time phase

Select the blood flow velocity (end diastolic velocity or minimum diastolic velocity) you want to use for the measurement.

- Move the caliper mark to the EDV position.
- Press the [Enter]key.



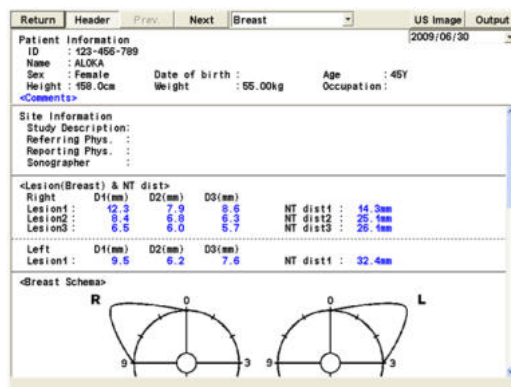
Set PSV or EDV to display "S/D" and other values.

Example of Measurement Results Display

BreDop2	:	(Selected measurement name)
RI:	:	Resistance Index
S/D:	:	PSV/EDV ratio
PSV:	cm/s	: Peak Systolic Velocity
EDV:	cm/s	: End Diastolic Velocity

5.3 Reports

Measurement results and obtained index values are sorted and displayed in the report.



The following operations are available using the report.

I) Displaying measurement results and images

- Measurement results
- Recorded ultrasonic images
- Past exam results

II) Editing results, comments and findings

III) Printing reports (print, save)

5.3.1 Displaying a Report

NOTE: Report display requires patient data input. Enter patient data on the ID screen.

(1) Displaying a Report

Procedure

1. Display the report.
 - Press the [Measurement] button on the touch panel and select [Report] from the measurement menu.
 - Select the [Report] icon from the [Accessories] tab in the function menu.

Patient Information	
ID	: 123-456-789
Name	: ALDRA
Sex	: Female
Height	: 150.0cm
Date of birth	: 55.00kg
Weight	: 45Y
Age	: Occupation:

Site Information	
Study Description	:
Referring Phys.	:
Reporting Phys.	:
Sonographer	:

<Lesion(Breast) & NT dist>	
Right	D1(mm) D2(mm) D3(mm) NT dist1 : 14.3mm
Lesion1	: 12.3 7.9 8.6 NT dist2 : 25.1mm
Lesion2	: 9.4 6.9 6.3 NT dist3 : 26.1mm
Lesion3	: 6.5 6.0 5.7
Left	D1(mm) D2(mm) D3(mm) NT dist1 : 32.4mm
Lesion1	: 9.5 6.2 7.6

<Breast Schema>

R L

The following switches are located at the top of the report.

[Return]	Closes the report.
[Header]	Switches the Header Block display (patient data display) between Long Form and Short Form.
[Prev.]	Displays the previous page.
[Next]	Displays the next page.
[(Study list)]	Switches the Study in the report.
[US Image]	Displays an ultrasonic image in the report.
[Output]	Outputs report data to a personal computer, storage media, printer or other destination.

Switching from Report Screen to the Scanning Screen

- Select [Return] on the upper corner of the report screen.

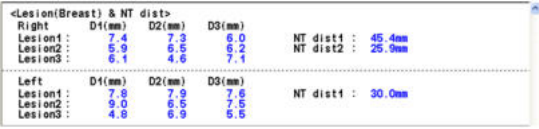
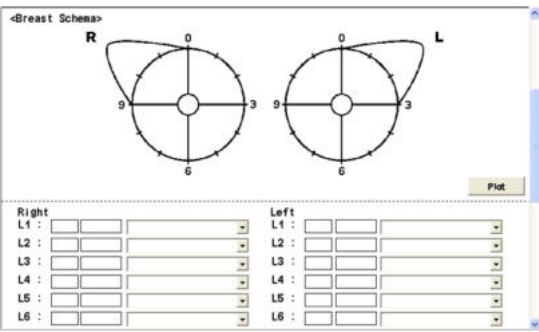
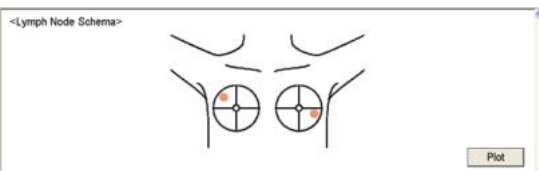
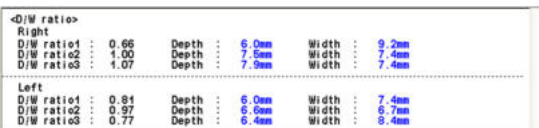
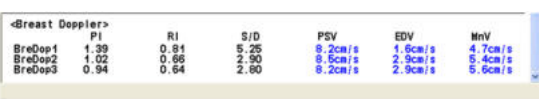
(2) Information Blocks Displayed in a Report

Reports are displayed in Study units.

The superficial organ measurement studies are Basic, Breast and Thyroid. The Header Block and Site Information Block are always displayed in reports. Other blocks are set in the measurement preset ([Study Assignment > (Study name) > Combined Report Display]) while blocks that include measurement results registered in a report are displayed.

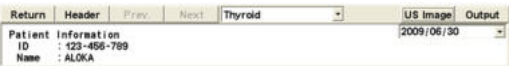
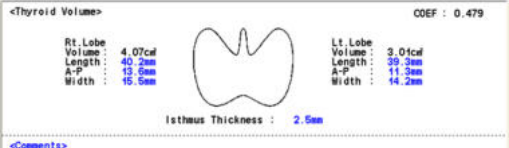
Breast Report

The measurement results of a Breast Study are displayed as follows.

	Header Block Displays patient data that was entered in the ID screen. [<Comment>] Show/hide the comment input field.
	Site Information Block Displays facility information, doctor in charge and other information
	Lesion Breast & NT dist Block Lesion breast measurement results and NT Distance measurement results.
	Breast Schema Block - Breast schema diagram [Plot]: Plot lesion position marks on the schema diagram. [Right], [Left] list fields (Findings) Input findings (region and orientation (clock face display) ultrasound findings) about lesions in the left and right breasts.
	Lymph Node Schema Block Breast schema diagram [Plot]: Plot lesion position marks on the schema diagram.
	D/W ratio Block Displays D/W ratio measurement results.
	Breast Doppler Block Displays BreDop measurement results.

Thyroid Report

The measurement results of the thyroid study are displayed as follows.

	Header Block Displays patient data that was entered in the ID screen.
	Site Information Block Displays facility information, doctor in charge and other information
	Thyroid Volume Block Measurement results for thyroid volume and isthmus thickness. [<Comment>] Show/hide the comment input field.

<Thyroid Doppler>					
	PI	RI	S/D	PSV	EDV
ThyDop1	1.42	0.83	6.00	9.2cm/s	1.4cm/s
ThyDop2	1.44	0.79	4.81	9.8cm/s	2.0cm/s
ThyDop3	1.27	0.72	3.96	8.7cm/s	2.4cm/s

Thyroid Doppler Block

Displays ThyDop measurement results.

(3) Attaching an Ultrasonic Image

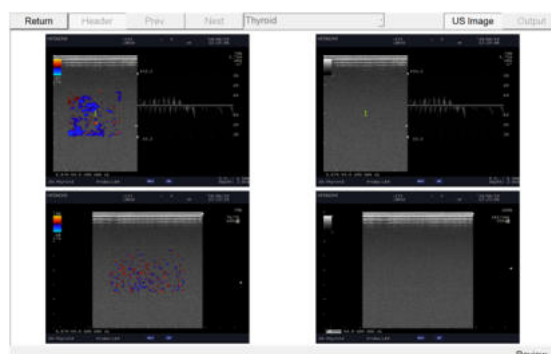
You can attach ultrasonic images to reports. The attached ultrasonic images will be displayed in the US Image Block. You can add stored images of the patient whose report is being displayed from the system hard disk or a USB flash drive.

Use the following options in [Report Data] under preset to select images to display in the US Image Block.

- Use Display Pasted US Image Form on the Screen to set the display format.
- Set the number of images to display immediately after selecting US Image Block in [Automatically be Displayed US Images Number].

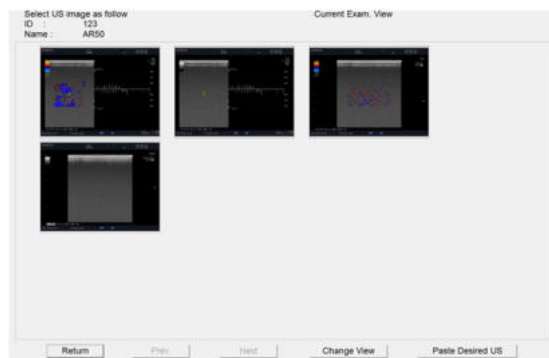
Procedure

1. Select [US Image] on the upper corner of the report screen.
US Image Block is displayed. The number of images configured with the preset are displayed in the order of top-left, top-right, etc., from the latest image saved to the system's hard disc or connected media, such as USB flash drive.
Images will be displayed as shown below when [Display Pasted US Image Form on the Screen] is set to [2×2] and [4] is selected in [Automatically be Displayed US Images Number.].



When 4 images are stored

2. If necessary, change the displayed images.
 - a. Select [Review] at the bottom of the screen.
Images on the system hard disk and connected media are displayed as thumbnails. Only today's images of the current patient are displayed. Current Exam.View is displayed at the top right of the screen.



- b. Select an image to display.
Selected images will be displayed with a blue frame.
- c. After selecting all the images to display, select [Paste Desired US].
Only the selected images are displayed in the UB Block.

Displaying images from past examination dates

Select [Change View] under the thumbnails. Current&Past Exam View is displayed in the upper right corner of the screen and past exam images of the current patient are displayed. You can also select images from past examinations to display in the US Image Block.

When you re-select [Change View], the screen switches to display the images of the day only (Current Exam.View). "Current Exam.View" is displayed at the top right of the screen.

3. To return to the report page, select [Return].

(4) Displaying Past Reports

NOTE: You cannot modify the data in the past reports.

Procedure

1. Select the arrow [▼] for the date on the top right of the report screen.
When past reports are available, a list of the report dates is displayed.



2. Select the date of the reports to display.
Reports for the selected date are displayed.

5.3.2 Editing Reports

You can edit the following content in the superficial organ report.

- Comment
- Findings (including the lesion plot on the schema diagram)
- Measurement results

(1) Entering Comments

Enter comments including ultrasound comments in the Comments field in Header Block.

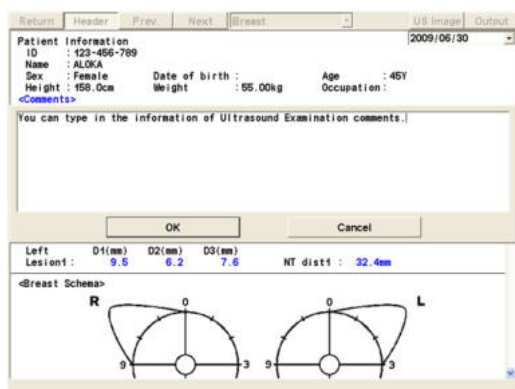
Procedure

1. Select [<Comments>].

When the [<Comments>] are hidden

Select [Header] on the upper corner of the report screen and select [<Comments>].

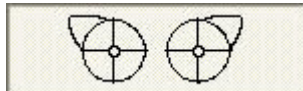
A text box is displayed.



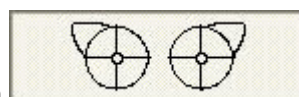
2. Enter a comment using the keyboard.
3. Select [OK] when you finish entering the comments.
The entry is confirmed.
To cancel the entry, select [Cancel].

(2) Entering Findings

Plot the site of the lesion in the schema diagram and enter the findings for each lesion. You can select the schema diagram corresponding to the selected report.

Report block	Schematic name	Schema diagram
Breast Schema	Breast Schema 1	
	Breast Schema 2	
Lymph Node Schema	Lymph Node Schema	

Entering Findings: Breast Schema 1



Plot the site of the lesion on the schema diagram . Enter the findings for each lesion.

The plot position is listed in the report in the form of the region category and direction (clock face display) that indicate the lesion.

The lesion plotted on the schema diagram is displayed as follows:

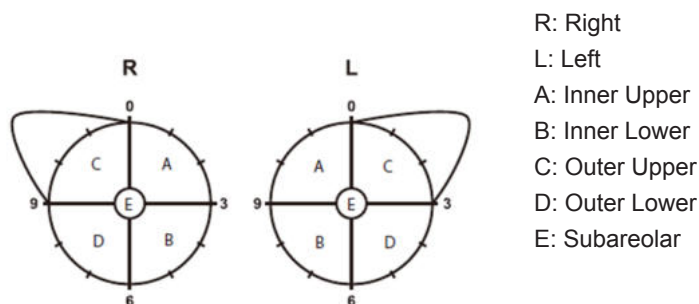
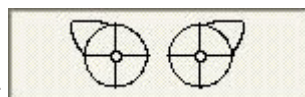


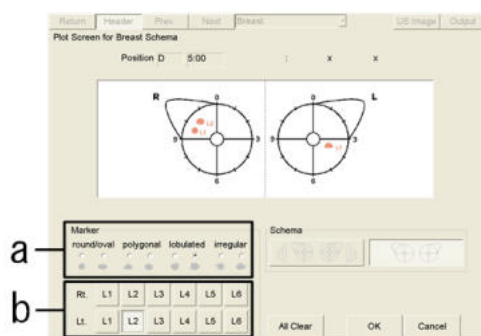
Fig.1: Region category indicating the lesion position

Procedure

1. Display the report.
2. Select [Plot] for the Breast schema Block.
Switches to the Plot Screen for Breast schema.



3. Select in the Schema.
4. Plot the lesion.



- a. Select the shape of the mark to plot.
- b. Select the measurement result number to plot.

Measurement result number

Rt L1 to L6 correspond to the measurement of [Rt. Lesion (Breast)1] to [Rt. Lesion (Breast)6].

Lt L1 to L6 correspond to the measurement of [Lt. Lesion (Breast)1] to [Lt. Lesion (Breast)6].

-> The selected measurement results are displayed on the top right of the schema diagram as:

(Diam1)x(Diam2)x(Diam3)

- c. Select the corresponding location of the schema diagram.
- d. Repeat steps a to c as many times as necessary.

Modifying the plotted positions

- I) Select the mark to be modified on the schema diagram.
- II) Select [Move].
- III) Select the corresponding location.

Deleting plot marks

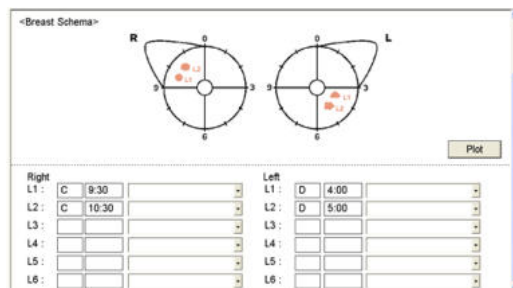
I) Select the mark to delete on the schema diagram.

II) Select [Delete].

5. Select [OK].

Returns to the report screen.

The region and direction of the plotted marks are displayed.



6. Select the lesion findings from the list or enter them directly.

To enter them directly

The content that is entered is added to the list as user-defined content.

To delete content from the list

Highlight the contents using the trackball and select [Delete] key.

Entering Findings: Breast Schema 2



Plot the site of the lesion on the schema diagram . Plot marks for a lesion in 2 positions, one on the front view and the other on the side view.

The plot position is listed in the report in the form of the region category and direction (clock face display) that indicate the lesion.

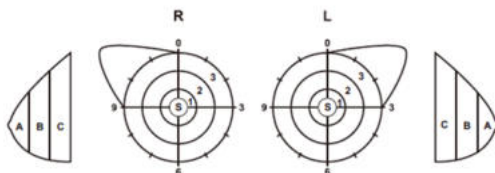


Fig.2: Region category indicating the lesion position

Indicates the R: Right, L: Left, S: Subareolar.

Procedure

1. Display the report.

2. Select [Plot] for the Breast schema Block.

Switches to the Plot Screen for Breast schema.



3. In the [Schema] field, select

4. Plot the lesion.

a. Select the shape of the mark to plot.

- b. Select the measurement result number to plot.

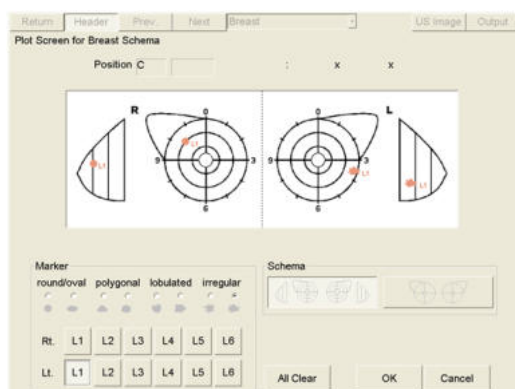
Measurement result number

Rt L1 to L6 correspond to the measurement of [Rt. Lesion (Breast) 1] to [Rt. Lesion (Breast) 6].

Lt L1 to L6 correspond to the measurement of [Lt. Lesion (Breast)1] to [Lt. Lesion (Breast)6].

-> The selected measurement results are displayed on the top right of the schema diagram as: "(Diam1)x(Diam2)x(Diam3)".

- c. Select corresponding locations on the front or side view.
- d. Select the other corresponding position in the front or side view.
- e. Repeat steps a to d as many times as necessary.



Modifying the plotted positions

- I) Select the mark to be modified on the schema diagram.
- II) Select [Move].
- III) Select the corresponding location.

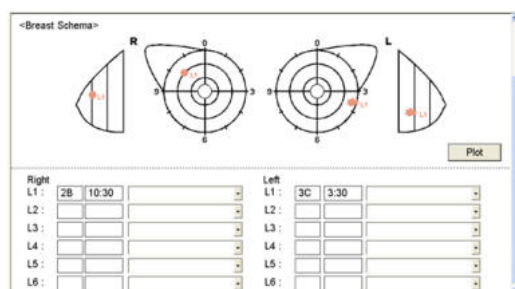
Deleting plot marks

- I) Select the mark to delete on the schema diagram.
- II) Select [Delete].

5. Select [OK].

Returns to the report screen.

The region and direction of the plotted marks are displayed.



6. Select the lesion findings from the list or enter them directly.

Entering Findings: Lymph Node Schema



Plot the site of the lesion on the schema diagram

Procedure

1. Display the report.
2. Select [Plot] for the Lymph Node Schema Block.
Switches to the Plot Screen for Lymph Node Schema.
3. Plot the lesion.



- a. Select ● under Marker.
- b. Select the corresponding location.
- c. Repeat steps a and b as many times as necessary.

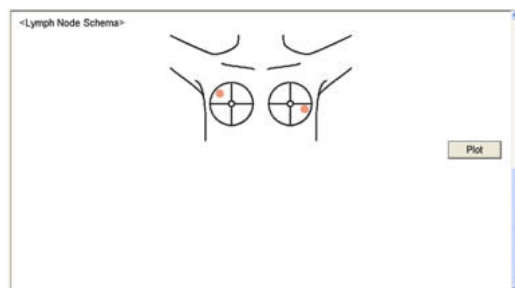
Modifying the plotted positions

- I) Select the mark to be modified on the schema diagram.
- II) Select [Move].
- III) Select the corresponding location.

Deleting plot marks

- I) Select the mark to delete on the schema diagram.
- II) Select [Delete].

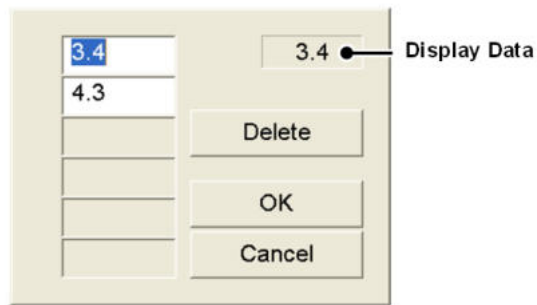
4. Select [OK].
Returns to the report screen.



(3) Editing the Measurement Results

Procedure

1. Select the measurement value to be modified.
The dialog box with the measurement value opens.



When Display Data in [Report Data] under preset is set to [Current], the data at the top appears in the report screen. If set to Average, an average value is displayed.

2. Revise the data.

Deleting data

- I) Select the measurement value from the dialog box.
- II) Select [Delete] from the dialog box.
- III) Select [OK] from the dialog box.

Revising data

Some measurement results, such as PI and RI, correlate to 2 blood flow velocities (EDV and PSV) within the same heartbeat cycle. Modify as necessary to maintain the mutual time-phase relationship.

- I) Select the measurement value from the dialog box.
- II) Enter values from the keyboard.
- III) Select [OK] from the dialog box.

Selecting the data you want to display

If Display Data of [Report Data] in the preset has been set to "Current", you can change the measurement value to be displayed on the report screen.

- I) Select the measurement value from the dialog box.
- II) Select [OK] from the dialog box.

The # symbol is added next to the name of modified items.

5.3.3 Outputting Reports

There are 2 ways to output reports.

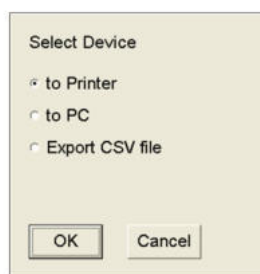
- Outputting to a local printer: Select the Block to output.
- Outputting as a CSV file: Output the values registered to the report to a connected media or device.

(1) Printing

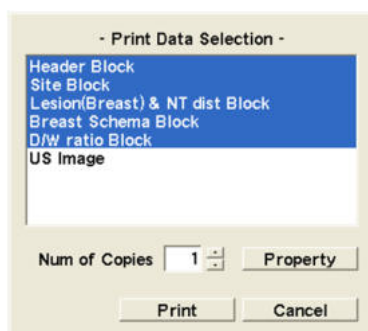
Print a report to the local printer (printer connected to the system).

Procedure

1. Select [Output] on the upper corner of the report screen.
A dialog box is displayed.



2. Select [to Printer], and press [OK].
The following dialog box is displayed.

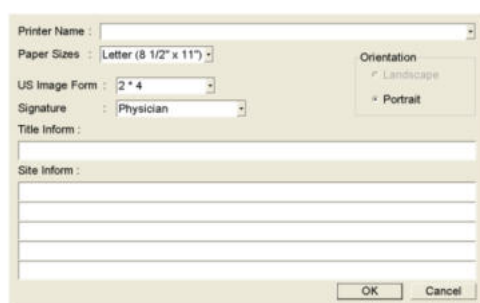


3. Select the blocks to be printed.
 - a. Select one of the blocks to print.
 - b. Repeat this step and highlight all the blocks you wish to print.

To cancel a selected block, select that block again.
4. Use Num of Copies to set the number of copies to print.
5. If necessary, configure the printer properties.
 - a. Select [Property].
 - b. See the next section to configure the printer property.
6. Select [Print].

Printer Properties

You can set the advanced printer properties.



Item	Options	Description
Printer Name		Select the printer model.
Paper Sizes	US Letter	Prints on US letter size paper.
	A4	Prints on A4 size paper.

Item	Options	Description
Orientation	Portrait	Sets the direction of the paper to the vertical orientation (there is no other option).
US Image Form	1x2	Prints a US Image block with 1 row of 2 images per sheet.
	1×3	Prints a US Image block with 1 row of 3 images per sheet.
	2 x 2	Prints a US Image block with 2 rows of 2 images per sheet.
	2×4	Prints a US Image block with 2 rows of 4 images per sheet.
Signature	Physician	Sets the Physician signature field.
	Phys. & Sonographer	Sets the Physician and Sonographer signature fields.
	None	Hides the signature field.
Title Inform		You can enter a report title using no more than 80 characters.
Site Inform		You can enter facility information (hospital department, address, telephone number, FAX number, etc.).

(2) Outputting as a CSV File

You can output data registered in the report as a CSV file.

Procedure

1. Select [Output] on the upper corner of the report screen.
A dialog box is displayed.



2. Select [Export CSV file], and press [OK].
A dialog box is displayed.



The file name is displayed in the format ID_Date_Application.
Select [Cancel] to return to the report screen.

3. Select the storage destination from the Target Medium list.
4. Change the file name if necessary.
5. Select [OK].

The selected CSV file is saved in the specified media.

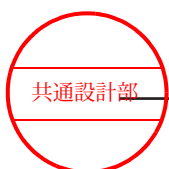
A CSV file contains patient information, numerical values and comments.

5.4 Presets

The presets for superficial organ measurements (S. Parts or Small Parts) can be classified roughly into 3 types.

- Create Measurement Tools
Settings for measurement methods, caliper mark display, and report display.
Settings for basic measurement, and for applied measurement.
- Study Assignment
Enables you to configure the menu, transferred items and report view in the study.
These are set for each study.
- SW Assignment
Assigns measurement functions to menu items.

Table3: Structure of S. Parts Presets



Create Measurement Tools	Basic Measurement	Measured Method & Display Items	B.Mode		
			M.Mode		
			D.Mode		
			F.Mode		
		Caliper Mark Control			
		Unit Selection			
		Caliper Auto Off			
		Display Form		Mark Display	
	Application Measurement	Measured Method & Display Items	B.Mode		
			D.Mode		
		Caliper Mark Control			
		Unit Selection			
		Caliper Auto Off			
		Report Data			
		Display Form		Mark Display	
		User's Calculation		Reserved Word	
Study Assignment	Breast Thyroid	Menu Assign			
		Combined Report Display			
		Transfer List Assign			
		Other			
SW Assignment	Touch Panel SW Assignment				
	+Mark Key Assignment				

5.4.1 Small Parts Presets

The top page of presets appears as follows:



[Small Parts Preset]
Small Parts Preset top page

(1) Create Measurement Tools

Settings for measurement methods, caliper marks, and report display.

Basic Measurement

Refer to the presets for basic measurements.

Reference information

2.2.7(3) Measurement-related Settings: Create Measurement Tools on page 82

Application Measurement

Settings for applied measurements (small parts measurement).

[Measured Method & Display Items > B.Mode]
(1/2): B mode measurement settings

[Measured Method & Display Items > B.Mode]
(2/2): B mode measurement settings

[Measured Method & Display Items > D.Mode]
(1/3): D mode measurement settings

[Measured Method & Display Items > D.Mode]
(2/3): D mode measurement settings

[Measured Method & Display Items > D.Mode]
(3/3): D mode measurement settings



Measured Method & Display Items (3/3)

Prev. Next

D.Mode

Name Assignment

Defined Doppler Measurement Name

BreDop1	BreDop1
BreDop2	BreDop2
BreDop3	BreDop3
ThyDop1	ThyDop1
ThyDop2	ThyDop2
ThyDop3	ThyDop3

Exit Cancel

[Caliper Auto Off]: Display setting for measurement results and caliper marks after freeze is canceled

Caliper Auto Off (1/6)

Prev. Next

Lesion(Breast)

OFF ON All Mark Erase Remain Active Mark

D/W ratio

OFF ON All Mark Erase Remain Active Mark

NT distance

OFF ON

Thyroid Volume

OFF ON All Mark Erase Remain Active Mark

Isthmus Thickness

OFF ON

Exit Cancel

[Display Form]: Current measurement result display settings

Display Form

Prev. Next

Result Display Window Style

Sideways

Package Result Display

Multi

Basic measurements are displayed together.

No

Exit Cancel

[User's Calculation]: User index calculation formula settings

[Report Data]: Report Display Settings

Report Data (1/1)

Prev. Next

Display Data

Current

Transfer from Report Data

ON

Storage Data Number

1 2 3 4 5 6

Pasted US Image Screen

Display Pasted US Image Form on the Screen

1x1 2x2 3x2 3x3

Automatically be Displayed US Images Number

0 1 2 3 4 5 6 7 8 9

Exit Cancel

[Display Form > Mark Display]: Display settings for caliper marks during measurement

Mark Display (1/5)

Prev. Next

Lesion(Breast)

Mark Display Mark Active

D/W ratio

Mark Display Mark Active

Thyroid Volume

Mark Display Mark Active

B Other Meas

Mark Display Mark Active

Breast Dop

Mark Display Mark Active

Thyroid Dop

Mark Display Mark Active

Exit Cancel

[User's Calculation > Reserved Word]: Reserved word settings for user index calculation formulas

User's Calculation

Equation Program

* Create User's Calculation

Delete User's Calculation

U-Calc. 1	U-Calc. 16
U-Calc. 2	U-Calc. 17
U-Calc. 3	U-Calc. 18
U-Calc. 4	U-Calc. 19
U-Calc. 5	U-Calc. 20
U-Calc. 6	U-Calc. 21
U-Calc. 7	U-Calc. 22
U-Calc. 8	U-Calc. 23
U-Calc. 9	U-Calc. 24
U-Calc. 10	U-Calc. 25
U-Calc. 11	U-Calc. 26
U-Calc. 12	U-Calc. 27
U-Calc. 13	U-Calc. 28
U-Calc. 14	U-Calc. 29
U-Calc. 15	U-Calc. 30

Exit Cancel

User's Calculation:Reserved Word (1/2)

Reserved Word Registration

* Create Reserved Word

Delete Reserved Word

Reserved Word 1	Reserved Word 16
Reserved Word 2	Reserved Word 17
Reserved Word 3	Reserved Word 18
Reserved Word 4	Reserved Word 19
Reserved Word 5	Reserved Word 20
Reserved Word 6	Reserved Word 21
Reserved Word 7	Reserved Word 22
Reserved Word 8	Reserved Word 23
Reserved Word 9	Reserved Word 24
Reserved Word 10	Reserved Word 25
Reserved Word 11	Reserved Word 26
Reserved Word 12	Reserved Word 27
Reserved Word 13	Reserved Word 28
Reserved Word 14	Reserved Word 29
Reserved Word 15	Reserved Word 30

Exit Cancel

(2) Study Assignment

You can configure the menu, transferred items and report view in each study.

[Study Assignment]: Tree view display settings of Study and user-defined Study

Study Assignment

Select Study

Copy from Other Study

Select Display Study on the Left Tree View

Study Name	Study Name	Study Name			
Basic	OFF	User8	OFF	User18	OFF
Breast	ON	User9	OFF	User19	OFF
Thyroid	ON	User10	OFF	User20	OFF
User1	OFF	User11	OFF	User21	OFF
User2	OFF	User12	OFF	User22	OFF
User3	OFF	User13	OFF		
User4	OFF	User14	OFF		
User5	OFF	User15	OFF		
User6	OFF	User16	OFF		
User7	OFF	User17	OFF		

Exit Cancel

[Menu Assign]Measurement menu settings

[Combined Report Display]: Report display block settings

Menu Assign

[Breast]

Select the Study at the Top Screen of Study Assignment and then Setup Measurement Menu Format.

Select Target View Mode

B.Mode M.Mode D.Mode

Select B(F).Mode Items

Insert Overwrite Delete

Distance	Dist-trace	Area-Trace	Area-Ellipse
Area-Circle	Volume 1	Volume 2	Histogram
B.Index	Rt.Hip J Angle	Lt.Hip J Angle	Angle
Flow Profile			
Rt.Lesion1	Rt.Lesion2	Rt.Lesion3	Rt.Lesion4
Rt.Lesion5	Rt.Lesion6	Lt.Lesion1	Lt.Lesion2
Lt.Lesion3	Lt.Lesion4	Lt.Lesion5	Lt.Lesion6
Rt.D/W ratio1	Rt.D/W ratio2	Rt.D/W ratio3	Rt.D/W ratio4
Rt.D/W ratio5	Rt.D/W ratio6	Lt.D/W ratio1	Lt.D/W ratio2
Lt.D/W ratio3	Lt.D/W ratio4	Lt.D/W ratio5	Lt.D/W ratio6
Rt.NT dist1	Rt.NT dist2	Rt.NT dist3	Rt.NT dist4
Rt.NT dist5	Rt.NT dist6	Lt.NT dist1	Lt.NT dist2
Lt.NT dist3	Lt.NT dist4	Lt.NT dist5	Lt.NT dist6
Rt.Thyroid V	Lt.Thyroid V	Isthmus T	

Exit Cancel

Combined Report Display

Study Name [Breast]

1.	Header Block	
2.	Site Block	
3.	Lesion(Breast) & NT dist Block	15.
4.	Breast Schema Block	16.
5.	D/W ratio Block	17.
6.	Breast Doppler Block	18.
7.	User's Calculation Block	19.
8.		20.
9.		21.
10.		22.
11.		23.
12.		24.
13.		25.
14.		26.

Exit Cancel

[[Transfer List Assign]]

Basic measurement result transferred item settings

[Other]

Measurement guide message display settings

(3) SW Assignment

Assigns measurement menus to the [Meas] tab in the function menu or select the basic measurement menu that will appear when you press the [Caliper] key.

[Touch Panel SW Assignment]

Configures the items that can be assigned to the [Meas] tab in the function menu.

[+Mark Key Assignment]

Sets the measurement item to launch when the [Caliper] key is pressed.

5.5 References

5.5.1 Formulas

Calculation items	Formulas
Thyroid Volume	Volume = 0.479 × Length × A-P × Width

5.5.2 References

I) Lesion (Breast), D/W ratio, NT distance, Breast Report

The Japan Association of Breast and Thyroid Sonology Guidelines for Ultrasonic Diagnosis of Breast Diseases Nankodo 2008.72p.

II) Breast Report

Cynthia L. Rapp BS, RDMS, "Sonography of the Breast." Official Proceedings - Society of Diagnostic Medical Sonography's 17th Annual Conference. September 14-17, 2000, Dallas Texas, p.57-67

III) Thyroid Volume

Brunn J, Block U, Ruf G, Bos I, Kunze WP, Scriba PC. "Volumetric analysis of thyroid lobes by real-time ultrasound (author's transl)." DEUTSCHE MEDIZINISCHE WOCHENSCHRIFT 1981 Oct 9, 106 (41), 1338-1340.

5.5.3 Terms and Abbreviations

Abbreviation	Meaning	Meaning
A-P	Anterior posterior diameter	Anteroposterior diameter
D/W Ratio	Depth/Width Ratio	Depth/Width Ratio
EDV	End Diastole Velocity	End diastolic velocity
Isthmus T	Isthmus Thickness	Isthmus Thickness
L	Length	Length
Left Lobe	Left Lobe of Thyroid Gland	Left Lobe of Thyroid Gland
NT dist	Nipple Tumor distance	Nipple Tumor distance
MnV	Mean Velocity	Mean velocity
PI	Pulsatility Index	Pulsatility index
PSV	Peak Systolic Velocity	Peak systolic velocity
RI	Resistance Index	Vascular resistance
Right Lobe	Right Lobe of Thyroid Gland	Right Lobe of Thyroid Gland
S	Subareolar	Subareolar
S/D	Systolic/Diastolic Velocity Ratio	Systolic/Diastolic velocity ratio
V	Volume	Volume
Vm	Mean Velocity	Mean velocity
W	Width	Width



Gynecological Measurements

- 6.1 Overview of Gynecological Measurements
- 6.2 Measurement Methods
- 6.3 Reports
- 6.4 Presets
- 6.5 GYN Presets
- 6.6 Create Measurement Tools
- 6.7 References

6.1 Overview of Gynecological Measurements

6.1.1 Gynecological Measurement Menu

Gynecological measurements provide the following measurement menus and measurement parameters.

Table1: B Mode

Measurement name	Menu	Measurement parameters				
Uterus measurement	Uterus	Ut-V	Ut-L	Ut-AP	Ut-W	
	Endom-T	Endom-T				
	Cervix	Crv-L	Crv-AP	Crv-W		
Ovarian measurement	Rt. Ovary, Lt. Ovary	Ov-V	Ov-L	Ov-AP	Ov-W	
Follicle volume measurement	Rt. Fol. Vol., Lt. Fol. Vol.	D1	D2	D3	avg	Vol
Bladder measurement	Pre Bldr Vol, Pst Bldr Vol	BI-V	BI-L	BI-AP	BI-W	

Measurement name	Menu	Measurement Methods	Measurement parameters		
Follicular measurement	Rt. Fol, Lt. Fol	Caliper	(first axis)		
		Caliper(Vol.)	(first axis)	Vol	
		2Caliper, Cross-Caliper	(first axis)	(second axis)	
		2Caliper(avg), Cross-Caliper(avg)	(first axis)	(second axis)	avg

Table2: D Mode

Measurement name	Menu	Measurement parameters				
Uterine arterial blood flow measurement	Rt. Uterine Artery Lt. Uterine Artery	PI MnV	RI Vm	S/D	PSV	EDV
Ovarian arterial blood flow measurement	Rt. Ovarian Artery Lt. Ovarian Artery	PI MnV	RI Vm	S/D	PSV	EDV
	GYNDop1,GYNDop2, GYNDop3	PI MnV	RI Vm	S/D	PSV	EDV

6.1.2 Gynecological Measurement Study

Gynecological measurements are comprised of the following studies.

- GYN: For general gynecological examinations

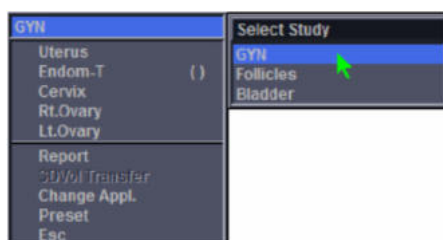
- **Follicles:** For infertility examinations
By entering LMP or BBT in the ID screen, you can manage ovarian follicle and endometrial thickness measurement results as daily changes in growth based on the menstrual cycle.
- **Bladder:** For bladder measurements.
The measurement menu and report display differ with the selected study.

(1) Switching the Study

Switches the Study within the same application.

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select the item at the very top (current study name) from the Measurement menu.

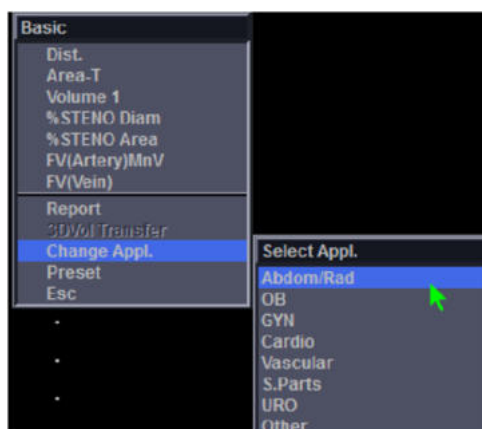


3. Select the Study you want to use.

(2) Switch the Study Using a Different Application

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select [Change Appl.].
3. Select the application.
4. Select Study.



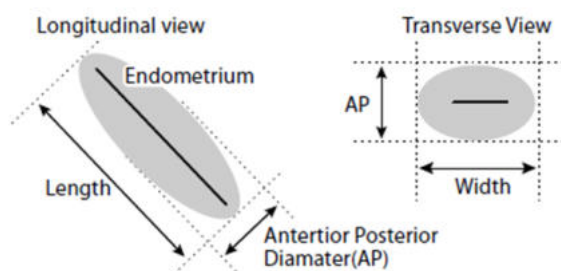
Example of menu display: Switching from Basic under Abdomen
Switches to the study of the selected application.

6.2 Measurement Methods

6.2.1 B mode

(1) Uterus Measurement

The uterus is approximated to an ellipsoid, then the length of the longitudinal view (Length), the anteroposterior (A-P), and the width of the transverse view (Width) are measured, and the volume is calculated.



Configure so the Length, A-P and Width are orthogonal to each other.

Procedure

1. Switch the measurement study to [GYN].
2. Record the longitudinal and transverse images of the uterus in B/B mode.
3. Press the [Measurement] button on the touch panel.
4. Select [Uterus] from the measurement menu.
5. Measure the Length, A-P and Width using the Caliper method.

Example of Measurement Results Display

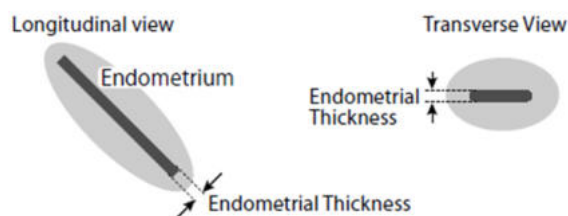
Uterus		
Ut-V:	cm ³	: Uterine volume
Ut-L:	cm	: Uterine length
Ut-AP:	cm	: Anteroposterior diameter of the uterus
Ut-W:	cm	: Uterine width

Reference information

1.2.1 Caliper Method on page 27

(2) Endom-T Measurement

Measure the thickness of the endometrium.



Procedure

1. To evaluate changes in endometrial thickness during the menstrual cycle, enter LMP (last menstrual period) or BBT (estimated date of ovulation) in the ID screen.
2. Switch measurement Study to [GYN] or [Follicles].
3. Record an image of the uterine endometrium.
4. Press the [Measurement] button on the touch panel.
5. Select [Endom-T] from the measurement menu.
6. Measure the uterine endometrium using the Caliper method.

Example of Measurement Results Display

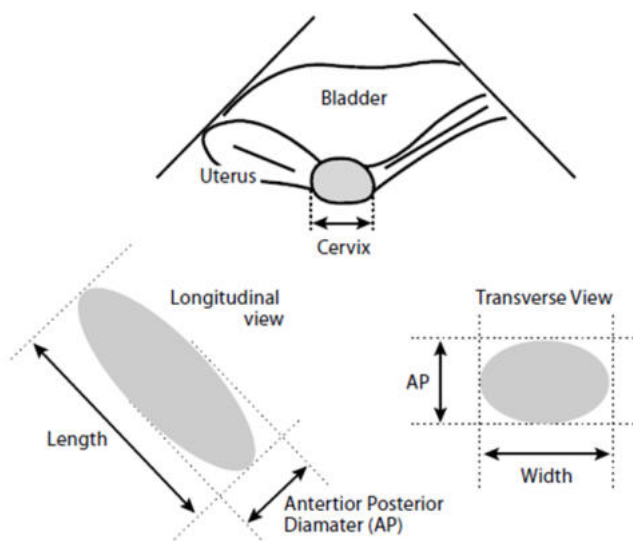
Endom-T:	
. cm	: Endometrial thickness

Reference information

1.2.1 Caliper Method on page 27

(3) Cervix Measurement

Measure the long and short axes of the longitudinal view of the uterine cervix (Length, A-P) and the long axis of the transverse view (Width).



Procedure

1. Switch the measurement study to [GYN].
2. Record the longitudinal and transverse images of the cervix in B/B mode.
3. Press the [Measurement] button on the touch panel.
4. Select [Cervix] from the measurement menu.
5. Measure the Length, A-P and Width using the Caliper method.

Example of Measurement Results Display

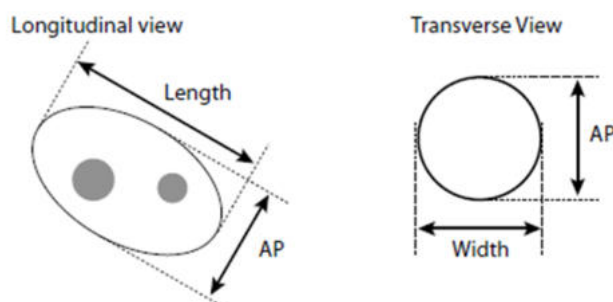
Cervix		
Crv-L:	cm	: Cervix length (Length)
Crv-AP:	cm	: Cervix Anteroposterior Length (A-P)
Crv-W:	cm	: Cervix Width (Width)

Reference information

1.2.1 Caliper Method on page 27

(4) Ovary Measurement

Since the left and right ovaries resemble spheroids (ellipsoids), measure the length of the longitudinal section (Length), the anteroposterior (A-P) and the width of the transverse section (Width) to obtain the volume of the ovaries.



Configure so the Length, A-P and Width are orthogonal to each other.

Procedure

1. Switch the measurement study to [GYN].
2. Record the longitudinal and transverse images of the ovaries in B/B mode.
3. Press the [Measurement] button on the touch panel.
4. Select the [Rt. Ovary] or [Lt. Ovary] from the measurement menu.
 - Select [Rt. Ovary] to measure the right ovary.
 - Select [Lt. Ovary] to measure the left ovary.
5. Measure the Length, A-P and Width using the Caliper method.

Example of Measurement Results Display

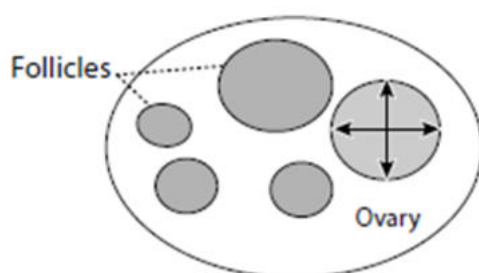
Rt.Ovary		
Ov-V:	cm ³	←Ovary volume
Ov-L:	cm	←Ovary length (Length)
Ov-AP:	cm	←Anteroposterior diameter of ovary (A-P)
Ov-W:	cm	←Ovary Width (Width)

Reference information

1.2.1 Caliper Method on page 27

(5) Follicles Measurement

This function allows you to measure the size of the follicles in the left and right ovaries. The diameter of up to 10 follicles in each ovary can be measured.



Use Follicles Measured Methods in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods > Display Items > B.Mode]) to set the measurement method.

Follicles Measured Methods	Measurement Methods	Measured Position
Caliper	Caliper method	Measures the first axis of an ovarian follicle.
Caliper(Vol.)	Caliper method	Measures the first axis of an ovarian follicle to calculate follicle volume.
2Caliper	Caliper method	Measures the second axis of an ovarian follicle.
Cross-Caliper	Ellipse method*1	Measures two perpendicular axes of an ovarian follicle.
2Caliper(avg)	Caliper method	Measures the second axis of an ovarian follicle to calculate the average value.
Cross-Caliper(avg)	Ellipse method*1	Measures two perpendicular axes of an ovarian follicle to calculate the average value.

*1

Cross-Caliper is the same measurement method as the Ellipse method. However, the ellipse is not displayed.

Procedure

1. To assess the number of ovarian follicles and changes in the follicle diameter according to the menstrual cycle, enter LMP or BBT in the ID screen.
2. Switch the measurement Study to [Follicles].

- Record an image showing the follicles of the ovary.
- Press the [Measurement] button on the touch panel.
- Select [Rt. Fol] from the measurement menu to measure the right follicle. Select [Lt. Fol] to measure the left follicle.
- Measure follicle size.

Measurement results are displayed as follows. Up to ten locations on the right and left side can be measured.

The number of follicles is displayed in front of the measurement value.

Example display of 2Caliper(avg) or Cross-Caliper(avg)

Example of Measurement Results Display

Rt.Follicles		
1:	2.4cm	: First axis measured value
:	2.2cm	: Second axis measured value
avg:	2.3cm	: Average value of the first axis and second axis

Reference information

1.2.1 Caliper Method on page 27

1.2.2 Ellipse Method on page 29

(6) Follicles Volume Measurement

Use this function to measure the three axes of the follicle (D1, D2, D3) and calculate the follicle volume. Up to ten follicles in each ovary can be measured.

Procedure

- To assess the number of ovarian follicles and changes in the follicle diameter according to the menstrual cycle, enter LMP or BBT in the ID screen.
- Switch the measurement Study to [Follicles].
- Record an image showing the follicles of the ovary.
- Press the [Measurement] button on the touch panel.
- Select [Rt. Fol.Vol] from the measurement menu to measure the volume of the right follicle. Select [Lt. Fol.Vol] to measure the volume of the left follicle.
- Measure the D1 and D2 using the Ellipse method.
The average is displayed with value for the two axes.
- Use the Caliper method to measure the D3 transverse image.
The volume (Vol.) is calculated.
- Measure only the number of follicles you need.

Only five examples can be displayed at one time.

Example of Measurement Results Display

Rt.Fol.Vol	
------------	--

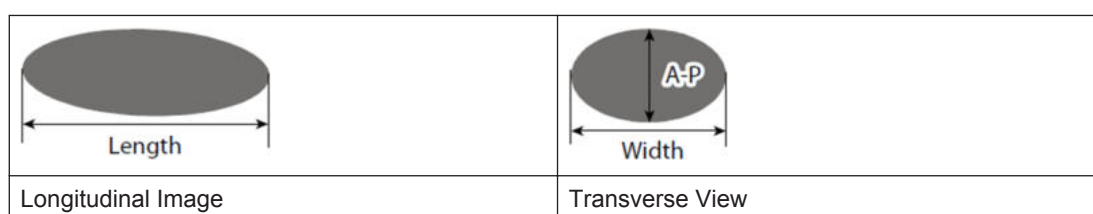
1:	2.1cm	←D1 Follicles measured value
:	2.0cm	←D2 Follicles measured value
2:	1.3cm	←D3 Follicles measured value
avg:	1.8cm	←Average value
Vol.:	2.78cm ³	←Volume

You may also stop measurement after only one or two axes.

(7) Bladder Volume Measurement

Obtain the volume of the bladder before and after it is full, and calculate the amount of urine discharged from the difference between these figures.

Approximate the bladder to an ellipsoid, measure the long axis of the transverse image (Length) and the length of the long and short axes of the longitudinal image (Width, A-P), and calculate the volume of the bladder.



Configure so the Length, A-P and Width are orthogonal to each other.

Procedure

1. Switch the measurement Study to [Bladder].
2. Record the vertical and transverse images of the bladder before and after urination in the B/B mode.
3. Measure the urinary bladder before urination.
 - a. Press the [Measurement] button on the touch panel and select [Pre Bldr Vol] from the measurement menu.
 - b. Display the longitudinal section and measure the Length.
 - c. Display the transverse section and measure the Width and A-P.
The volume (Pre Bldr Vol.) is displayed.
 - d. To confirm the measurement, press [Send].
4. Measure the urinary bladder after urination.
 - a. Press the [Measurement] button on the touch panel and then select [Pst Bldr Vol] from the measurement menu.
 - b. Calculate the Length, Width, A-P in the same way before urination.
The volume (BI-V) is displayed. The report will indicate the amount of urine discharged (Void Volume).

Example of Measurement Results Display

PreBldr Vol.		: Measurement of bladder volume before urination
Bl-V:	cm ³	: Volume of Bladder
Bl-L:	cm	: Bladder Length (Length)
Bl-AP:	cm	: Bladder Anteroposterior (A-P)
Bl-W:	cm	: Width of Bladder (Width)

PstBldr Vol.		: Measurement of bladder volume after urination
Bl-V:	cm ³	: Volume of Bladder
Bl-L:	cm	: Bladder Length (Length)
Bl-AP:	cm	: Bladder Anteroposterior (A-P)
Bl-W:	cm	: Width of Bladder (Width)

Reference information

1.2.1 Caliper Method on page 27

6.2.2 D Mode

The following precautions are necessary when taking measurements in D mode.

- When recording an arterial blood flow Doppler waveform (pulse method), set the Doppler angle of incidence as low as possible. If the Doppler angle of incidence exceeds 60°, the blood velocity measurement error increases.
- When measuring the blood velocity using multiple blood flow waveform images, use identical recording conditions (forward and reverse flow directions) for all of the blood flow waveforms. The blood flow measurement values of the system are recorded as real numbers but the ± sign is not displayed on the screen.
Completely different values might be displayed, particularly when the display of measurement values of reports is set at average value (Display Data is set at "Average" in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > Report Data])).

(1) Uterine Artery, Ovarian Artery

You can trace the right and left uterine artery and ovarian artery waveforms to calculate PI, RI, S/D and other values.

The Doppler Trace method consists of [Auto] (Auto Trace) and [Manual] (Manual Trace). Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to set the measurement method for each measurement parameter.

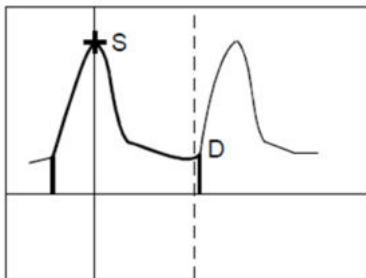
Procedure

1. Switch the measurement study to [GYN].
2. Record the artery blood flow Doppler waveform.
3. Press the [Measurement] button on the touch panel.

4. Select the name of the blood vessel to be measured from the measurement menu.
 - To measure the blood flow of the right uterine artery, select [Rt.UtA].
 - To measure the blood flow of the left uterine artery, select [Lt.UtA].
 - To measure the blood flow of the right ovarian artery, select [Rt.OvA].
 - To measure the blood flow of the left ovarian artery, select [Lt.OvA].

A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.

5. Using the Doppler Trace method, trace the blood flow Doppler waveform. When the blood flow Doppler waveform is traced, a line cursor accompanied by ""S"" (peak systolic velocity point) and ""D"" (end diastolic velocity point) is displayed.



6. Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

Rt.UtA		: Name of selected blood vessel
PI:		: Pulsatility Index
RI:		: Resistance Index
S/D:		: PSV/EDV ratio
PSV:	cm/s	: Peak Systolic Velocity
EDV:	cm/s	: End Diastolic Velocity
MnV:	cm/s	: Mean Velocity
[1Beat avg.]		: Detected Heartbeats

Reference information

1.2.5 Doppler Trace Method on page 31

(2) GYNDop Measurements

Obtains the PSV (peak systolic velocity) and EDV or minimum diastolic velocity, and S/D from blood flow in arteries.

3 user measurements can be configured for the measurement of gynecological arterial flow.

Gynecological flow measurement GYNDop1
 GYNDop2
 GYNDop3

Use Name Assignment in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method > Display Items > D.Mode]) to change a measurement name.

In this measurement, set the following 2 points:

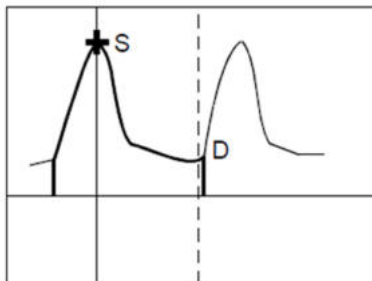
- Peak systolic velocity (PSV)
- End-diastolic velocity (EDV) or minimum diastolic velocity

NOTE: End-diastolic blood velocity (EDV) and the minimum diastolic velocity are not necessarily identical. Set the EDV time phase to match the blood velocity to be used for the measurement.

The Doppler Trace method consists of [Auto] (Auto Trace) and [Manual] (Manual Trace). Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method > Display Items > D.Mode]) to set the measurement method for each measurement parameter.

Procedure

1. Record the pulsating blood flow Doppler waveform.
2. Press the [Measurement] button on the touch panel.
3. Select one of the following: [GYNDop1], [GYNDop2], or [GYNDop3].
 A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.
4. Using the Doppler Trace method, trace the blood flow Doppler waveform.



When the blood flow Doppler waveform is traced, a line cursor accompanied by "S" (peak systolic velocity point) and "D" (end diastolic velocity point) is displayed. Measurement results are displayed simultaneously.

5. Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

GYNDop1	
PI :	: Pulsatility Index
RI :	: Resistance Index

S/D:		: PSV/EDV ratio
PSV:	cm/s	: Peak Systolic Velocity
EDV:	cm/s	: End Diastolic Velocity
MnV:	cm/s	: Mean Velocity
[1Beat avg.]		: Detected Heartbeats

Reference information

1.2.5 Doppler Trace Method on page 31

6.3 Reports

Measurement results and obtained index values are sorted and displayed in the report.

The screenshot displays a medical report interface with the following sections:

- Return Header:** Prev, Next, GYN, US Image, Output
- Patient Information:**
 - ID: 123-456-789-0
 - Name: [Redacted]
 - Sex: Female, Date of birth: 1984/06/18, Age: 26Y
 - Height: 160.0cm, Weight: 52.00kg, Occupation: [Redacted]
 - BMI: 20.3
 - LMP: 2011/01/15, Cycle day: 20, GRAV: PARA: AB: ECTO:
- <Comments>**
- Site Information:**
 - Study Description: [Redacted]
 - Referring Phys.: [Redacted]
 - Reporting Phys.: [Redacted]
 - Sonographer: [Redacted]
- <Uterus>**
 - Volume: 34.16cm³, Length: 7.0cm, A-P: 3.0cm, Width: 3.1cm
 - Endometrial Thickness: 1.0cm
 - Position: [Redacted]
- <Cervix>**
 - Length: 3.6cm, A-P: 2.5cm, Width: 1.9cm
- <Rt./Lt.Ovary>**
 - Right:** Volume: 14.34cm³, Length: 3.4cm, A-P: 3.1cm, Width: 2.6cm, Tube: [Redacted]
 - Left:** Volume: 8.37cm³, Length: 2.7cm, A-P: 2.8cm, Width: 2.1cm, Tube: [Redacted]

The following operations are available using the report.

I) Displaying measurement results and images

- Measurement results
- Displaying graphs
- Recorded ultrasonic images
- Past exam results

II) Editing results, comments and findings

III) Printing reports (print, save)

6.3.1 Displaying a Report

NOTE: Report display requires patient data input. Enter patient data on the ID screen.

(1) Displaying a Report

- Press the [Measurement] button on the touch panel and then select [Report] from the measurement menu.
- Select [Report] from the [Accessories] tab of the function menu.

The report screen provides the following buttons.

[Return]	Closes the report.
[Header]	Switches the Header Block display (patient data display) between Long Form and Short Form.
[Prev.]	Displays the previous page.
[Next]	Displays the next page.
[(Study list)]	Switches the Study in the report.
[US Image]	Displays an ultrasonic image in the report.
[Output]	Outputs report data to a personal computer, storage media, printer, or other destination.

To switch from the report screen to the scanning screen, select [Return] on the upper right of the report screen.

(2) Information Blocks Displayed in a Report

Reports are displayed in Study units.

The gynecological measurement studies are GYN, Bladder and Follicles. All studies divide information into blocks for display. The Header Block and Site Information Block are always displayed in reports. Other blocks are set in the measurement preset ([Study Assignment > (Study name) > Combined Report Display]) while blocks that include measurement results registered in a report are displayed.

	Header Block Patient information that was entered in the ID screen. [<Comment>] Show/hide the comment input field.
	Site Information Block Facility information, doctor in charge, and other information

<Uterus> Volume : 34.16cm³ Length : 7.0cm A-P : 3.0cm Width : 3.1cm Endometrial Thickness : 1.0cm Position : <Cervix> Length : 3.6cm A-P : 2.5cm Width : 1.9cm	Uterus Block Displays results for uterus and cervical measurements.
<Rt./Lt.Ovary> Right Volume : 14.34cm³ Length : 3.4cm A-P : 3.1cm Width : 2.6cm Tube : Left Volume : 8.37cm³ Length : 2.7cm A-P : 2.8cm Width : 2.1cm Tube :	Ovary Block Displays ovary measurement results.
<GYN Doppler Measurement> PI RI S/D PSV EDV RI/V Rt. UTA 1.65 0.80 5.00 70.7cm/s 14.1cm/s 34.3cm/s Lt. UTA 2.45 1.01 91.00 51.5cm/s 0.6cm/s 21.2cm/s Rt. Ova 1.39 0.79 4.74 72.4cm/s 15.3cm/s 41.1cm/s Lt. Ova 1.46 0.77 4.43 52.6cm/s 11.9cm/s 27.9cm/s	Doppler Block Displays results for uterine artery blood flow and ovarian artery blood flow measurements.
<Anatomy Check List> Uterus Left Ovary Left Adnexa Endometrium Left Ovarian Cyst Polyp Right Ovary Right Adnexa Cul de Sac Right Ovarian Cyst Fibroid	Anatomy Check List Block Enter ultrasound findings, etc.
<Bladder> Void Volume : 237.6cl Pre-Void Volume : 241.5cl Length : 8.4cm A-P : 8.0cm Width : 6.8cm Post-Void Volume : 3.89cl Length : 1.4cm A-P : 1.6cm Width : 3.1cm	Bladder Block Displays Bladder Volume measurement results.
<Ovary Follicles Diameter> Right 1 2 3 4 5 6 7 8 9 10 Fol D1(cm) 2.2 2.1 2.0 1.8 1.6 Left Fol D1(cm) 2.3 2.0 1.8 1.7 1.6 Endometrial Thickness 1.1cm	Follicles Block Displays today's results for ovarian follicle and endometrial thickness measurements in order of size. Displays measurement results for the two axes when 2Caliper or Cross-Caliper was used for measurement.
<Ovary Follicles Volume> Right 1 2 3 4 5 6 7 8 9 10 Fol D1(cm) 2.1 2.3 Fol D2(cm) 2.0 2.2 Fol D3(cm) 1.3 2.1 avg 1.8 2.2 Vol.(cm³) 2.78 5.35 Left Fol D1(cm) 2.2 2.1 Fol D2(cm) 2.1 1.7 Fol D3(cm) 2.3 2.1 avg 2.2 2.0 Vol.(cm³) 5.56 3.89	Follicles Volume Block Displays today's results for follicle volume measurements in order of volume.
<Rt Ovary Follicles Diameter> Cycle Follicles(cm) Exam.Date day 1 2 3 4 5 6 7 8 9 10 2011/02/03 12 2.8 2.4 2.4 2.1 1.3 2011/02/07 16 2.2 2.1 2.0 1.8 1.6 <Lt Ovary Follicles Diameter> Cycle Follicles(cm) Exam.Date day 1 2 3 4 5 6 7 8 9 10 2011/02/03 12 2.3 2.2 2.1 1.9 2011/02/07 16 2.3 2.0 1.8 1.7 1.6	Cycle Day Follicles Block Displays follicle measurement result history. Displays measurement results for the two axes when 2Caliper or Cross-Caliper was used for measurement.
<Rt Ovary Follicles Volume> Cycle Follicles (Average)(cm) Exam.Date day 1 2 3 4 5 6 7 8 9 10 2011/02/03 12 1.8 2.78 2011/02/07 16 2.1 1.7 4.50 2.49 <Lt Ovary Follicles Volume> Cycle Follicles (Average)(cm) Exam.Date day 1 2 3 4 5 6 7 8 9 10 2011/02/07 16 2.1 2.0 4.57 4.05	Cycle Day Follicles Volume Block Displays follicle volume measurement result history.
<Endometrial Thickness> Cycle day Exam.Date day 1 2 2011/02/03 12 1.0cm 2011/02/07 16 1.1cm	Cycle Day Endom-T Block Displays endometrial thickness measurement result history.

<Drug Administration> Exam Date 2011/02/03 Cycle day 12 HCG 150 2011/02/07 16		Drug & Serum Block Displays medication profile and serum hormone values.
<Serum Levels> Exam Date 2011/02/03 Cycle day 12 Estradiol 12 2011/02/07 16 LH 15		

(3) Attaching an Ultrasonic Image

You can attach ultrasonic images to reports. The attached ultrasonic images will be displayed in the US Image Block. You can add stored images of the patient whose report is being displayed from the system hard disk or a USB flash drive.

Use the following options in [Report Data] under preset to select images to display in the US Image Block.

- Use Display Pasted US Image Form on the Screen to set the display format.
- Set the number of images to display immediately after selecting US Image Block in [Automatically be Displayed US Images Number].

Procedure

1. Select [US Image] on the upper corner of the report screen.
 The US Image Block is displayed. The number of images configured with the preset are displayed in the order of top-left, top-right, etc., from the latest image saved to the system's hard disc or connected media, such as USB flash drive.
 Images will be displayed as shown below when [Display Pasted US Image Form on the Screen] is set to [2×2] and [4] is selected in [Automatically be Displayed US Images Number].



When 3 images are stored

2. If necessary, change the displayed images.
 - a. Select Review at the bottom of the screen.
 Images on the system hard disk and connected media are displayed as thumbnails. Only today's images of the current patient are displayed. "Current Exam.View" is displayed at the top right of the screen.



- b. Select an image to display.
Selected images will be displayed with a blue frame.
- c. After selecting all the images to display, select [Paste Desired US].
Only the selected images are displayed in the US Image Block.

Displaying images from past examination dates

Select [Change View] below the thumbnails. "Current>Post Exam.View" is displayed in the upper right corner of the screen and past exam images of the current patient are displayed. You can also select images from past examinations to display in the US Image Block.

When you re-select [Change View], the screen switches to display the images of the day only (Current Exam.View). "Current Exam.View" is displayed at the top right of the screen.

3. To return to the report page, select [Return].

(4) Displaying Past Reports

Displays past reports.

NOTE: You cannot modify the data in the past reports.

Procedure

1. Select [▼] on the upper right corner of the report screen.
When past reports are available, a list of the report dates is displayed.



2. Select the date of the report you want to open.
The report of the selected date opens.

6.3.2 Editing Reports

You can edit the following contents in the report.

- Comments
- Findings
- Measurement results

(1) Entering Comments

Enter comments including ultrasound comments in the Comments field in Header Block.

Procedure

1. Select [<Comments>].

When the <Comments> are hidden

Select [Header] on the upper corner of the report screen and select [<Comments>].

A text box is displayed.

The screenshot shows a software interface for a Gynecological (GYN) report. At the top, there are tabs: 'Return', 'Header', 'Phys', 'Next', 'GYN', 'US Image', and 'Output'. The 'Header' tab is selected. Below the tabs, there is a 'Patient Information' section with fields for ID (123-456-789-0), Name, Sex (Female), Date of birth (1984/05/18), Age (28Y), Height (160.0cm), Weight (52.00kg), Occupation, BMI (20.3), LMP (2011/01/15), Cycle day (20), GRAV, PARA, AB, and ECTO. Below this is a 'Site Information' section with fields for Study Description, Referring Phys, Reporting Phys, and Sonographer. The main part of the screen is divided into three sections: '<Uterus>', '<Cervix>', and '<Rt./Lt. Ovary>'. Each section contains fields for Volume, Length, A-P, and Width. The '<Uterus>' section has a text box for 'Position'. The '<Cervix>' section has a text box for 'Length'. The '<Rt./Lt. Ovary>' section has text boxes for 'Tube' for both Right and Left ovaries.

2. Enter a comment using the keyboard.
3. Select [OK] when you finish entering the comments.
The entry is confirmed.
To cancel the entry, select [Cancel].

Entering Ultrasound Findings for the Position of the Uterus: Uterus Block

The Uterus Block contains a comment field for entering details regarding uterus position from ultrasonic findings.

The screenshot shows a close-up of the '<Uterus>' section of the report. It contains fields for Volume (34.16cm³), Length (7.0cm), A-P (3.0cm), and Width (3.1cm). Below these fields is a text box labeled 'Position'.

Procedure

1. Display the report and switch to GYN Study.
2. Select the [Position] field from the Uterus Block.
3. Enter a comment using the keyboard.

Entering Ultrasound Findings for the Oviducts

The Ovary Block contains a comment field for entering details regarding uterus position from ultrasonic findings.

The screenshot shows a close-up of the '<Rt./Lt. Ovary>' section of the report. It contains fields for Volume, Length, A-P, and Width for both Right and Left ovaries. Below these fields are text boxes labeled 'Tube' for both Right and Left ovaries.

Procedure

1. Display the report and switch to GYN Study.
2. Select the [Tube] field from the Ovary Block

3. Enter a comment using the keyboard.

Entering Drug Dosage and Serum Hormone Value

The Drug & Serum Block contains a field for entering drug dosages and serum hormone values.

<Drug Administration>	
Exam Date	Cycle day
2011/02/03	12
2011/02/07	16

<Serum Levels>	
Exam Date	Cycle day
2011/02/03	12
2011/02/07	16

Procedure

1. Display the report and switch to Follicles Study.
2. Enter the drug dosage in <Drug Administration> under the Drug & Serum Block.
 - a. Select a gynecological drug from the <Drug Administration> list or enter it from the keyboard.
 - b. Use the keyboard to enter drug dosage in the right field.
3. Enter a serum hormone value in <Serum Levels> in the Drug & Serum Block.
 - a. Select a serum hormone from the <Serum Levels> list or enter it.
 - b. Use the keyboard to enter serum hormone values in the right field.

(2) Entering Data in the Anatomy Check List

Anatomy Check List is a function that displays anatomical comments concerning the uterus, ovaries, other organs and also comments concerning waveforms, as a checklist.

In the default settings, the Anatomy Check List Block is not part of any Study report. Use the measurement preset ([Study Assignment > (Study Name) > Combined Report Display]) to display this block in a report.

<Anatomy Check List>	
Uterus	Anteverted
Left Ovary	
Left Adnexa	
Endometrium	
Left Ovarian Cyst	
Polyp	
	Right Ovary
	Right Adnexa
	Cul de Sac
	Right Ovarian Cyst
	Fibroid
	WNL
	Enlarged
	Not Seen
	Absent

Procedure

1. Open a report and switch to the Study containing the Anatomy Check List Block.
2. Select the items you want to enter from the list.

Setting Items You Want to Display in the Anatomy Check List

Use preset for the setting.

Procedure

1. Select [Anatomy Check List Assign] in the measurement preset ([Study Assignment > (Study Name)]).

The Anatomy Check List Assign is displayed.

1	Uterus	21	41
2	Right Ovary	22	42
3	Left Ovary	23	43
4	Right Adnexa	24	44
5	Left Adnexa	25	45
6	Cul de Sac	26	46
7	Endometrium	27	47
8	Right Ovarian Cyst	28	48
9	Left Ovarian Cyst	29	49
10	Fibroid	30	50
11	Polyp	31	51
12		32	52
13		33	53
14		34	54
15		35	55
16		36	56
17		37	57
18		38	58
19		39	59
20		40	60

2. Select the item you want to change.
The following dialog box is displayed.

3. Select the items you want to display.
4. To delete an item, select the empty field at the top of the dialog box.

Deleting items

Select the empty field at the top of the dialog box.

Specifying Anatomy Check List Item Options

Specify options and User-defined items in the Anatomy Check List.

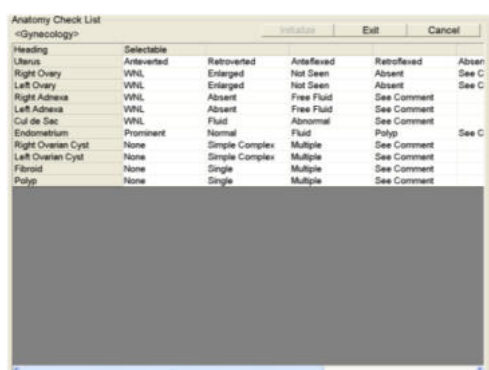
Procedure

1. Select [Anatomy Check List] in the measurement preset ([Create Measurement Tools > Application Measurement > Report Data]).
- The Anatomy Check List is displayed.



2. Select [Built-in] to change internal system data. Select [User] to set Heading and Selectable.

Selecting [Built-in] displays the following screen.

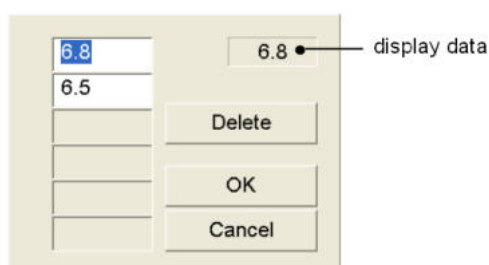


3. Select the item you want to change.
4. Enter an option from the keyboard.
5. Enter the option and select [Exit].

(3) Editing the Measurement Results

Procedure

1. Select the measurement value to be modified.
The dialog box with the measurement value opens.



When Display Data in [Report Data] under preset is set to [Current], the data at the top appears in the report screen. If set to Average, an average value is displayed.

2. Revise the data.

Deleting data

- I) Select the measurement value from the dialog box.
- II) Select [Delete] from the dialog box.
- III) Select [OK] from the dialog box.

Revising data

Measurement results, such as PI and RI, correlate to two blood flow velocities (EDV and PSV) within the same heartbeat cycle. For that reason, any revisions that are made must be made to both to ensure that a mutual time phase relationship is maintained.

- I) Select the measurement value from the dialog box.
- II) Enter values from the keyboard.
- III) Select [OK] from the dialog box.

A prefix # will be added next to the name of the modified item.



Selecting the data to be displayed

If Display Data of [Report Data] in the preset has been set to "Current", you can change the measurement value to be displayed on the report screen.

- I) Select the measurement value from the dialog box.
- II) Select [OK] from the dialog box.

6.3.3 Outputting Reports

There are 3 ways to output reports.

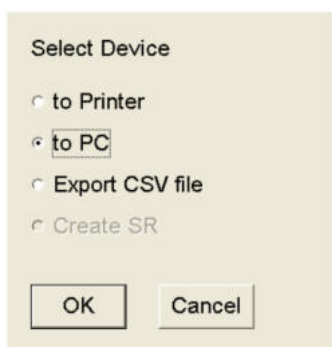
- Outputting to a local printer: Select the Block to output.
- Outputting as a CSV file: Output the values registered to the report to a connected media or device.
- Creating a DICOM SR file: Create a DICOM SR file.

(1) Printing

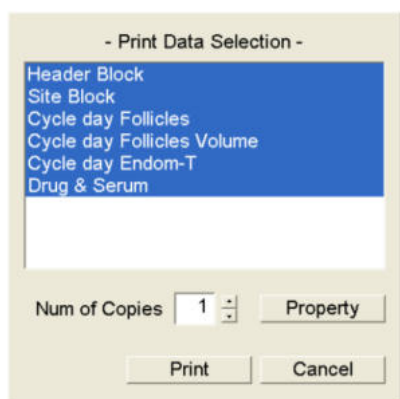
Print a report to the local printer (printer connected to the system).

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.



2. Select [to Printer], and press [OK].
The following dialog box is displayed.

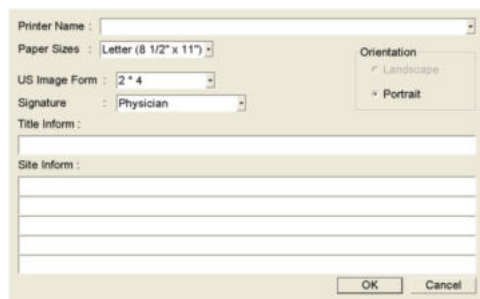


3. Select the blocks to be printed.
 - a. Select one of the blocks to print.
 - b. Repeat this step and highlight all the blocks to print.

To cancel a selection, select the Block again.
4. Use Num of Copies to set the number of copies to print.
5. Configure printer properties if necessary.
 - a. Select [Property].
 - b. See the next section to configure the printer property.
6. Select [Print].

Printer Properties

You can set the advanced printer properties.



Item	Options	Settings
Printer Name		Select the printer model.
Paper Sizes	US Letter	Prints on US letter size paper.
	A4	Prints on A4 size paper.
Orientation	Portrait	Sets the direction of the paper to the vertical orientation. (No option other than Portrait available)

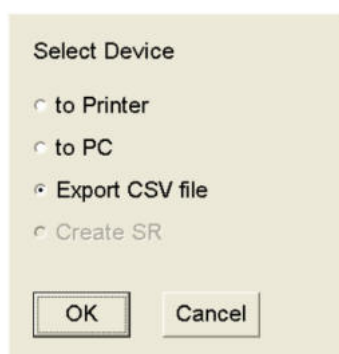
Item	Options	Settings
US Image Form	1×2	Prints a US Image Block with 1 row of 2 images per page.
	1×3	Prints a US Image Block with 1 row of 3 images per page.
	2×2	Prints a US Image Block with 2 rows of 2 images per page.
	2×4	Prints a US Image Block with 2 rows of 4 images per page.
Signature	Physician	Sets the Physician signature field.
	Physician & Sonographer	Sets the Physician and Sonographer signature fields.
	None	Hides the signature field.
Title Inform		You can enter a report title using no more than 80 characters.
Site Inform		You can enter facility information (hospital department, address, telephone number, FAX number, etc.).

(2) Outputting as a CSV File

You can output data registered in the report as a CSV file.

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.



2. Select [Export CSV file], and press [OK].
The dialog box is displayed.



The dialog box titled "Target Medium" has a radio button labeled "USB" which is selected. Below it is a "File Name" field containing the text "123-456-789-0_20110204_GY". Underneath is a "File List" area, which is currently empty. At the bottom are "OK" and "Cancel" buttons.

The file name is displayed in the format ID_Date_Application.
Select [Cancel] to return to the report screen.

3. Select the storage destination from the Target Medium list.
4. Change the file name if necessary.
5. Press [OK].

The selected CSV file is saved in the specified media.

A CSV file contains patient information, numerical values and comments.

(3) Creating a DICOM SR File

You can create a DICOM SR file from the data displayed in the reports.

NOTE The optional DICOM SR compatible software (SOP-AR50-21) is necessary for creating DICOM SR files.

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.



The dialog box titled "Select Device" has four radio button options: "to Printer", "to PC", "Export CSV file", and "Create SR". The "Create SR" option is selected. At the bottom are "OK" and "Cancel" buttons.

2. Select [Create SR], and press [OK].
A DICOM SR file is created for the examination date shown on the report. Any existing file will be overwritten.
The DICOM SR file is not sent at this time.

Sending a DICOM SR File

NOTE: The optional DICOM networking software (SOP-AR50-10) is necessary for connecting to a DICOM SR server.

A created DICOM SR file is sent to the DICOM SR server when an examination is ended by selecting [New Patient] key or [End Study] from the [Accessories] tab in the function menu. If [SR Auto Creation] is "On" in preset ([Common Preset] > [DICOM SR]) and today's DICOM SR file has not yet been created, an SR file containing the current examination will be created and sent together with other created DICOM SR files to the DICOM SR server.

6.4 Presets

Gynecological measurement presets (GYN preset) can be broadly divided into 3 types.

- **Create Measurement Tools**
Settings for measurement methods, caliper mark display, and report display.
Settings for basic measurement, and for applied measurement.
- **Study Assignment**
You can configure the menu, transfer items and report view in each study. These are set for each
- **SW Assignment**
Assigns measurement functions to menu items.

Table3: GYN preset configuration

Create Measurement Tools	Basic Measurement	Measured Method & Display Items	B.Mode
			M.Mode
			D.Mode
			F.Mode
		Caliper Mark Control	
		Unit Selection	
		Caliper Auto Off	
		Display Form	Mark Display
	Application Measurement	Measured Method & Display Items	B.Mode
			D.Mode
		Caliper Mark Control	
		Unit Selection	
		Caliper Auto Off	
		Report Data	Anatomy Check List
		Display Form	Mark Display
		User's Calculation	Reserved Word

Study Assignment	GYN Follicles Bladder	Menu Assign
		Anatomy Check List Assign
		Combined Report Display
		Transfer List Assign
		Other
SW Assignment	Touch Panel SW Assignment	
	+Mark Key Assignment	

6.5 GYN Presets

The pages of the preset are displayed as shown below.



[GYN Preset]
GYN Preset top page

6.6 Create Measurement Tools

6.6.1 Basic Measurement

Refer to the presets for basic measurements.

Reference information

2.2.7(3) *Measurement-related Settings: Create Measurement Tools* on page 82

(1) Application Measurement

Enables you to make settings for applied measurement (gynecological measurement).

[Measured Method &Display Items <B.Mode]
(1/2): B mode measurement settings

[Measured Method &Display Items <B.Mode]
(2/2): B mode measurement settings

[Measured Method & Display Items <D.Mode]
(1/2): D mode measurement settings

[Measured Method & Display Items <D.Mode]
(2/2): D mode measurement settings

[Caliper Auto Off]: Caliper mark and
measurement result display settings for when
freeze is canceled

[Report Data]
Report display data settings

[Report Data > Anatomy Check List]
Report display data settings

Report Data

Display Data: **Current**

Transfer from Report Data: **OFF**

Storage Data Number: 1 2 3 4 5 6

Pasted US Image Screen: Display Pasted US Image Form on the Screen
1x1 2x2 3x2 3x3

Automatically be Displayed US Images Number: 0 1 2 3 4 5 6 7 8 9

Follicles Report Display Order: **Descending**

Exit Cancel

[Report Data > Anatomy Check List > Built-in]
Internal options

Anatomy Check List (1/1)

Anatomy Check List

Gynecology: **Built-in** User

Exit Cancel

[Report Data > Anatomy Check List > User]
User settings

Anatomy Check List <Gynecology>

Heading	Selectable	Anterverted	Retroverted	Anteflexed	Retroflexed	Absent
Uterus	Anterverted	Retroverted	Anteflexed	Retroflexed	Absent	See C
Right Ovary	WNL	Enlarged	Not Seen	Absent	See C	See C
Left Ovary	WNL	Enlarged	Not Seen	Absent	See C	See C
Right Adnexa	WNL	Absent	Free Fluid	See Comment	See C	See C
Left Adnexa	WNL	Absent	Free Fluid	See Comment	See C	See C
Cul de Sac	WNL	Fluid	Abnormal	Polyp	See Comment	See C
Endometrium	Prominent	Normal	Fluid	Polyp	See Comment	See C
Right Ovarian Cyst	None	Simple Complex	Multiple	See Comment	See C	See C
Left Ovarian Cyst	None	Simple Complex	Multiple	See Comment	See C	See C
Fibroid	None	Single	Multiple	See Comment	See C	See C
Polyp	None	Single	Multiple	See Comment	See C	See C

Initialize Exit Cancel

[Display Form]: Vertical and horizontal display of
measurement results, display of multiple results,
settings for simultaneous display with basic
measurement

Anatomy Check List <Gynecology>

Heading	Selectable	Not Seen	Seen	Not Seen	Seen
User1	Seen	Not Seen	Seen	Not Seen	Seen
User2	Seen	Not Seen	Seen	Not Seen	Seen
User3	Seen	Not Seen	Seen	Not Seen	Seen
User4	Seen	Not Seen	Seen	Not Seen	Seen
User5	Seen	Not Seen	Seen	Not Seen	Seen
User6	Seen	Not Seen	Seen	Not Seen	Seen
User7	Seen	Not Seen	Seen	Not Seen	Seen
User8	Seen	Not Seen	Seen	Not Seen	Seen
User9	Seen	Not Seen	Seen	Not Seen	Seen
User10	Seen	Not Seen	Seen	Not Seen	Seen

Initialize Exit Cancel

[Display Form > Mark Display]
Caliper mark display settings

Display Form

Result Display Window Style: **Sideways**

Package Result Display: **Multi**

Basic measurements are displayed together: **No**

Exit Cancel

[User's Calculation]
User index calculation formula settings

Mark Display (1/5)

Uterus: **Mark Display** **Mark Active**

Cervix: **Mark Display** **Mark Active**

Endom-T: **Mark Display** **Mark Active**

Ovary: **Mark Display** **Mark Active**

Bladder: **Mark Display** **Mark Active**

Follicles: **Mark Display** **Mark Active**

Follicles Volume: **Mark Display** **Mark Active**

GYN Dop: **Mark Display** **Mark Active**

Exit Cancel

[User's Calculation > Reserved Word]
Reserved word settings for user index calculation
formulas

User's Calculation

Equation Program

Create User's Calculation

Delete User's Calculation

U-Calc. 1	U-Calc. 16
U-Calc. 2	U-Calc. 17
U-Calc. 3	U-Calc. 18
U-Calc. 4	U-Calc. 19
U-Calc. 5	U-Calc. 20
U-Calc. 6	U-Calc. 21
U-Calc. 7	U-Calc. 22
U-Calc. 8	U-Calc. 23
U-Calc. 9	U-Calc. 24
U-Calc. 10	U-Calc. 25
U-Calc. 11	U-Calc. 26
U-Calc. 12	U-Calc. 27
U-Calc. 13	U-Calc. 28
U-Calc. 14	U-Calc. 29
U-Calc. 15	U-Calc. 30

Exit Cancel

User's Calculation Reserved Word (1/2)

Reserved Word Registration

Create Reserved Word

Delete Reserved Word

Reserved Word 1	Reserved Word 16
Reserved Word 2	Reserved Word 17
Reserved Word 3	Reserved Word 18
Reserved Word 4	Reserved Word 19
Reserved Word 5	Reserved Word 20
Reserved Word 6	Reserved Word 21
Reserved Word 7	Reserved Word 22
Reserved Word 8	Reserved Word 23
Reserved Word 9	Reserved Word 24
Reserved Word 10	Reserved Word 25
Reserved Word 11	Reserved Word 26
Reserved Word 12	Reserved Word 27
Reserved Word 13	Reserved Word 28
Reserved Word 14	Reserved Word 29
Reserved Word 15	Reserved Word 30

Exit Cancel

(2) Study Assignment

You can configure the menu, transferred items and report view in each study.

[Study Assignment]: Tree view display settings of Study and user-defined Study

Study Assignment

Select Study

Copy from Other Study

Select Display Study on the Left Tree View

Study Name	Study Name	Study Name
GYN	ON	User8
Follicles	ON	User9
Bladder	ON	User10
User1	OFF	User11
User2	OFF	User12
User3	OFF	User13
User4	OFF	User14
User5	OFF	User15
User6	OFF	User16
User7	OFF	User17
		User18
		User19
		User20
		User21
		User22

Exit Cancel

[Menu Assign]

Measurement menu parameter settings

Menu Assign

[GYN]

Select the Study at the Top Screen of Study Assignment and then Setup Measurement Menu Format.

Select Target View Mode

Select B(F) Mode Items

Distance	Dist-trace	Area-Trace	Area-Ellipse
Area-Circle	Volume 1	Volume 2	Histogram
B Index	Rt Hip J Angle	Lt Hip J Angle	Angle
Flow Profile			
Rt Follicles	Lt Follicles	Rt Follicles Vol	Lt Follicles Vol
Uterus	Endom-T	Cervix	Rt Ovary
Lt Ovary	PreBldr Vol	PstBldr Vol	

Exit Cancel

[Anatomy Check List Assign]

Anatomy Check List Display Item Settings

Anatomy Check List Assign (1/1)

Anatomy Check List Assign

<<Gynecology>>

1	Uterus	21	41
2	Right Ovary	22	42
3	Left Ovary	23	43
4	Right Adnexa	24	44
5	Left Adnexa	25	45
6	Cul de Sac	26	46
7	Endometrium	27	47
8	Right Ovarian Cyst	28	48
9	Left Ovarian Cyst	29	49
10	Fibroid	30	50
11	Polyp	31	51
12		32	52
13		33	53
14		34	54
15		35	55
16		36	56
17		37	57
18		38	58
19		39	59
20		40	60

Exit Cancel

[Combined Report Display]
Report display block settings

[Transfer List Assign]
Settings for transferring items of basic measurement results

	Distance	Area	Circum	Axis	Diameter
Ut-L					
Ut-AP					
Ut-W					
Endom-T					
Crv-L					
Crv-AP					
Crv-W					
Rt.Ov-L					
Rt.Ov-AP					
Rt.Ov-W					
Lt.Ov-L					
Lt.Ov-AP					
Lt.Ov-W					

[Other]
Measurement guide message display settings

(3) SW Assignment

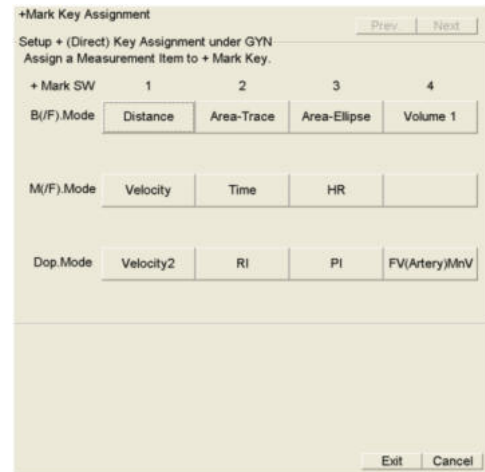
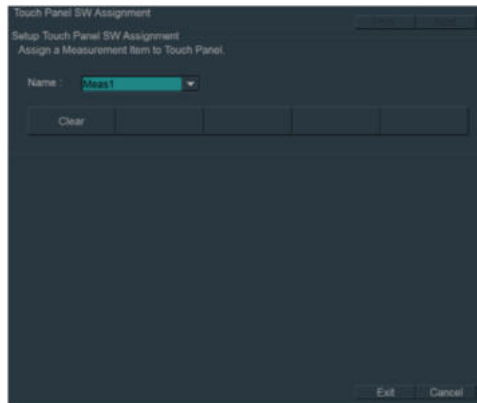
Assigns measurement menus to the [Meas] tab in the function menu or select the basic measurement menu that will appear when you select [Calliper] key .

[Touch Panel SW Assignment]

Configures the items that can be assigned to the [Meas] tab in the function menu.

[+Mark Key Assignment]

Sets the measurement item to launch when [Calliper] key is selected.



6.7 References

6.7.1 Formulas

B mode calculation formula

Calculated parameters	Formulas
Uterus	Volume (cm ³) = 0.523 × Length × A-P × Width
Ovary	Volume (cm ³) = 0.523 × Length × A-P × Width
Bladder Vol	Volume (cm ³) = π/6 × Length (cm) × Width (cm) × A-P (cm)
Follicles	Volume (cm ³) = 4/3π × r ³ (r = radius, r1 = d1 ÷ 2)
Follicles Vol.	Volume (cm ³) = 4/3π × r1 × r2 × r3 Volume (cm ³) = π/6 × d1 × d2 × d3 (r = radius, r = d ÷ 2) Average(cm) = (d1 + d2 + d3)/3

6.7.2 Anatomy Check List

Internal system items

Heading	Selectable					
Uterus	Anteverted	Retroverted	Anteflexed	Retroflexed	Absent	See Comment
Right Ovary	WNIL	Enlarged	Not Seen	Absent	See Comment	
Left Ovary	WNIL	Enlarged	Not Seen	Absent	See Comment	
Right Adnexa	WNIL	Absent	Free Fluid	See Comment		
Left Adnexa	WNIL	Absent	Free Fluid	See Comment		
Cul de Sac	WNIL	Fluid	Abnormal	See Comment		
Endometrium	Prominent	Normal	Fluid	Polyp	See Comment	
Right Ovarian Cyst	None	Simple Complex	Multiple	See Comment		
Left Ovarian Cyst	None	Simple Complex	Multiple	See Comment		
Fibroid	None	Single	Multiple	See Comment		
Polyp	None	Single	Multiple	See Comment		

6.7.3 References

(1) B mode

I) Uterus Volume

Barry B.Goldberg, M.D., Alfred B.Kurtz,M.D., Atlas of Ultrasound Measurements. Mosby Year Book Medical Publishers, INC., p194, ISBN 0-8151-3541-6

II) Ovarian Volume

Pe Harris L.Chohen, MD et al., "Ovarian Volumes Measured by US : Bigger than We Think," Radiology 1990, 177, 189-192

III) Endometrial Thickness

Seth Granberg, MD et al., "Endometrial thickness as measured by endovaginal ultrasonography for identifying endometrial abnormality," Am J Obstet Gynecol 1991, 164, 47-52

IV) Endometrial Thickness

Theera Tongsong, MD et al., "Use of Vaginosonographic Measurements of Endometrial Thickness in the Identification of Abnormal Endometrium in Pre-and Postmenopausal Bleeding," J Clin Ultrasound 22, 479-482, October 1994

V) Endometrial Thickness

Igal Wolman, MD et al., "The Sensitivity and Specificity of Vaginal Sonography in Detecting Endometrial Abnormalities in Women with Postmenopausal Bleeding," J Clin Ultrasound 24, 79-82, February 1996

VI) Follicles measurement

Queenan et.al., "Ultrasound scanning of ovaries to detect ovulation in women" Fertility and Sterility 34 (2), August 1980

VII) Follicles measurement

C.O'Herlihy, L.J.Ch.De Crespigny and H.P.Robinson, "Monitoring ovarian follicular development with real-time ultrasound," British Journal of Obstetrics and Gynecology 87, 613-618, July 1980

(2) D mode

I) Uterine Artery

Kurjak, MD et al., "Transvaginal color flow Doppler in the assessment of ovarian and uterine blood flow in infertile women," Fertility and Sterility 56 (5), 870-873, November 1991

II) Uterine Artery

ZEE WEINER, DAN BECK et al., "Uterine artery flow velocity waveforms and color flow imaging in women with perimenopausal and postmenopausal bleeding: Correlation to endometrial histopathology," Acta Obstet Gynecol

III) Ovarian Artery

Kurjak, MD et al., "Transvaginal color flow Doppler in the assessment of ovarian and uterine blood flow in infertile women," Fertility and Sterility 56 (5), 870-873, November 1991

6.7.4 Terms and Abbreviations

Abbreviation	Meaning	Meaning
AB	Abortus	Number of abortions or miscarriages
AP	Antero posterior diameter	Anteroposterior diameter
Bl	Bladder	Bladder
BBT	Based on Basal Body Temperature	Estimated ovulation date based on basal body temperature
Crv	Cervix	Cervix

Abbreviation	Meaning	Meaning
Cycle day	Cycle day	Cycle day
ECTOP	Ectopic	Number of ectopic pregnancies
EDV	End Diastolic Velocity	End Diastolic Velocity
Endom-T	Endometrial Thickness	Endometrial Thickness
Fol.	Follicles	Follicles
Grav	Gravida	Gravida
L	Length	Length
Lt	Left	Left
LMP	Last Menstrual Period	Last Menstrual Period
MnV	Mean Velocity	Mean Velocity
Ov	Ovary	Ovary
OvA	Ovarian Artery	Ovarian Artery
Para	Para	Number of para (number of births)
PI	Pulsatility Index	Pulsatility Index
Pre.Bldr Vol.	Pre Bladder Volume	Pre Bladder Volume
Pst.Bldr Vol.	Post Bladder Volume	Post Bladder Volume
PSV	Peak Systolic Velocity	Peak Systolic Velocity
RI	Right	Right
Rt./Lt.	Right/Left	Right/Left
S/D	Systolic/Diastolic velocity Ratio	Systolic/Diastolic Velocity Ratio
Ut	Uterus	Uterus
UtA	Uterine Artery	Uterine Artery
V	Volume	Volume
Vm	Mean Velocity	Mean velocity (Mean method)
W	End Diastolic Velocity	End Diastolic Velocity
EDV	Width	Width

Obstetric Measurements

- 7.1 Obstetrics Measurement Overview
- 7.2 Measurement Methods
- 7.3 Reports
- 7.4 Presets
- 7.5 References

7.1 Obstetrics Measurement Overview

7.1.1 Obstetrics Measurement Menus

Obstetrics measurements provide the following measurement menus and measurement parameters. For information on calculation formulas and development tables, refer to 7-5. References.

B Mode						
Measurement Functions	Measurement Menu	Display Item				Remarks
Gestational age measurement	BPD, FL, etc.	Author	GA	Normal Range	Growth Rate	The normal range display type differs with each table (± days, ± SD, upper limit-lower limit)
		EDC				
Fetal weight measurement	FW (Tokyo U), etc.	Author	each GA	GA Data	Normal Range	Measured at multiple cross-sections
		EDC				
Ratio measurements	FL/BPD (Hohler), etc.	Author	Ratio	Normal Range		Measured at two cross-sections Author is indicated in the report

The results displayed for the above measurements differ with the selected author.

B Mode						
Measurement Functions	Measurement Menu	Display Item				Remarks
Amniotic fluid index measurement	AFI Moore etc.	Author	AFI	Normal Range		Measured at four cross-sections
		Q1	Q2	Q3	Q4	
	AF Pocket	AF Pocket				Measured at one cross-section
	AFV	AFV				
Cardiothoracic ratio measurement	CTAR	CTAR	Heart	Thorax		Area ratio
	CTR	CTR	Heart	Thorax		Circumference ratio
Cervical length measurement	Cervix	Cervix				For endovaginal examination

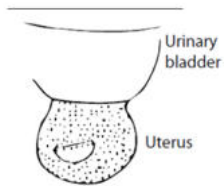
B Mode, M Mode						
Measurement Functions	Measurement Menu	Display Item				Remarks
Fetus cardiac function measurement	LV Function	LVIDd	LVIDs	EDV	ESV	Evaluation of ejection fraction and contraction coefficient of fetus heart
		EF	FS	SV	RVDd	

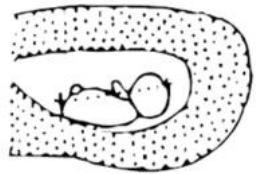
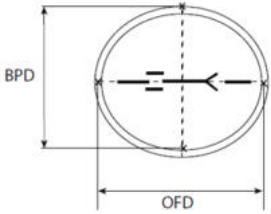
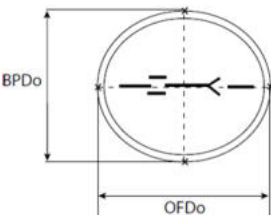
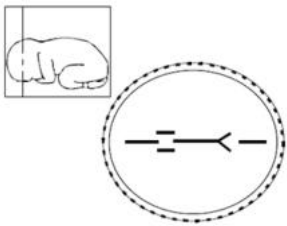
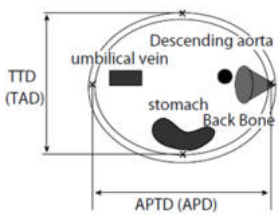
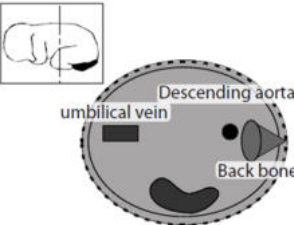
M Mode, D Mode				
Measurement Functions	Measurement Menu	Display Item		Remarks
Fetal heart rate	FHR	FHR		Fetal heart rate
	PreHR(Amnio)	PreHR		Fetal heart rate during amniocentesis (before and after)
	PstHR(Amnio)	PstHR		

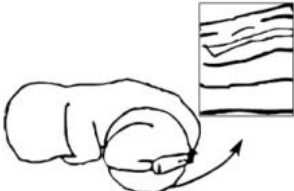
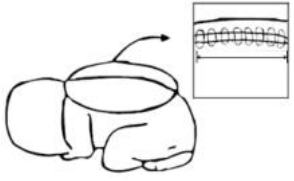
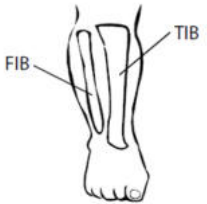
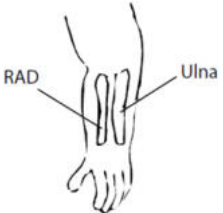
D Mode						
Measurement Functions	Measurement Menu	Display Item				Remarks
Fetal Doppler	Umbilical Artery	PI	RI	S/D	PSV	Fetal circulatory dynamics diagnosis You can define the names for OB Dop 1 to 3 to suit their purpose and application. Select Right/Left for the uterine artery
	Uterine Artery	EDV	MnV	Vm	HR	
	Descending Aorta					
	Renal-Artery					
	OB Dop 1					Evaluates right ventricular failure in a fetus.
	OB Dop 2					
	OB Dop 3					
	MCA					
	PLI	PLI	A	SF		Display Qp/Qs in the report
	LVOT Flow	pV	MnV	VTI	LVOT	
		CSA	SV			
	RVOT Flow	pV	MnV	VTI	RVOT	
		CSA	SV			
	Ductus Venosus	PI	a/S	S/a	PVIV	Fetal ductus venosus flow waveform measurement
		S	D	a	MnV	
		HR				

(1) GA Measurement Menu

There are the following measurement areas for GA measurement.

GA Measurements	Full spelling	Meaning	
EES	Early Embryonic Size	Early Embryonic Size	
GS	Gestational Sac	Gestational sac	
mGS	Mean Gestational Sac	Gestational sac	

GA Measurements	Full spelling	Meaning	
CRL	Crown Rump Length	Crown Rump Length	
BPD	Biparietal Diameter	Biparietal diameter (outer - inner)	
OFD	Outer Orbital Diameter	Occipital Frontal Diameter	
BPD _o	Biparietal Diameter (outer-outer)	Biparietal diameter (outer - outer)	
OFD _o	Occipital Frontal Diameter (outer-outer)	Occipital Frontal Diameter outer to outer)	
HC	Head Circumference	Head Circumference	
TC	Thoracic Circumference	Thoracic Circumference	
TL	Thoracic Length	Thoracic Length	
APTD (APD)	Antero Posterior Trunk Diameter	Anteroposterior trunk Diameter	
TTD (TAD)	Transverse Trunk Diameter (Transverse Abdominal Diameter)	Transverse trunk diameter	
AXT	APTD × TTD		
AC	Abdominal Circumference	Abdominal Circumference	
FTA	Fetal Trunk cross-sectional Area	Fetal trunk cross-sectional area	
AD	Abdominal Diameter	Abdominal diameter	

GA Measurements	Full spelling	Meaning	
HL	Humerus Length	Humerus length	
FL	Femur Length	Femur length	
LV	Length of Vertebrae	Length of vertebrae	
TIB	Tibia length	Tibia length	
FIB	Fibula	Fibula length	
ULNA	Ulna length	Ulna length	
RAD	Radius length	Radius length	
NBL	Nasal Bone Length	Nasal Bone Length	
User1 to User10		User settings	

(2) FW Measurement Menu

FW Measurement Menu	Measurement parameters			
FW Tokyo U	BPD	APTD	TTD	FL
FW Osaka U	BPD	FTA	FL	
FW Hadlock1	AC	FL		
FW Hadlock2	HC	AC	FL	
FW Hadlock3	BPD	AC	FL	
FW Hadlock4	HC	AC		
FW Hadlock5	BPD	HC	AC	FL

FW Measurement Menu	Measurement parameters			
FW Shinozuka	BPD	AC	FL	
FW Hansmann	BPD	TTD		
FW Warsof	BPD	AC		
FW Shapard	BPD	AC		
FW Campbell	AC			
FW JSUM'03	BPD	AC	FL	

(3) Fetus Ratio Measurement Menu

Fetus Ratio measurement	Measurement parameters		Author	Remarks
BPD _o /OFD _o	BPD _o	OFD _o	Hadlock	Cephalic Index
FL/BPD	FL	BPD	Hohler	
FL/AC	FL	AC	Hadlock	
HC/AC	HC	AC	Campbell	
LVW/HW	LVW	HW	P&J	
FL/HC	FL	AC	Hadlock	

7.1.2 Obstetrics Measurement Study

Gynecological measurements are comprised of the following studies.
The measurement menu and report display differ with the selected study.

- Basic: For general obstetric examination
- Early: For early pregnancy
- Extended: For high-risk pregnancy
- BPP/Amnio: For BPP/amniotic fluid puncture scoring
- Anatomy: For an anatomical checklist of the fetus

There are the following studies for twin fetuses.

- Twin Basic: For general obstetric examination
- Twin Early: For early pregnancy
- Twin Extended: For high-risk pregnancy
- Twin BPP/Amnio: For BPP/amniotic fluid puncture scoring
- Twin Anatomy: For an anatomical checklist of the fetus

There are the following studies for triplet fetuses.

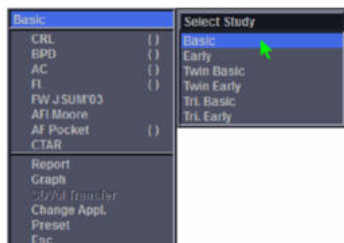
- Tri.Basic: For general obstetric examination
- Tri.Early: For early pregnancy
- Tri.Extended: For high-risk pregnancy
- Tri.BPP/Amnio: For BPP/amniotic fluid puncture scoring
- Tri.Anatomy: For an anatomical checklist of the fetus

(1) Switching the Study

Switches the Study within the same application.

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select the item at the very top (current study name) from the Measurement menu.

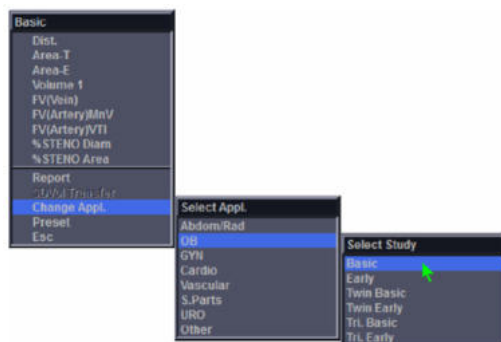


3. Select the Study to change.

(2) Switch the Study Using a Different Application

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select [Change Appl.].
3. Select the application.
4. Select Study.



Menu example: Switching from Basic under Abdomen
Switches to the study of the selected application.

7.2 Measurement Methods

This chapter explains measurement methods.

Enter any of the following information in the ID screen prior to an obstetrics measurement:

- LMP: Last Menstrual Period
- BBT: Estimated date of ovulation

- EDC: Expected date of birth
- EGA: Gestational age at past examination dates
- GA: Gestational age at the examination date

Displays fetal growth including previous examination results as a growth curve when information is

7.2.1 Examining Multiplets

Use the multiplet study for examining multiplets.

Obstetrics measurements can be executed for each fetus when a Study is changed to twins or triplets. Measurement results and reports can also be recorded for each fetus. The measurement item names in measurement results are prefixed by a letter (a, b, c) to distinguish the results for each type of fetus.

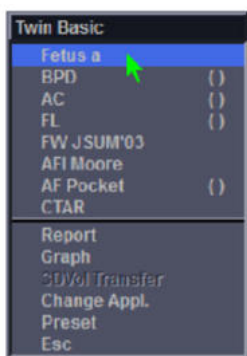
Measurements that target multiple fetuses are measurements other than measurements on the pregnant woman's side (Cervix, UtA).

(1) Switching the Fetal Code: Measurement Menus

Differentiates between the fetuses during measurement. Measurements are performed separately for each fetus.

Procedure

1. Switch to the study for multiplets.
2. Press the [Measurement] button on the touch panel.
The Measurement menu is displayed.



3. Select [Fetus a].
Switches to "Fetus b" in the screen.



When [Fetus b] is selected, it changes to "Fetus a".

(2) Switching the Fetal Code: [Meas] Tab Menu

[Fetus a]/[Fetus b]/[Fetus c] is not assigned under the factory default settings. Use the measurement preset ([SW Assignment > Touch Panel SW Assignment]) to set this function.

- Select [Fetus a] from the [Meas] tab in the function menu to switch to [Fetus a].
- Select [Fetus b] from the [Meas] tab in the function menu to switch to [Fetus b].
- Select [Fetus c] from the [Meas] tab in the function menu to switch to [Fetus c].

(3) Display of Measurement Results for Multiple Fetuses

The measurement name is prefixed by a fetal code.

Table5: Example showing GA measurement (BPD) display

Normal example	Example showing Fetus a	Example showing Fetus b	Example showing Fetus c	
BPD: Tokyo U	aBPD:Tokyo U	bBPD:Tokyo U	cBPD:Tokyo U	Fetal code letter, measurement name
. cm	. cm	. cm	. cm	Measurement results
w d± d	w d± d	w d± d	w d± d	Estimated gestational age
' //	' //	' //	' //	Expected date of birth

Table 6: Example showing FW measurement

Normal example	Example showing Fetus a	Example showing Fetus b	Example showing Fetus c	
FW:Tokyo U	aFW:Tokyo U	bFW:Tokyo U	cFW:Tokyo U	Fetal code letter, measurement name
g	g	g	g	Estimated fetus weight
' //	' //	' //	' //	Expected date of birth

Normal example	Example showing Fetus a	Example showing Fetus b	Example showing Fetus c	
BPD . cm	BPD . cm	BPD . cm	BPD . cm	Measurement results
w d	w d	w d	w d	Estimated gestational age
APTD . cm	APTD . cm	APTD . cm	APTD . cm	Measurement results
TTD . cm	TTD . cm	TTD . cm	TTD . cm	Measurement results
FL . cm	FL . cm	FL . cm	FL . cm	Measurement results
w d	w d	w d	w d	Estimated gestational age

7.2.2 B Mode

(1) Gestational Age (GA) Measurement

GA measurement is a generic term used for measurements that calculate the gestational age and expected date of delivery.

GA measurement uses the estimated gestational age table to calculate the gestational age and expected date of delivery from the measurement values of the fetus.

- Fetal measurement regions: GA Measurement Menu
- Estimated gestational age table: GA Tables:

Procedure

1. Render and record the region to be measured.
2. Press the [Measurement] button on the touch panel.
3. Select the measurement menu.
4. Measure the target region using the Caliper method
Measuring circumference and area (HC, TC, AC, FTA, AD, AXT, and HC2)
The following methods are the factory default settings.

HC, TC, AC, HC2: Use the Ellipse method to perform this measurement.

FTA: Use the Trace method to perform this measurement.

AD, AXT: Use the Cross-Caliper method to perform this measurement.

Example of Measurement Results Display

Measurement results show the gestational age and the expected delivery date. The results displayed will vary according to the estimated gestational age table.

(When in BPD)

US-GA: w d	: Average gestational age calculated from the GA measurement results
------------	--

' / /	: Average value of the expected date of delivery calculated from the GA measurement results
BPD: JSUM'03	: Fetal measurement region: Creator of the estimated gestational age table
. cm	: Measured value
w d + .	: Estimated gestational age and standard deviation (SD)
' / /	: Estimated date of delivery

Reference information

7.1.1(1) *GA Measurement Menu* on page 251

7.5.4(1) *GA Tables* on page 309

Transferring the Values of Basic Measurements

Transfer the measurement results of Distance (Dist.), Area-Trace (Area-T), Area-Ellipse (Area-E) to the GA measurement.

NOTE: [Transfer] is not assigned under the factory default settings. Use the measurement preset ([SW Assignment > Touch Panel SW Assignment]) to set this function.

Procedure

1. Measure the target region using the basic measurement.
2. Then use the steps below to transfer it.
 - a. Select [Transfer] from the function [Meas] menu.
 - b. Select the basic measurement results you wish to transfer.
A list of transfer destinations is displayed
 - c. Select the application measurement parameters of the transfer destination.
The selected basic measurement results are transferred
 - d. Repeat steps "a" to "c" as needed, to transfer other basic measurement results.

NOTE: A different calculation formula may be used when transferring basic measurement results to the circumference and area measurements such as AC, FTA, etc., using the Ellipse method or the Trace method. Before transferring the basic measurement results, check the calculation formula of the basic measurement and GA measurement.

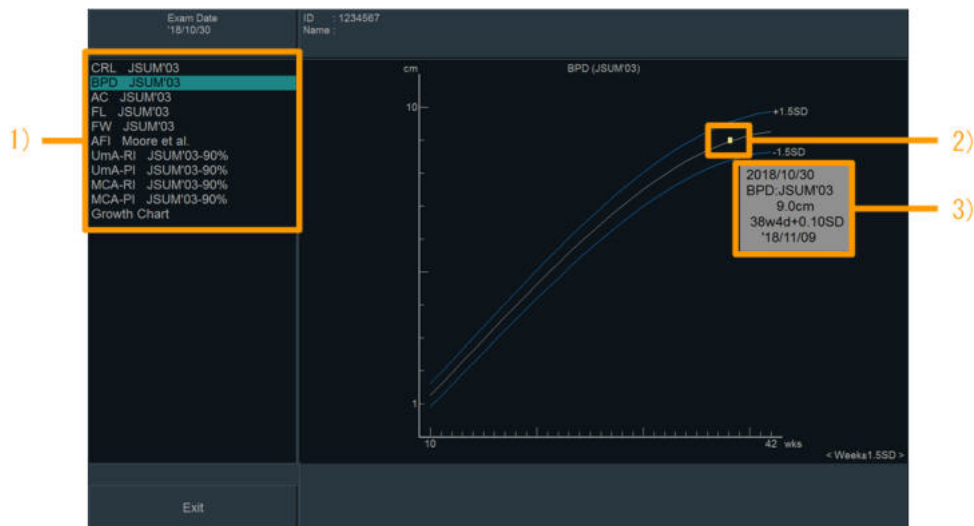
Reference information

2.2.7(5)(a) *[Meas] Tab Menu Settings: Touch Panel SW Assignment* on page 102

Displaying a Graph

You can display a graph after measurement

If past examination results for the same patient are available, they are also plotted in the graph.



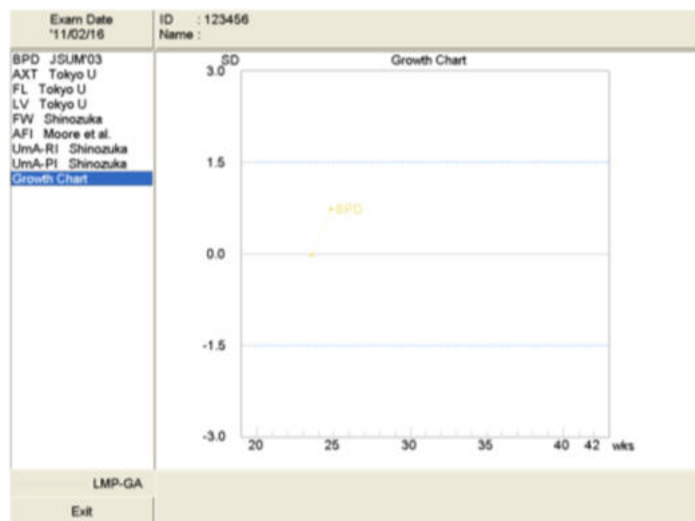
- 1) A graph menu
- 2) A plot location of today's measurement results
(The gray broken line indicates a gestational week calculated from the data entered on the ID screen.)
- 3) Today's measurement results

The fetus growth graph (Growth Analysis) displays the deviation data for the number of weeks of each estimated gestational age table. Use it as a guideline for growth.

NOTE: The measured values are displayed when you point to the 2) or 3) plot position.

Procedure

1. Display a graph.
 - a. Press the [Measurement] button on the touch panel and select [Graph] from the measurement menu.
The graph is displayed
The measured values are displayed when the pointer is placed over the plot positions.
2. Select measurement results from the graph menu on the left side of the screen.
The selected measurement results are displayed on the graph.
When the [Growth Chart] is selected, it is displayed as shown below.



[Growth Chart] is displayed when the SD type obstetrics table (Example: BPD JSUM'03) is assigned.

To return to the measurement screen, select [Exit.]

(2) Fetal Weight (FW) Measurement

Use this function to measure the estimated fetal weight from the measured values of several fetal parts.

- Setting of the estimated fetal weight equation and growth table (FW Growth Table)
Specify settings in FW Equation under the measurement preset ([Study Assignment > (Study Name) > OB Program > GA FW Ratio]).
- Setting of the estimated weight display based on the GA measurement results
Set Auto under FW Equation in the measurement preset ([Study Assignment > (Study Name) > OB Program > GA FW Ratio]) to [ON].
- Setting of the unit in which to display fetal weight
Specify settings in the measurement preset ([Create Measurement Tools > Application Measurement > Unit Selection]).

Procedure

1. Record the position of the FW measurement target region.
2. Press the [Measurement] button on the touch panel.
3. From the measurement menu, select FW measurement (example: [FW JSUM'03]).
4. Measure the target region.
The estimated fetal weight is shown when all the parts are measured.
If GA measurement has been performed on the target region before selecting FW measurement, the GA results are also used for the FW measurement.

Example of Measurement Results Display

Example showing FW measurement results (displayed together with GA measurement results for [FW JSUM'03]).

US-GA: w d	: Gestational age average calculated from the GA measurement results
------------------	--

' / /	: Average value of the expected date of delivery calculated from the GA measurement results
FW:JSUM'03	: Fetal weight measurement: Author of the calculation formula
g	: Estimated fetal weight based on the FW calculation formula
%ile	: Normal range (Displayed when FW Growth Table is set to Hadlock(%ile))* ¹
w d	: Estimated gestational age based on the FW Growth Table* ²
' / /	: Estimated date of delivery based on the FW Growth Table* ²
BPD: . cm	Fetal measurement region (BPD)
w d	: Estimated gestational age based on the measured value listed above* ³
AC: . cm	Fetal measurement region (AC)
w d	: Estimated gestational age based on the measured value listed above* ³
FL: cm	Fetal measurement region (FL)
w d	: Estimated gestational age based on the measured value listed above* ³

*1. When [Normal Range] of the FW measurement parameter in the measurement preset (Create Measurement Tools > Application Measurement > Measured Methods & Display Items > B.Mode) is set to on.

*2. It is displayed when [GA Date] and [EDC] are set to ON in the FW measurement result display setting in the preset. The factory default setting is OFF.

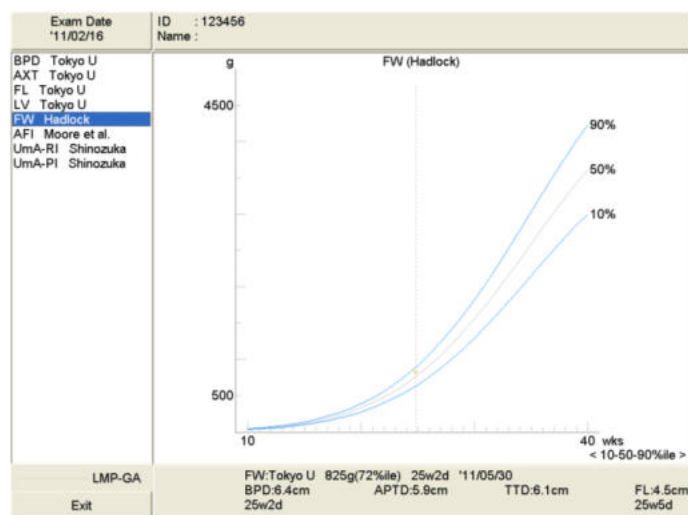
*3. Displayed when the estimated gestational age table is set.

Displaying a Graph

You can display a graph after measurement

If past examination results of the same patient are available, changes in fetal growth can be displayed in a graph.

The fetus growth graph (Growth Analysis) displays the deviation data for each gestational age (in weeks) in the estimated gestational age table. Use it as a guideline for growth.



Procedure

1. Display a graph.
 - a. Press [Measurement] button on the touch panel select [Graph] from the measurement menu

The graph is displayed.

The measured values are displayed when the pointer is placed over the plot positions

2. Select measurement results from the graph menu on the left side of the screen.
The selected measurement results are displayed on the graph.
To return to the measurement screen, select [Exit].

(3) Fetus Ratio Measurement

You can calculate the ratio from the measurement values of the measured fetal parts (two locations).

- Setting the ratio equation and growth table (FW Growth Table)
Use Ratio Equation under the measurement preset ([Study Assignment > (Study Name) > OB Program > GA FW Ratio]) to set the equation.
- Setting the ratio display based on the GA measurement results
Set Auto under Ratio Equation in the measurement preset ([Study Assignment > (Study Name) > OB Program > GA FW Ratio]) to [ON].
- Measurement menu settings
The Fetus Ratio measurement is not assigned to the measurement menu as the factory default setting. Use the measurement preset ([Study Assignment > (Study Name) > Menu Assign]) to set this measurement.

Procedure

1. Record the position of the FW measurement target region.
2. Press the [Measurement] button on the touch panel.
3. Select Fetus Ratio measurement (Example: [FL/AC]) from the measurement menu.
4. Measure the target region.
When all the target regions are measured, the ratio is displayed.
If GA measurement has been performed on the target region before selecting Fetus Ratio measurement, the GA results are also used for the Fetus Ratio measurement.

Example of measurement results display(for [FL/AC])

Example showing FW measurement results (displayed together with GA measurement results for [FW JSUM'03]).

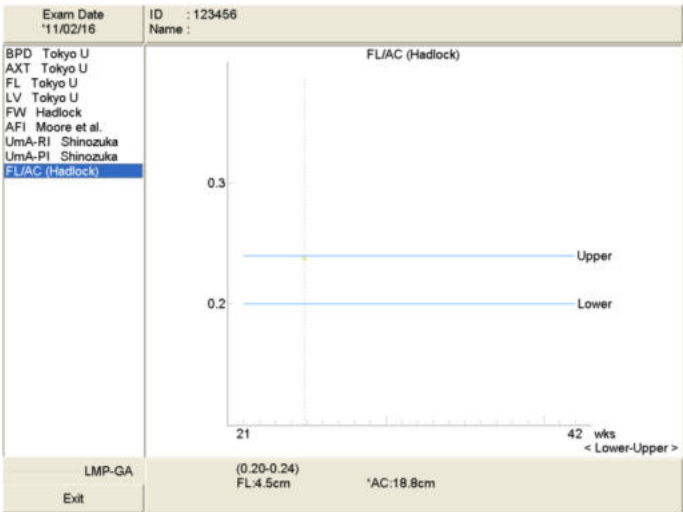
FL/AC :		: Measurement region name
.		: Ratio
-		: Normal range
FL :	. cm	: Measurement region (molecule)
AC :	. cm	: Measurement region (denominator)

Displaying a Graph

If measurement results are available, you can display a graph.

If past examination results of the same patient are available, changes in fetal growth and development can be displayed in a graph.

This fetus growth graph (Growth Analysis) displays deviation data related to the number of weeks indicated in the estimated gestational week table. Use it as a guideline for growth.



Procedure

1. Display a graph.
 - a. Press the [Measurement] button on the touch panel and select [Graph] from the measurement menu.

The graph is displayed.

The measured values are displayed when the pointer is placed over the plot positions.
2. Select measurement results from the graph menu on the left side of the screen.

The selected measurement results are displayed on the graph.

To return to the measurement screen, select [Exit].

(4) Amniotic Fluid Index (AFI) Measurements

Use this function to measure the free space in the amniotic fluid pocket in the uterus, and to calculate the amniotic fluid index (AFI). In this AFI measurement, divide the gravid uterus into four parts (Q1 to Q4) of the surface of the abdominal wall to calculate the greatest amniotic fluid depth of each part and their sum.

You can set the normal range table for AFI in [AFI Author] in the preset ([Study Assignment > (Study Name) > OB Program > Other]).

Procedure

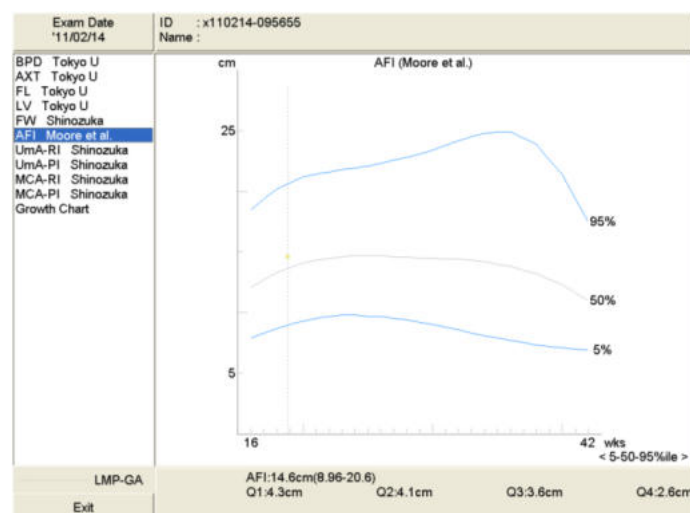
1. Move the probe parallel to sagittal plane of the mother's body, and apply it perpendicularly to the mother's back.
2. Record the cross-section of the first of the 4 divided parts of the area to be examined
3. Press the [Measurement] button on the touch panel.
4. Select [AFI] from the measurement menu.
The AFI measurement menu shows the Author's Name specified in the normal range table. If "Moore" has been specified, it will be displayed as [AFI Moore].

5. Measure the Q1 using the Caliper method
6. Measure from Q2 to Q4.
 - a. Render the second cross-section.
 - b. Measure the Q2 using the Caliper method.
 - c. Repeat step a through step b to measure Q3 and Q4.
 The total value is displayed.

Example of Measurement Results Display

AFI:Moore	Selected measurement name
. cm	: Q1 to Q4 total
. - .	: Normal range
Q1: . cm	: Q1 Measured value
Q2: . cm	: Q2 Measured value
Q3: . cm	: Q3 Measured value
Q4: . cm	: Q4 Measured value

Displaying a Graph



- Press [Measurement] button on the touch panel and then [Graph] from the measurement menu

(5) AF Pocket Measurement and AFV Measurement

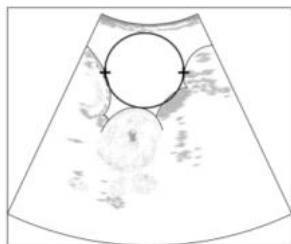
Use these functions to measure the maximum depth of free space in the amniotic fluid pocket in the uterus. AF Pocket (Amniotic Fluid Pocket) and AFV (Amniotic Fluid Volume) measure the same region.

The Caliper method and Circle method are used for the measurement.

AF Pocket or AFV in the measurement preset ([Create Measurement Tools > Application Measurement > Measure Method & Display Items > B.Mode]) to set this measurement. The factory default setting is set to Circle method.

Procedure

1. Render and record the amniotic fluid pocket surrounded by the placenta and the fetus.



2. Press the [Measurement] button on the touch panel.
3. Select the [AF Pocket] or [AFV] from the measurement menu.
4. Measure the free space in the amniotic fluid pocket using the Circle method.

Example of Measurement Results Display

[AF Pocket] measurement results

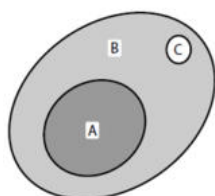
AF Pocket:	cm	: Measured value
------------	----	------------------

[AFV] measurement results

AFV:	. cm	: Measured value
------	------	------------------

(6) CTAR Measurements and CTR Measurements

The CTAR (Cardio Thoracic Area Ratio), CTR (Cardio Thoracic Ratio) measurements are used to measure the size of the part of the heart that is in the thorax. These measurements are used to estimate the enlargement of the heart of the fetus.



Schematic fetal thoracic cross section
A: Heart (four-chamber cross section)
B: Fetal thoracic cross section
C: Spine

- CTAR: Determines the ratio of the fetal thoracic cross-sectional area and fetal heart cross-sectional area.
- CTR: Determines the ratio of the fetal thoracic cross sectional circumference and fetal cardiac cross sectional circumference.

You can set the measurement method by using [Ellipse] (factory default setting), [Circle], [Trace], or [Cross-Caliper]. Use the measurement preset ([Create Measurement Tools > Application Measurement > Measure Method & Display Items> B.Mode]) to set this function.

Procedure

1. Using the part that enables the four-chamber cross-section of the heart to be displayed, display the cross-section of the thorax and the cross-section of the heart.
2. Press the [Measurement] button on the touch panel and then [CTAR] or [CTR] from the measurement menu.

3. Measure the cross-sectional area of the heart.
4. Measure the cross-sectional area of the thorax.

Example of Measurement Results Display

Example of [CTAR] (above) and [CTR] (below)

CTAR: %	: Cardio Thoracic Area Ratio
A: . cm ²	: Cardiac cross-sectional area
B: . cm ²	: Thoracic cross-sectional area

CTR: %	: Cardio Thoracic Ratio
A: . cm	: Cardiac cross sectional circumference
B: . cm	: Thoracic cross-sectional circumference

Reference information

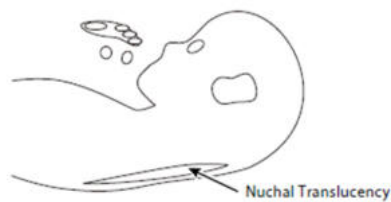
1.2.1 Caliper Method on page 27

1.2.2 Ellipse Method on page 29

1.2.4 B Trace Method on page 30

(7) Automatic Measurement of Nuchal Translucency (NT)

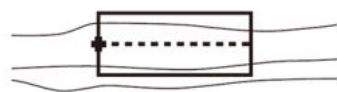
Nuchal Translucency (NT) automatic measurement allows you to automatically trace the boundary of the low echo area observed in the back of the fetus's neck during early pregnancy and calculate NT.



REQUISITE: The optional SOP-AR50-42 is required for NT automatic measurement.

Procedure

1. Switch the measurement Study to [Early].
2. Record the longitudinal image of the fetus displaying NT.
3. Press the [Measurement] button on the touch panel.
4. Select [Auto NT] from the measurement menu.
ROI is displayed in the center of the screen.



5. Shift the left side of ROI to the start point and align the + mark to the center of the height of the low echo area.
6. Adjust the height of the ROI by using the [Pointer] rotary encoder.

7. Press the [Enter]key.
8. Align the right side of ROI to the end position and align the + mark to the center of the height.
9. Press the [Enter]key.
The trace line and the positions of the maximum and minimum NT values are displayed on the image. The maximum value is displayed as 1 and the minimum value as 2.



10. If necessary, adjust the trace level by using the [Pointer] rotary encoder.
 - a. Correct the trace level of the light blue display line by using the [Pointer] rotary encoder.
Temporarily deleting the trace line
Select [Mark Display] from the Meas tab in the function menu.
 - b. Press the [Enter]key.
The other line is displayed in light blue.
 - c. Correct the trace level using the [Pointer] rotary encoder.

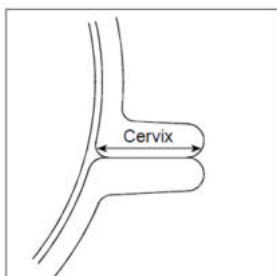
Example of Measurement Results Display

Nuchal trans	: Selected measurement name
1max: mm	: Maximum value
2min: mm	: Minimum value
mean: mm	: Average value
SD: mm	: Standard deviation
width: mm	: ROI width
points:	: Measurement points
med: mm	: Median value

(8) Measurement of the Length of the Cervix: Cervix

This measures the length of the cervical duct in the neck of the uterus.

The length of the uterine cervix is used as a predictor of premature birth during the second trimester.



- [Cervix] is not assigned to the measurement menu as the factory default. Use the measurement preset ([Study Assignment > (Study Name) > Menu Assign]) to assign this function to the measurement menu.

- The Caliper method and Trace method are available for [Cervix] measurement. The factory default setting is set to Caliper method.

Procedure

1. Render and record the cervix.
2. Press the [Measurement] button on the touch panel.
3. Select [Cervix] from the measurement menu.
4. Use the Caliper or the Trace method to measure the length of the cervical duct in the neck of the uterus.

Example of Measurement Results Display

Cervix: . cm	: Cervical length
--------------	-------------------

7.2.3 M Mode

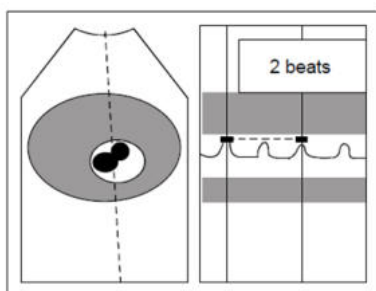
(1) Fetal Heart Rate Measurement: FHR

Measure the fetal heart rate from images of the fetal heart in M mode (or D mode). Methods of measuring the heart rate of the fetus include [FHR], [PreHR] and [PstHR]. The method of performing each measurement is identical.

[PreHR] and [PstHR] are used to monitor the fetus before and after an amniotic fluid puncture. They are displayed in the Amnio/ CVS Block in the report.

Procedure

1. Record the fetal heart rate in M mode or D mode images.
2. (When [PreHR] or [PstHR]) switch the measurement study to [BPP/Amnio] Study.
3. Press the [Measurement] button on the touch panel.
4. From the measurement menu, select [FHR] ([PreHR] or [PstHR] before and after an amniotic fluid puncture).
5. Measure the heart rate using the Caliper method.



Heart rate to be measured

The factory default setting for the heart rate is the time for two heartbeats.

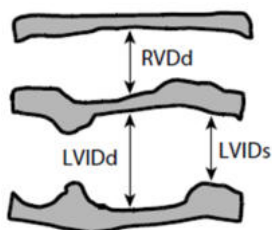
To change the number of heartbeats to be measured, change [Cardiac Cycles #] in [M.Mode] or [D.Mode] in the measurement preset ([Create Measurement Tools > Basic Measurement > Measure Method & Display Items]).

Example of Measurement Results Display

FHR: BPM	: Heart rate
---------------	--------------

(2) LV Function Measurement

Measure the left ventricular end-diastolic diameter (LVIDd) and left ventricular end-systolic diameter (LVIDs) in the M mode (or B mode) image and evaluate the ejection function of the left ventricle of the fetus using the Pombo method..



LVIDd: LV Internal Diameter (diastole)

LVIDs: LV Internal Diameter (systole)

RVDd: RV end diastole diameter (diastole)

The [LV Function] is not assigned to the measurement menu as the factory default. Use the measurement preset ([Study Assignment > (Study)> Menu Assign]) to assign this function to the measurement menu.

Procedure

1. Record the M mode (or B mode) image of the cross-section of the fetal heart.
2. Press the [Measurement] button on the touch panel.
3. Select [LV Function] from the measurement menu.
4. Using the Caliper method, measure the end-diastolic left ventricular internal diameter (LVIDd).
For B mode images
I) Press [TBF] key to search and display the end-diastolic cross section of the heart.
II) Press the [TBF]key.
III) Using the Caliper method, measure the end-diastolic left ventricular internal diameter (LVIDd).
5. Similarly, using the Caliper method, measure the end-systolic left ventricular internal diameter (LVIDs).
6. Similarly, using the Caliper method, measure the end-systolic right ventricular internal diameter (RVDd).

Example of Measurement Results Display

LV Function	Selected measurement name
LVIDd: cm	: LV Internal Diameter (diastole)
LVIDs: cm	: LV Internal Diameter (systole)
RVDd: cm	: RV end diastole diameter (diastole)
EDV: ml	: Left ventricular end diastolic volume
ESV: ml	: Left ventricular end systolic volume
EF: %	: Ejection fraction

FS:	%	: Fractional shortening
SV:	ml	: 1 stroke volume

7.2.4 D Mode

The following precautions are necessary when taking measurements in D mode.

- When recording an arterial blood flow Doppler waveform (pulse method), set the Doppler angle of incidence as low as possible. If the Doppler angle of incidence exceeds 60°, the blood velocity measurement error increases.
- When measuring the blood velocity using multiple blood flow waveform images, use identical recording conditions (forward and reverse flow directions) for all of the blood flow waveforms. The blood flow measurement values of the system are recorded as real numbers but the $\pm$ sign is not displayed on the screen.

Completely different values might be displayed, particularly when the display of measurement values of reports is set at average value ([Display Data] is set at "Average" in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > Report Data])).

Measurement in D mode is set to measurement menu in Extended Study.

(1) Artery Measurements

Trace the arterial blood flow waveforms to obtain PI, RI, S/D, and other values.

Measurement targets include the uterine artery blood flow, umbilical cord arterial blood flow, middle cerebral artery, aorta descendens blood flow, and the renal arterial blood flow.

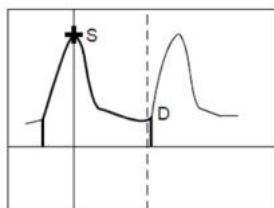
The Doppler Trace method consists of [Auto] (Auto Trace) and [Manual] (Manual Trace). Set the measurement method by specifying settings for each measurement item in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]).

Procedure

1. Switch the measurement Study to [Extended].
2. Record the artery blood flow Doppler waveform.
3. Press the [Measurement] button on the touch panel.
4. Select the name of the blood vessel to be measured from the measurement menu.
 - To measure the blood flow of the right uterine artery, select [Rt.UtA].
 - To measure the blood flow of the left uterine artery, select [Lt.UtA].
 - To measure the umbilical cord arterial blood flow, select [UmA].
 - To measure the middle cerebral artery blood flow, select [MCA].
 - To measure the aorta descendens blood flow, select [D-Ao].
 - To measure the renal arterial blood flow, select [Renal-A].

A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.

- Using the Doppler Trace method, trace the blood flow Doppler waveform. When the blood flow Doppler waveform is traced, a line cursor accompanied by "S" (peak systolic velocity point) and "D" (end diastolic velocity point) is displayed. The measurement results are displayed at the same time.



- Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

(Rt.UtA measurement display)

Rt.UtA	Selected measurement name
PI: .	: Pulsatility Index
RI: .	: Resistance Index
S/D: .	: PSV/EDV ratio
PSV: . cm/s	: Peak Systolic Velocity
EDV: . cm/s	: End Diastolic Velocity
MnV: . cm/s	: Mean Velocity
[1Beat avg.]	: Detected heart rate

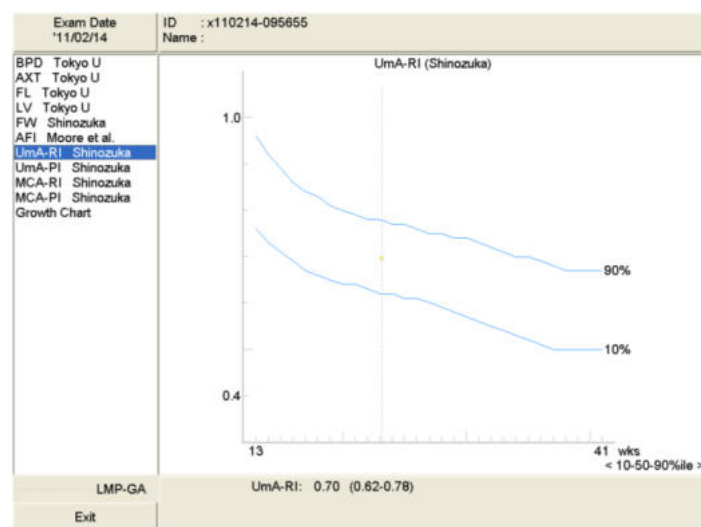
Reference information

1.2.5 Doppler Trace Method on page 31

Displaying a Graph

- Press the [Measurement] button on the touch panel and select [Graph] from the measurement menu.

The image will be displayed as follows.



(2) OB Dop Measurements

Obtain the PSV (peak systolic velocity) and EDV (minimum diastolic velocity, and S/D of blood flow in arteries.

In an obstetrical arterial blood flow measurement, you can set three types of user-defined measurements.

Obstetrical blood flow	OB Dop1
measurement	OB Dop2
	OB Dop3

Use Name Assignment in the measurement preset ([Create Measurement Tools> Application Measurement > Measured Method & Display Items > D.Mode]) to change a measurement name.

In this measurement, set the following 2 points:

- Peak Systolic Velocity (PSV)
- End-diastolic velocity (EDV) or minimum diastolic velocity
NOTE: End-diastolic velocity (EDV) and the minimum diastolic blood velocity are not necessarily identical. Set the EDV time phase to match the blood velocity to be used for the measurement.

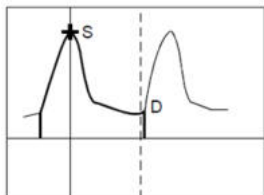
Doppler Trace methods include [Auto] (Auto Trace) and [Manual] (Manual Trace). Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to set the measurement method for each measurement parameter.

Procedure

1. Switch the measurement Study to [Extended].
2. Record the pulsating blood flow Doppler waveform.
3. Press the [Measurement] button on the touch panel.
4. Select one of the following from the measurement menu: [OB Dop1], [OB Dop2], or [OB Dop3].

A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.

5. Using the Doppler Trace method, trace the blood flow Doppler waveform.
When the blood flow Doppler waveform is traced, a line cursor accompanied by "S" (peak systolic velocity point) and "D" (end diastolic velocity point) is displayed.



6. Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

(for OB Dop1 measurement)

OB Dop1	Selected measurement name
PI: .	: Pulsatility Index
RI: .	: Resistance Index
S/D: .	: PSV/EDV ratio
PSV: . cm/s	: Peak Systolic Velocity
EDV: . cm/s	: End Diastolic Velocity
MnV: . cm/s	: Mean Velocity
[1Beat avg.]	: Detected heart rate

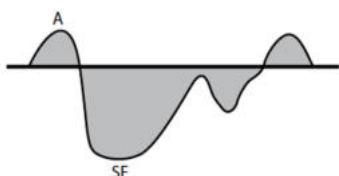
Reference information

1.2.5 Doppler Trace Method on page 31

(3) Preload Index Measurement: PLI

The PLI measurement calculates the ratio of two flow velocity values (A wave and SF wave) for the inferior vena cava of a fetus.

It is used to evaluate right ventricular failure in a fetus.



Fetal inferior vena cava waveform

Procedure

1. Record the blood flow Doppler waveform for the inferior vena cava of a fetus.
2. Press the [Measurement] button on the touch panel.
3. Select [PLI] from the measurement menu.
4. Move the caliper mark to the position of the A wave and press [Enter] key.
5. Move the caliper mark to the position of the SF wave and press [Enter] key.
"PLI" is displayed.

Example of Measurement Results Display

PLI: .	: Preload Index (PLI = A ÷ SF)
A: . cm/s	: A wave flow velocity
SF: . cm/s	: SF wave flow velocity

(4) LVOT Flow Measurement, RVOT Flow Measurement

Obtain the velocity time integral (VTI) from the left ventricular (right ventricular) outflow tract flow velocity waveform, and the stroke volume from the left ventricular (right ventricular)

outflow tract diameter (LVOT, RVOT).Based on the measurement results of LVOT Flow and RVOT Flow, the ratio for the left and right outflows is displayed in the report as Qp/Qs.

- [LVOT Flow] and [RVOT Flow] are not assigned to the measurement menu as the factory default. Use the measurement preset ([Study Assignment > (Study Name) > Menu Assign]) to assign this function to the measurement menu.

Procedure

1. Record the left ventricular outflow tract waveform on the B/D mode image.
2. Press the [Measurement] button on the touch panel.
3. Select the [LVOT Flow] or [RVOT Flow] from the measurement menu.
 - To measure the left ventricular outflow tract flow waveform, select [LVOT Flow].
 - To measure the right ventricular outflow tract flow waveform, select [RVOT Flow].
4. Measure the interval of single heartbeat with the Doppler Trace method
The velocity-time integration value (VTI) is calculated.
5. Press the [Enter]key.
6. Using the Caliper method, measure the flow path cross-sectional area (CSA).
The flow path cross-sectional area (CSA) and blood flow volume are displayed. The cross-sectional area of a flow path is calculated on the assumption that it is shaped as a perfect circle.

Example of Measurement Results Display

LVOT Flow	
pV: cm/s	: Peak blood flow velocity
MnV: cm/s	: Mean velocity
VTI: cm	: Velocity-time integral value
LVOT: cm	: Left Ventricular Out Tract diameter
CSA: cm ²	: Cross-sectional area
SV: . ml	: Stroke volume

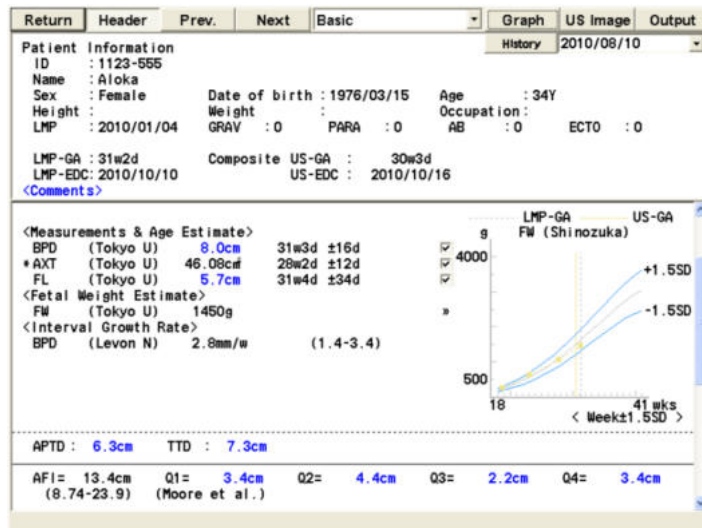
Reference information

1.2.5 Doppler Trace Method on page 31

1.2.1 Caliper Method on page 27

7.3 Reports

In a report, measurement results and obtained index values are sorted and displayed.



The following operations are available using the report.

I) Displaying measurement results and images

- Measurement results
- Displaying Graphs
- Recorded ultrasonic images
- Past exam results

II) Editing results, comments and findings

III) Outputting reports (printing, saving)

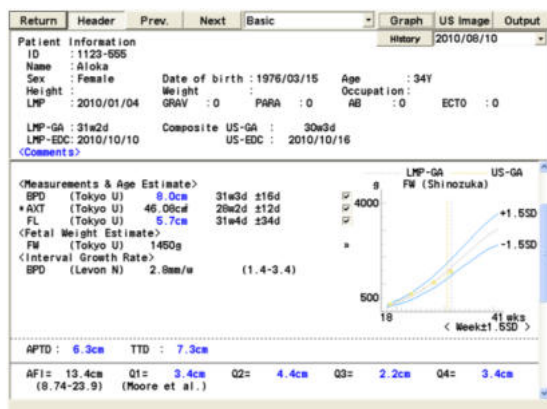
7.3.1 Displaying a Report

NOTE: Report display requires patient data input. Enter patient data on the ID screen.

(1) Displaying a Report

Procedure

1. Display the report.
 - Press the [Measurement] button on the touch panel and select [Report] from the measurement menu.
 - Select the [Report] icon from the [Accessories] tab in the function menu.



The following switches are located at the top of the report.

- [Return] Closes the report.
- [Header] Switches the Header block (patient data) display between Long Form and Short Form.
- [Prev.] Displays the previous page.
- [Next] Displays the next page.
- [(Study list)] Switches the Study in the report.
- [Graph] Displays multiple growth graphs.
- [History] Displays past examination results.
- [US Image] Displays an ultrasonic image in the report.
- [Output] Outputs report data to a computer, to media, to a printer, or to another destination.

Switching from Report Screen to the Scanning Screen

- Select [Return] on the upper corner of the report screen.

(2) Information Blocks Displayed in a Report

Reports are displayed in Study units.

The obstetrics measurement studies are Basic, Early, Extended, BPP/Amnio and Anatomy. These Studies are also provided for twins and triplets.

All studies divide information into blocks for display. The Header Block and Site Information Block are always displayed in reports. Other blocks are set in the measurement preset ([Study Assignment > (Study name) > Combined Report Display]) while blocks that include measurement results registered in a report are displayed.

The screenshot shows a software interface for obstetric measurements. At the top, there are tabs: Return, Header, Prev, Next, Basic, Graph, US Image, and Output. The 'Basic' tab is selected. Below the tabs, there is a 'Patient Information' section with fields for ID, Name, Sex, Date of birth, Age, Height, Weight, GRAV, PARA, AB, and ECTO. Below this, there is a 'Measurements & Age Estimate' section with fields for BPD, FL, and FW. To the right of these fields is a graph showing fetal growth curves. At the bottom, there are fields for APTD, TTD, and AF1.

Header Block

Patient information that was entered in the ID screen.

Composite US-GA

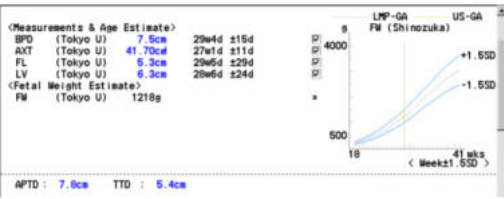
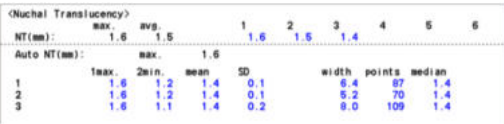
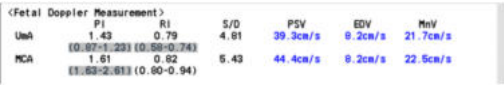
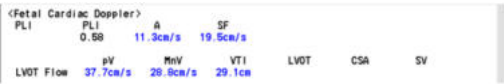
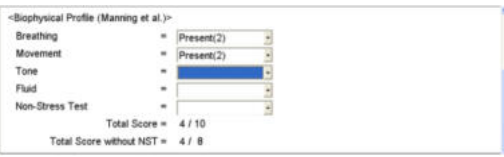
Gestational age calculated from the GA measurement results

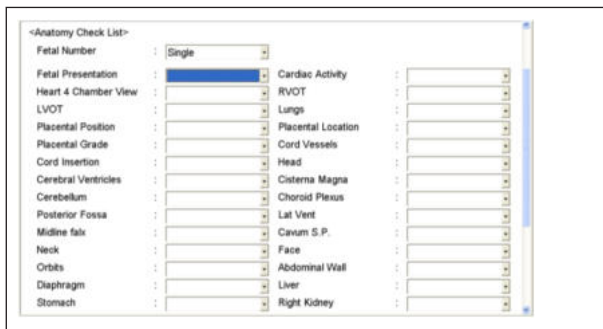
Composite US-EDC

Expected delivery date calculated from GA measurement results.

<Comment>

Show/hide the comment input field.

	Site Information Block Facility information, doctor in charge, and other information
	GA, FW & Ratio Block Displays GA measurement results, FW measurement results, and ratio measurement results. NOTE: Check the Author's Name in the FW Growth Table. If multiple FW Growth Tables are set, select [Graph] to check the Author's Name.
	Nuchal Translucency Block Displays NT and Auto NT measurement results.
	Other (AFI, AFV) Block Displays AFI measurement results, AF Pocket measurement results, AFV measurement results, and Cervix measurement results.
	Fetal Cardiac (B/M) Block Displays FHR measurement results, CTAR measurement results, CTR measurement results, and LV Function measurement results.
	Fetal Doppler Block Displays UmA measurement results, MCA measurement results, and other D mode measurement results.
	Fetal Cardiac Doppler Block Displays PLI measurement results, LVOT Flow measurement results, and RVOT Flow measurement results.
	BPP Block Enter BPP scoring.
	Amnio/ CVS Block Enter the amniocentesis or chorionic villus sampling examination results.

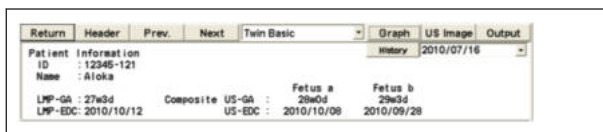
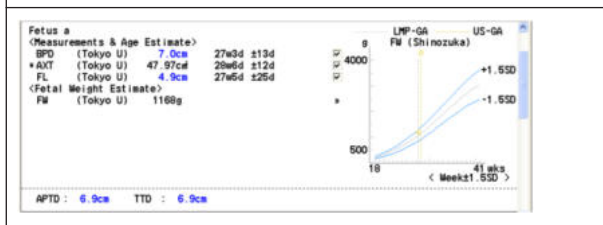
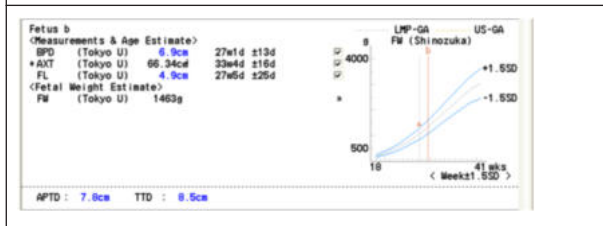
	Anatomy Check List Block Enter the Anatomy Check List.
---	--

Example of Multiplets Report Display

If a multiplet study is selected, the report will change over to a multiplet display. Results are displayed distinguishing between Fetus a, Fetus b, and Fetus c.

Able 7: Example showing twins report (some blocks only)

Composite US-GA and Composite US-EDC are displayed for each

	Header Block Patient information that was entered in the ID screen.
	GA, FW & Ratio Block(Fetus a) Displays GA measurement result, FW measurement result, and ratio measurement result for Fetus a.
	GA, FW & Ratio Block(Fetus b) Displays GA measurement result, FW measurement result, and ratio measurement result for Fetus b.
	Other (AFI, AFV) Block (Fetus a) Displays AFI measurement result, AF Pocket measurement result, AFV measurement result, and Cervix measurement result for Fetus a.
	Other (AFI, AFV) Block (Fetus b) Displays AFI measurement result, AF Pocket measurement result, AFV measurement result, and Cervix measurement result for Fetus b.

(3) Displaying a Graph

GA, FW & Ratio Block or Fetal Doppler Block data can display changes in fetal growth and development in a graph.

There are two methods for displaying the graph.

- The GA, FW & Ratio Block or Fetal Doppler Block displays a graph with measurement results.
- Displays only graph.

Displaying a Graph Next to the Measurement Results

Select the graph to display next to the measurement results in the GA, FW & Ratio Block or Fetal Doppler Block.

Procedure

1. Display the report.
2. Select [Graph].

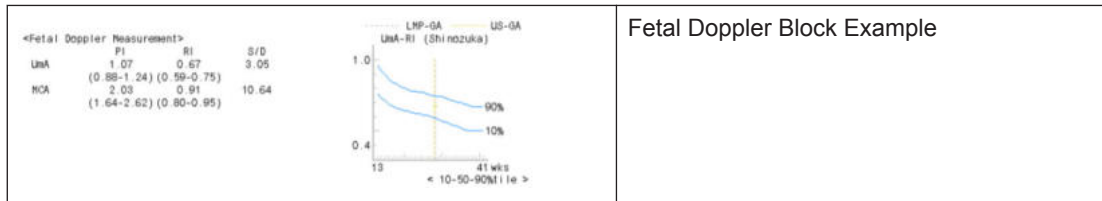
The following dialog box is displayed. The item with measurement results is highlighted.

3. Select [Gr-1] in Graph number on the screen.
 4. From Growth Curve, select one item to display.
 - a. From the list, select one item to display.
 - b. Select the display format from [Gr-1], [±day] and [±SD]
 5. From Fetal Doppler, select the display item. Select the field to [OFF] to avoid displaying it.
 6. Select [OK].
- The graph is displayed.

Graph example

For multiplets, the graph will be displayed for each fetus

	GA, FW & Ratio Block Gr-1 Example When the pointer is placed on the plot location, measurement results at that point in time are displayed.
	GA, FW & Ratio Block ±day Example
	GA, FW & Ratio Block ±SD Example



Fetal Doppler Block Example

Displaying a Graph over the Entire Report Screen

You can simultaneously display multiple graphs.

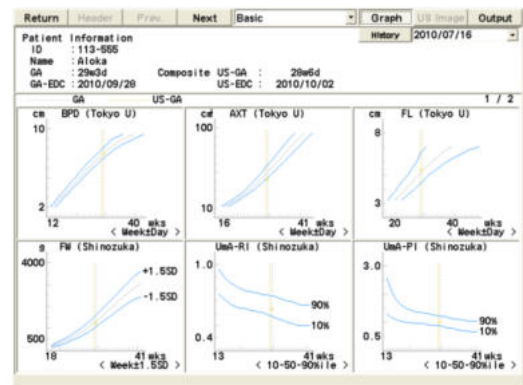
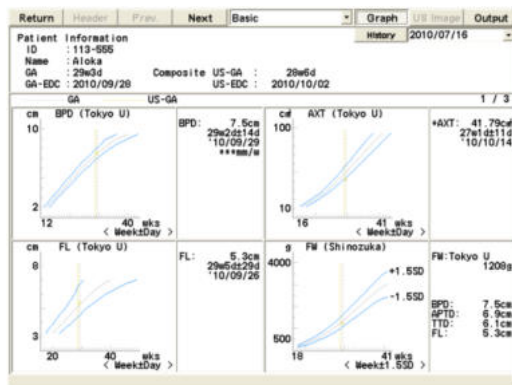
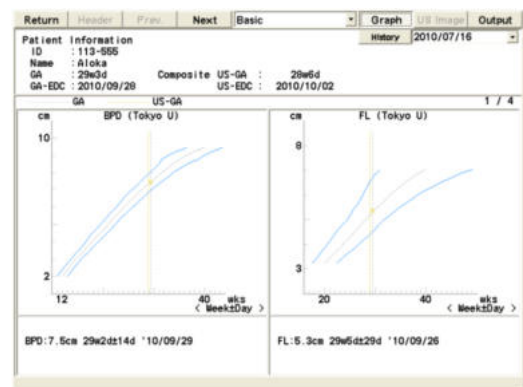
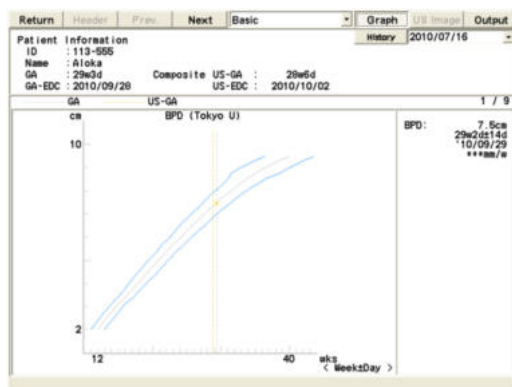
Procedure

1. Display the report.
2. Select [Graph].
3. Select one of the following in Graph number on the screen:[1], [2], [4] or[6].
4. From Growth Curve, select the display item.
Displaying all items
 Select [All].
5. From Fetal Doppler, select the display item.
Displaying all items
 Select [All].
6. Select [OK].
 The graph is displayed.

Graph example

When [1] is selected in Graph number on the screen

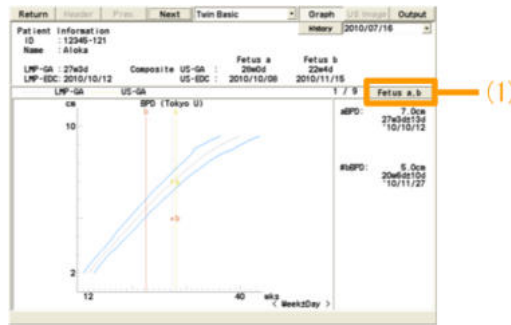
When [2] is selected in Graph number on the screen



When [4] is selected in Graph number on the screen

When [6] is selected in Graph number on the screen

For multiplets, measurement results of all fetuses will be displayed in one graph.



(1) [Fetus a, b]

When [Fetus a, b] is selected, the graph display changes in the order of "Fetus a"→ "Fetus b"→"Fetus a, b"→"Fetus a" →

In the case of triplets, the button will be displayed as [Fetus a, b, c]. The graph display changes in the following order: "Fetus a"→"Fetus b"→"Fetus c"→"Fetus a, b, c"→ "Fetus a" →

(4) Attaching an Ultrasonic Image

You can attach ultrasonic images to reports. The attached ultrasonic images will be displayed in the US Image Block. You can add stored images of the patient whose report is being displayed from the system hard disk or a USB flash drive.

To set the US Image Block display, specify settings for the following items in [Report Data] under the preset.

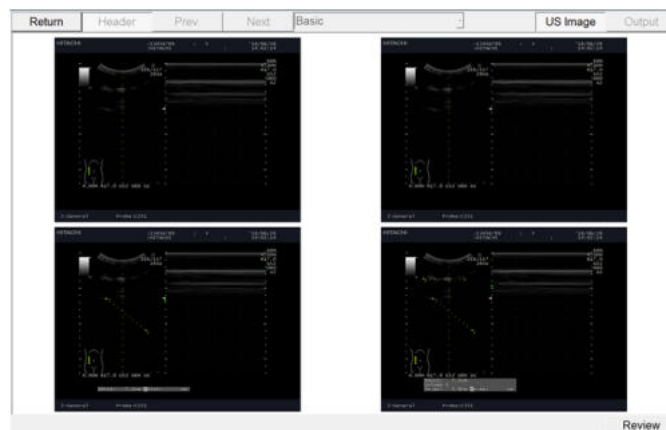
- To set the display format, specify settings for Display Pasted US Image Form on the Screen.
- Set the number of images to display immediately after selecting US Image Block in [Automatically be Displayed US Images Number].

Procedure

1. Select [US Image] at the top of the report screen.

The US Image Block is displayed. Images are displayed in order (for example, from the top left or from the top right) from the latest images saved to the system's hard disk or connected media, such as USB flash drive.

Images will be displayed as shown below when [Display Pasted US Image Form on the Screen] is set to [2×2] and [4] is selected in [Automatically be Displayed US Images Number].



When 4 images are stored

2. If necessary, change the displayed images.
 - a. Select [Review] at the bottom of the screen.
Images on the system hard disk and connected media are displayed as thumbnails.
Only today's images of the current patient are displayed. The "Current Exam.View" is displayed at the top right of the screen.
 - b. Select an image to display.
The selected image is marked by a blue frame.
 - c. After selecting all the images to display, select [Paste Desired US].
Only the selected images are displayed in the US Image Block.

Displaying images from past examination dates

Select [Change View] under the thumbnails. [Current&Post Exam.View] is displayed at the top right of the screen and past exam images of the current patient are displayed. You can also select past exam images to display in the US Image Block. If you select [Change View] again, the screen switches to display today's images only (Current Exam.View). [Current Exam.View] is displayed at the top right of the screen.

3. To return to the report page, select [Return].

7.3.2 Editing Reports

You can edit the following contents in the report.

- Comments
- Findings
- Measurement results

(1) Entering Comments

Enter comments including results of ultrasonic findings in the [Comments] field in the Header Block.

Procedure

1. Select [<Comments>].
When the [<Comments>] are hidden
Select [Header] on the upper corner of the report screen and select [<Comments>].
A text box is displayed.

2. Enter a comment using the keyboard.
3. Select [OK] when you finish entering the comments.
The entry is confirmed.
To cancel the entry, select [Cancel].

(2) Editing the Measurement Results

Procedure

1. Select the measurement value to be modified.
The dialog box with the measurement value opens.

When Display Data in [Report Data] under preset is set to [Current], the data at the top appears in the report screen. If it is set to "Average", an average value is displayed.

2. Revise the data.

Deleting data

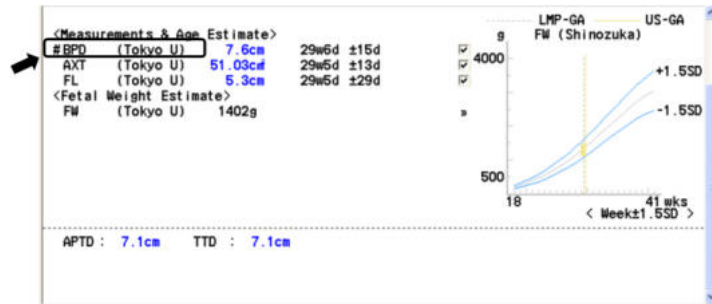
- I) Select the measurement value from the dialog box.
- II) Select [Delete] from the dialog box.
- III) Select [OK] from the dialog box.

Revising data

For measurement results that have mutual relationships with two blood flow velocities in the cardiac cycle (EDV, PSV), such as PI measurement and RI measurement, revise the data so that this mutual time phase relationship is maintained.

- I) Select the measurement value from the dialog box.
- II) Enter values from the keyboard.
- III) Select [OK] from the dialog box.

A prefix # will be added next to the name of the modified item.



Selecting the data to be displayed

If Display Data of [Report Data] in the preset has been set to "Current", you can change the measurement value to be displayed on the report screen.

- I) Select the measurement value from the dialog box.
- II) Select [OK] from the dialog box.

Modifying the Average GA Measurement Value

The gestational age and expected date of birth calculated from the GA measurement vary depending on the GA measurement. The average value of the gestational age(Composite US-GA) and the average value of the expected date of birth (Composite US-EDC) are shown in the Header Block.

You can remove unnecessary results by selecting the results to be included in the Composite US-GA and Composite US-EDC calculation.

Procedure

1. Display the report.
2. Display GA, FW & Ratio Block.
3. Use the check box displayed at the right of each GA measured value to select GA measured values to be included in the Composite US-GA and Composite US-EDC calculation.
 - Insert a checkmark: The measured value will be included in the Composite US-GA/Composite US-EDC calculation.
 - Remove the checkmark: The value will be excluded from the calculation of Composite US-GA/Composite US-EDC.

Example

Selecting the check boxes		Example of Composite US-GA/Composite US-EDC
If all boxes contain a checkmark. <Measurements & Age Estimate> BPD (Tokyo U) 8.0cm 31w3d ±16d ☒ * AXT (Tokyo U) 46.08cm 28w2d ±12d ☒ FL (Tokyo U) 5.7cm 31w4d ±34d ☒	→	Composite US-GA : 30w3d US-EDC : 2010/10/16
If the checkmarks are removed <Measurements & Age Estimate> BPD (Tokyo U) 8.0cm 31w3d ±16d ☐ * AXT (Tokyo U) 46.08cm 28w2d ±12d ☐ FL (Tokyo U) 5.7cm 31w4d ±34d ☐	→	Composite US-GA : 31w3d US-EDC : 2010/10/23

(3) Entering the Anatomy Check List

An Anatomy Check List is "an anatomical checklist for a fetus" which is intended to ensure more effective observation of fetal status.

Anatomy Check List Block is not incorporated in any Study report as the default setting. Specify settings in the measurement preset ([Study Assignment > (Study Name) > Combined Report Display])

Procedure

1. Open a report and switch to the Study containing the Anatomy Check List Block. The Anatomy Check List Block is displayed.

The screenshot shows a window titled "<Anatomy Check List>". At the top, "Fetal Number" is set to "Single". Below this, there are two columns of dropdown menus. The left column includes: Fetal Presentation, Heart 4 Chamber View, LVOT, Placental Position, Placental Grade, Cord Insertion, Cerebral Ventricles, Cerebellum, Posterior Fossa, Midline falx, Neck, Orbits, Diaphragm, and Stomach. The right column includes: Cardiac Activity, RVOT, Lungs, Placental Location, Cord Vessels, Head, Cisterna Magna, Choroid Plexus, Lat Vent, Cavum S.P., Face, Abdominal Wall, Liver, and Right Kidney. Each dropdown menu has a small arrow on the right side.

The list block is displayed as shown below for multiplets.

The screenshot shows a window titled "<Anatomy Check List>". At the top, "Fetal Number" is set to a blank dropdown. Below this, the form is divided into two columns: "Fetus a" and "Fetus b". Each column has a series of dropdown menus for the same anatomical items as the single fetus form: Fetal Presentation, Cardiac Activity, Heart 4 Chamber View, RVOT, LVOT, Lungs, Placental Position, Placental Location, Placental Grade, Cord Vessels, Cord Insertion, Head, and Cerebral Ventricles.

2. Select from the list.

Specifying the Display Items in the Anatomy Check List

Use preset for setting.

Procedure

1. Select [Anatomy Check List Assign] in the measurement preset ([Study Assignment > (Study) > OB Program]). Use Anatomy Check List Assign to set the display format. The first page shows the information on the Pregnant Woman and the second page shows the information on the Fetus.

Example of preset settings

Anatomy Check List Assign (1/2) Prev Next

Anatomy Check List Assign

<Pregnant Woman>

1	Fetal Number	21	41
2		22	42
3		23	43
4		24	44
5		25	45
6		26	46
7		27	47
8		28	48
9		29	49
10		30	50
11		31	51
12		32	52
13		33	53
14		34	54
15		35	55
16		36	56
17		37	57
18		38	58
19		39	59
20		40	60

Exit Cancel

Anatomy Check List Assign (2/2) Prev Next

Anatomy Check List Assign

<Fetus>

1	Fetal Presentation	21	Neck	41	Right Foot
2	Cardiac Activity	22	Face	42	Left Foot
3	Heart 4 Chamber View	23	Orbits	43	Gender
4	RVOT	24	Abdominal Wall	44	
5	LVOT	25	Diaphragm	45	
6	Lungs	26	Liver	46	
7	Placental Position	27	Stomach	47	
8	Placental Location	28	Right Kidney	48	
9	Placental Grade	29	Left Kidney	49	
10	Cord Vessels	30	Urinary Bladder	50	
11	Cord Insertion	31	Spine-Lumbar	51	
12	Head	32	Spine-Cervical	52	
13	Cerebral Ventricles	33	Spine-Thoracic	53	
14	Cisterna Magna	34	Spine-Sacral	54	
15	Cerebellum	35	Right Arm	55	
16	Choroid Plexus	36	Left Arm	56	
17	Posterior Fossa	37	Right Leg	57	
18	Lat Vent	38	Left Leg	58	
19	Midline falx	39	Right Hand	59	
20	Cavum S.P.	40	Left Hand	60	

Exit Cancel

- Select the item you want to change.
The following dialog box is displayed.

Fetal Presentation
Placental Position
Placental Location
Placental Grade
APV
Head
Cerebral Ventricles
Cisterna Magna
Cerebellum
Choroid Plexus
Posterior Fossa
Lat Vent
Midline falx
Cavum S.P.
Neck
Nuchal Fold
Face
Orbits
Cardiac Activity
Heart 4 Chamber View
Outflow Tract
RVOT
LVOT
Lungs
Abdominal Wall
Diaphragm

Exit Cancel

- Select the items you want to display.
Deleting items
Select the empty field at the top of the dialog box.

Reference information

For the Anatomy Check List items and option list, see below.

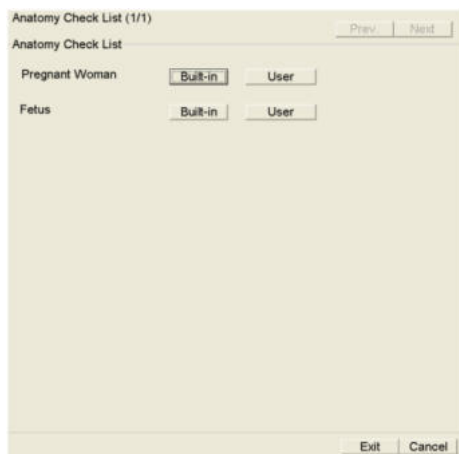
7.5.2 *Anatomy Check List* on page 307

Specifying the Anatomy Check List Options

Specify the option for each item in the Anatomy Check List item and specify each item in the User settings.

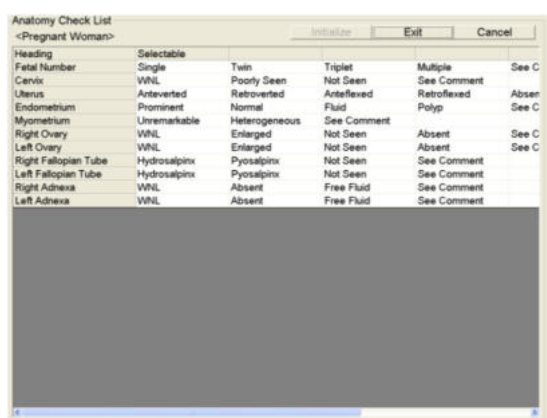
Procedure

- Select [Anatomy Check List] in the measurement preset ([Create Measurement Tools > Application Measurement > Report Data]).
- The Anatomy Check List is displayed.



2. Select [Built-in] to change internal system items. Select [User] to set Heading and Selectable.

If you choose Built-in, the following screen is shown.



3. Select the item you want to change.
4. Enter the options from the keyboard.
5. Select [Exit] when all the changes have been made.

(4) Entering Biophysical Profile Scoring (BPP Scoring)

BPP Scoring is a report for which the examiner chooses options according to evaluation criteria, based on the information obtained from relatively long-term observation of ultrasonic images of the fetus. Points are added based on the options selected and evaluations are made based on this total. It is used mainly for managing high risk pregnancies.

There are two evaluation criteria for BPP Scoring recommended by Vintzileous et al., and Manning et al. Specify the evaluation criteria to be used in [Select BPP Scoring Criteria] under the measurement preset ([Create Measurement Tools > Application Measurement > Report Data]).

Procedure

1. Display the report.
2. Switches to the BPP/Amnio Study.

BPP/Amnio Study display is turned off in the factory default setting. To display this study, register BPP in the measurement preset ([Study Assignment > (Study Name) > Combined Report Display]).

The Biophysical Profile Scoring Block is displayed.

<Biophysical Profile (Manning et al.)>

Breathing	=	Present(2)
Movement	=	Present(2)
Tone	=	
Fluid	=	
Non-Stress Test	=	

Total Score = 4 / 10
Total Score without NST = 4 / 8

The list block is displayed as shown below for multiples.

<Biophysical Profile (Manning et al.)>

	Fetus a	Fetus b
Breathing	= Present(2)	
Movement	= Present(2)	
Tone	=	
Fluid	=	
Non-Stress Test	=	

Total Score = 4 / 10 0 / 10
Total Score without NST = 4 / 8 0 / 8

3. Select the result for each evaluation item.
 - a. Select the item field.
 - b. Select the option.
 - c. Repeat steps a through b to select the result for each evaluation item.
The number in parentheses for the selected option is added to [Total Score].

Reference information

For details of the BPP Scoring items and options, see below.

7.5.3 Biophysical Profile Scoring (BPP Scoring) on page 307

(5) Entering the Amniocentesis or Chorionic Villus Sampling Results

Enter the Amniocentesis or Chorionic Villus Sampling examination results. Enter the change in the heart beat of the fetus or findings concerning the amniotic fluid before and after sampling.

Input either the amniocentesis or chorionic villus sampling results to the Amniocentesis Block.

Procedure

1. Display the report.
2. Display Amniocentesis Block.

Amnio examination is turned off in the factory default setting. To display this study, specify settings under the measurement preset ([Study Assignment > (Study Name) > Combined Report Display]).

3. Enter each item for Amniocentesis from the keyboard or select from the list.
How to select the list
 - a. Select the item field.
 - b. Select the option.
 - c. Repeat steps a through b to select the result for each evaluation item.

Amnio/CVS Block Input item

Item name	Entered information
Puncture Site	Select the puncture site from "RUQ", "RLQ", "LUQ" and "LLQ". "RUQ" (Right Upper Quadrant) "RLQ" (Right Lower Quadrant) "LUQ" (Left Upper Quadrant) "LLQ" (Left Lower Quadrant)
# of puncture	A range of 1 to 10 punctures can be selected with the above puncture sites.
Am't. Fluid withdrawn	Enter the amniotic fluid sample volume using the keyboard.
Color of fluid	Select the macroscopic condition of the amniotic fluid obtained by puncture from "Clear", "Bloody", and "Dark". Or enter it from the keyboard.
Fetal Heart Rate	Display the value measured for the fetal heartbeat before and after amniocentesis (PreHR, PstHR). This information can be used to manage the stress caused to the fetus by the puncture.
Placenta	Enter comments concerning the placenta using the keyboard.

7.3.3 Outputting Reports

A report can be output to a local printer or exported as a CSV file.

(1) Printing

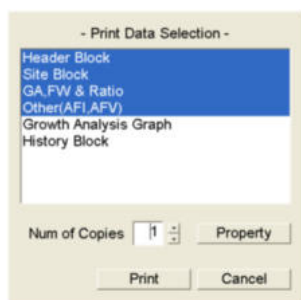
Print a report to the local printer (printer connected to the system).

Procedure

1. Select [Output] on the upper corner of the report screen.
A dialog box is displayed.



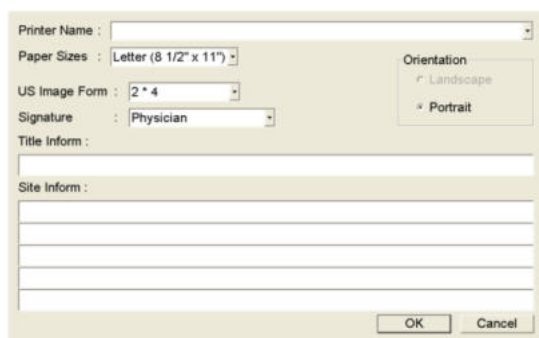
2. Select [to Printer], and press [OK].
The following dialog box is displayed.



3. Select the blocks to be printed.
 - a. Select one of the blocks to print.
 - b. Repeat this step and highlight all the blocks you wish to print.To cancel a selected block, select that block again.
4. Use Num of Copies to set the number of copies to print.
5. Configure printer properties if necessary.
 - a. Select [Property].
 - b. See the next section to configure the printer property.
6. Select [Print].

Printer Properties

You can set the advanced printer properties.



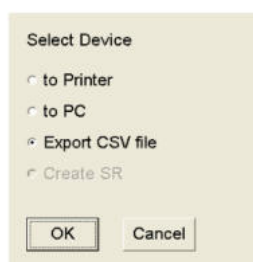
Item	Options	Description
Printer Name		Select the printer model.
Paper Sizes	US Letter	Prints on US letter size paper.
	A4	Prints on A4 size paper.
Orientation	Portrait	Sets the direction of the paper to the vertical orientation (there is no other option).
US Image Form	1x2	Prints a US Image Block with 1 rows of 2 images per sheet.
	1x3	Prints a US Image Block with 1 rows of 3 images per sheet.
	2x2	Prints a US Image Block with 2 rows of 2 images per sheet.
	2x4	Prints a US Image Block with 2 rows of 4 images per sheet.
Signature	Physician	Sets the Physician signature field.
	Phys. & Sonographer	Sets the Physician and Sonographer signature fields.
	None	Hides the signature field.
Title Inform		You can enter a report title using no more than 80 characters.
Site Inform		You can enter facility information (hospital department, address, telephone number, FAX number, etc.).

(2) Outputting as a CSV File

You can output data registered in the report as a CSV file.

Procedure

1. Select [Output] on the upper corner of the report screen.
A dialog box is displayed.



2. Select [Export CSV file], and press [OK].
A dialog box is displayed.



Target Medium

☒ USB

File Name

123-456-789-0_20110204_GY

File List

OK Cancel

The file name is displayed in the format ID_Date_Application.
Select [Cancel] to return to the report screen.

3. Select the storage destination from the Target Medium list.
4. Change the file name if necessary.
5. Select [OK].
The selected CSV file is saved in the specified media.
A CSV file contains patient information, numerical values and comments.

(3) Creating a DICOM SR File

You can create a DICOM SR file from the data displayed in the reports.

NOTE The optional DICOM SR compatible software (SOP-AR50-21) is necessary for creating DICOM SR files.

Procedure

1. Select [Output] on the upper corner of the report screen.
A dialog box is displayed.



Select Device

☐ to Printer

☐ to PC

☐ Export CSV file

☒ Create SR

OK Cancel

2. Select [Create SR], and press [OK].
A DICOM SR file is created for the examination date shown on the report. Any existing file will be overwritten.
The DICOM SR file is not sent at this time.

Sending a DICOM SR File

NOTE: The optional DICOM networking software (SOP-AR50-10) is necessary for connecting to a DICOM SR server.

If [SR Auto Creation] is "On" in preset ([Common Preset > DICOM SR]) and today's DICOM SR file has not yet been created, an SR file containing the current examination will be created and sent together with other created DICOM SR files to the DICOM SR server.

7.4 Presets

The obstetrics measurement preset (OB preset) can be classified roughly into 3 types.

- Create Measurement Tools
Settings for measurement methods, caliper mark display, and report display.
Settings for basic measurement, and for applied measurement.
- Study Assignment
Enables you to configure the menu, transferred items and report view in the study.
These are set for each study.
- SW Assignment
Assigns measurement functions to menu items.

Table 8: OB preset configuration



Create Measurement Tools	Basic Measurement	Measured Method & Display Items	B.Mode
			M.Mode
			D.Mode
			F.Mode
		Caliper Mark Control	
		Unit Selection	
		Caliper Auto Off	
		Display Form	Mark Display
	Application Measurement	Measured Method & Display Items	B.Mode
			M.Mode
			D.Mode
		Caliper Mark Control	
		Unit Selection	
		Caliper Auto Off	
		Report Data	Anatomy Check List
		Display Form	Mark Display
		User's Calculation	Reserved Word
		Built-in & User-defined Table	GA Table
			FW Equation
			FW Growth
			Fetus Ratio
			AFI Table
			Doppler Table
			Interval Growth Rate
			User's Name
		User's Calculation	Reserved Word
Study Assignment	Basic Early Twin Basic Twin Early, etc.	OB Program	GA FW Ratio
			Other
			Anatomy Check List Assign
			Graph Number
		Menu Assign	
		Combined Report Display	
		Transfer List Assign	
		Other	
SW Assignment	Touch Panel SW Assignment		
	+Mark Key Assignment		

7.4.1 OB Presets



[OB Preset]
OB preset top page

(1) Create Measurement Tools

Basic Measurement

Refer to the presets for basic measurements.

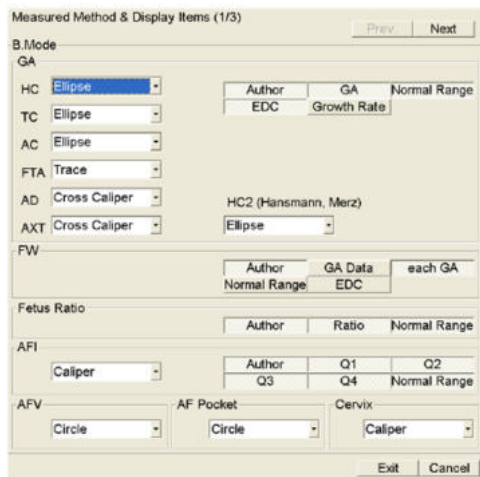
Reference information

2.2.7(3) *Measurement-related Settings: Create Measurement Tools* on page 82

Application Measurement

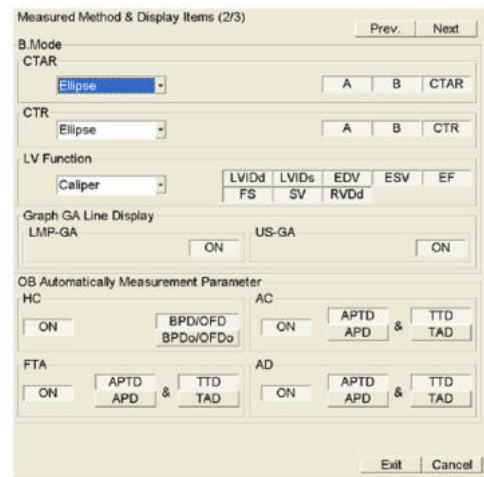
Settings for applied measurement (obstetrics measurement).

[Measured Method & Display Items > B.Mode]
(1/3): B mode measurement settings



[Measured Method & Display Items> B.Mode]
(3/3): B mode measurement settings

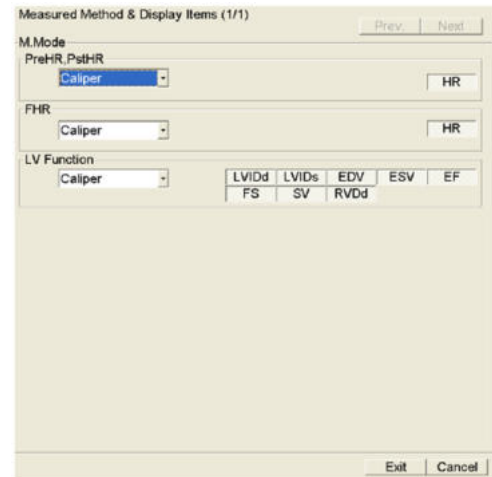
[Measured Method & Display Items > B.Mode]
(2/3): B mode measurement settings



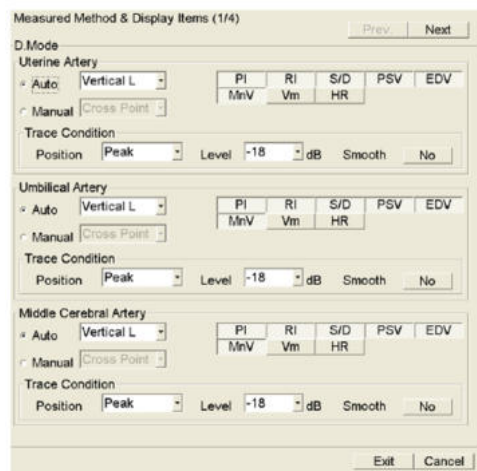
[Measured Method & Display Items > M.Mode]
(1/1): M mode measurement settings



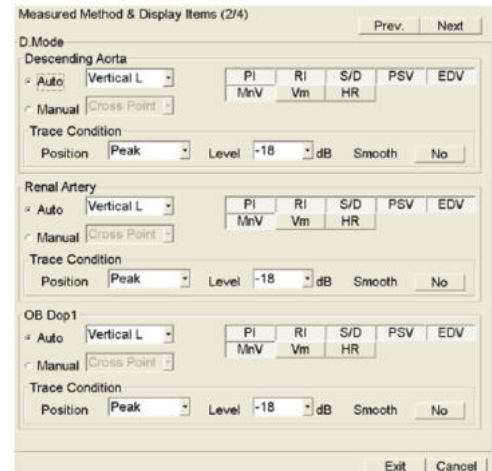
[Measured Method & Display Items > D.Mode]
(1/4): D mode measurement settings



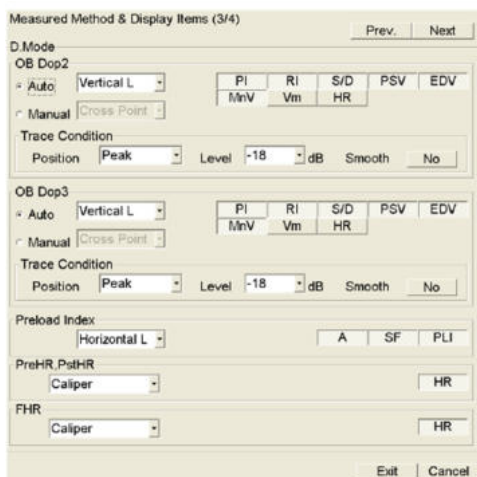
[Measured Method & Display Items > D.Mode]
(2/4): D mode measurement settings



[Measured Method & Display Items > D.Mode]
(3/4): D mode measurement settings



[Measured Method & Display Items > D.Mode]
(4/4): D mode measurement settings



[Unit Selection]: Changes unit of fetus weight
(gram → Pound)



[Caliper Auto Off]: Caliper mark and
measurement result display settings for when
freeze is canceled

Unit Selection

Fetal Weight

gram

Exit Cancel

Caliper Auto Off (1/5)

GA Measured

OFF ON All Mark Erase Remain Active Mark

AFI

OFF ON All Mark Erase Remain Active Mark

FW Measured

OFF ON All Mark Erase Remain Active Mark

Ratio Measured

OFF ON All Mark Erase Remain Active Mark

B Other Measured

OFF ON All Mark Erase Remain Active Mark

M.D Measured

OFF ON All Mark Erase Remain Active Mark

Fetal Cardiac

OFF ON All Mark Erase Remain Active Mark

Exit Cancel

Report Data: (1/2) Report display data settings

Report Data: (2/2) Report display data settings

Report Data (1/2)

Display Data

Current

Transfer from Report Data

ON

Storage Data Number

1 2 3 4 5 6

Pasted US Image Screen

Display Pasted US Image Form on the Screen

1x1 2x2 3x2 3x3

Automatically be Displayed US Images Number

0 1 2 3 4 5 6 7 8 9

Select BPP Scoring Criteria

Manning et al.

Clinical Data Display of Exam: Data History

ON

Exit Cancel

Report Data (2/2)

Calculate of Composite US-GA

All Studies

NT Report Display Order

Descending

Exit Cancel

[Report Data > Anatomy Check List] Report display data settings

Anatomy Check List (1/1)

Anatomy Check List

Pregnant Woman

Built-in User

Fetus

Built-in User

Exit Cancel

[Report Data > Anatomy Check List > Built-in] Internal options

[Report Data > Anatomy Check List > User] User settings

[illegible]

Anatomy Check List		Reference	Exit	Cancel
Heading	Instructions			
Unit1	Exam	Not Exam		
Unit2	Exam	Not Exam		
Unit3	Exam	Not Exam		
Unit4	Exam	Not Exam		
Unit5	Exam	Not Exam		
Unit6	Exam	Not Exam		
Unit7	Exam	Not Exam		
Unit8	Exam	Not Exam		
Unit9	Exam	Not Exam		
Unit10	Exam	Not Exam		

Display Form

Result Display Window Style

Sideways

Package Result Display

Multi

Basic measurements are displayed together.

No

Exit Cancel

Mark Display (1/5) Prev Next

GA,FW,Ratio
 Mark Display Mark Active

AFI
 Mark Display Mark Active

B Other Measured
 Mark Display Mark Active

CTAR,CTR
 Mark Display Mark Active

M,D Measured
 Mark Display Mark Active

Fetal Cardiac
 Mark Display Mark Active

Fetal Heart Rate
 Mark Display Mark Active

Exit Cancel

[Built-in & User-defined Table > GA Table]
Gestational week table list and user registration

[Built-in & User-defined Table > GA Table > User #]: User registration of gestational week table

GA Table						Prev	Next
Built-In GA Table						User-defined Table	
Tokyo U	GS	CRL	BPD	FL	LV	AXT	☐ Create GA Table ☐ Create GA Equ ☐ Delete GA
Osaka U	CRL	BPD	FTA	FL	HL		User1(-----)
Hadlock	BPD	HC	AC	FL	CRL		User2(-----)
Had-90%	HC	AC	FL				User3(-----)
Hadlock84	BPD	HC	AC	FL			User4(-----)
Jeanly	FL	HL	TiB	ULNA	BD		User5(-----)
Jea-95%	FL	HL	TiB	ULNA	RAD		User6(-----)
Campbell	BPD	HC	AC	FL			User7(-----)
Merz	BPD	OFD	HC2	TTD	APTD	AC	User8(-----)
	FL	HL	TiB	FTB	ULNA	RAD	User9(-----)
Shinozuka	BPD	AXT	AC	FL			User10(-----)
Hansmann	CRL	BPD	OFD	HC2	TTD	AC	User11(-----)
	FL	HL					User12(-----)
Rempen	mGS	CRL	BPD				User13(-----)
Chitkara U	TC	TL					User14(-----)
Kurtz	BPD		Robinson	CRL			User15(-----)
Sabbagha	BPD		Daya	CRL			User16(-----)
Hill	CD		Nelson	CRL			User17(-----)
	CD		Hohler	FL			User18(-----)
Goldstein	CD	EES	O'Brien	FL			User19(-----)
Hellman	mGS		Warda	FL			User20(-----)
						Exit	Cancel

The screenshot shows the "User-defined QA Table" dialog box. It has several input fields and buttons:

- User-defined QA Table**: A dropdown menu showing "Measurement".
- QA Unit**: A dropdown menu showing "cm".
- Data Interval**: A dropdown menu showing "wk".
- Author's Name**: A text field containing "User1".
- Method**: A dropdown menu.
- Range of**: A dropdown menu.
- Data Form**: A dropdown menu.
- Buttons**: "Copy from Built-in", "Exit", "Print", "Next", and "Cancel".
- Data**: Three large empty tables for defining the QA table data.

[Built-in & User-defined Table > FW Equation]
Fetal weight calculation formula list and user registration

[Built-in & User-defined Table > FW Equation > User #]: User registration of fetal weight equation

FW Equation

Prev Next

Built-in FW Equation

- Tokyo U : BPD,APTD,TTD,FL
- Osaka U : BPD,FTA,FL
- Hadlock1 : AC,FL
- Hadlock2 : HC,AC,FL
- Hadlock3 : BPD,AC,FL
- Hadlock4 : HC,AC
- Hadlock5 : BPD,HC,AC,FL
- Shinozuka : BPD,AC,FL
- Hansmann : BPD,TTD
- Warsof : BPD,AC
- Shepard : BPD,AC
- Campbell : AC
- JSUMF03 : BPD,AC,FL

User-defined FW Equation

- Create FW Equation
- Delete FW Equation

User1 :
User2 :
User3 :
User4 :
User5 :

Exit Cancel

User-defined FW Equation

FW Unit: gram

Author's Name: User1

FW Equation

FW =

Calculator interface with various mathematical symbols and variables.

Exit Cancel

[Built-in & User-defined Table > FW Growth] Fetal weight growth table list and user registration

[Built-in & User-defined Table > FW Growth > User #]: User registration of fetal weight growth table list

FW Growth

Prev Next

Built-in FW Growth Table

- Brenner
- Osaka U
- Hadlock
- Shinozuka
- Doublet
- Yarkoni(Twins)
- JSUMF03

User-defined FW Growth Table

- Create FW Growth Table
- Create FW Growth Equation
- Delete FW Growth

User1(-----)
User2(-----)
User3(-----)
User4(-----)
User5(-----)

T = FW Growth Table
E = FW Growth Equation

Exit Cancel

User-defined FW Growth Table

FW Unit: gram

Author's Name: User1

Data Interval: wk

Range of Data: - to -

Data Form: -

Copy from Built-in

Exit Prev Next Cancel

Data table with multiple columns and rows.

[Built-in & User-defined Table > Fetus Ratio] Fetus ratio measurement list and user registration

[Built-in & User-defined Table > Fetus Ratio > User #]: User registration of fetus ratio measurement list

Fetus Ratio

Prev Next

Built-in Fetus Ratio

- C<BPD>OFD<>(Hadlock)
- FL/BPD(Hohler)
- FL/AC(Hadlock)
- HC/AC(Campbell)
- LW/HW(P&J)
- FL/HC(Hadlock)

User-defined Fetus Ratio

- Create Fetus Ratio Table
- Create Fetus Ratio Equation
- Delete Fetus Ratio

User1(-----)
User2(-----)
User3(-----)
User4(-----)
User5(-----)
User6(-----)

T = Fetus Ratio Table
E = Fetus Ratio Equation

Exit Cancel

User-defined Fetus Ratio

Parameters: FL, AC

Author's Name: User1

Data Interval: wk

Range of Data: - to -

Data Form: -

Copy from Built-in

Exit Prev Next Cancel

Data table with multiple columns and rows.

[Built-in & User-defined Table > AFI Table] Fetus ratio measurement list and user registration

[Built-in & User-defined Table > AFI Table > User #]: User registration of fetus ratio measurement list

[Built-in & User-defined Table > Doppler Table]
Fetus ratio measurement list and user registration

[Built-in & User-defined Table > Doppler Table > User #]: User registration of fetus ratio measurement list

[Built-in & User-defined Table > Interval Growth Rate] Built-in tables for Interval Growth Rate

[Built-in & User-defined Table > User's Name] New measurement region registration

[User's Calculation]: User-created calculation formula settings

[User's Calculation > Reserved Word]: Reserved word settings for user-created calculation formulas

User's Calculation

Equation Program

Create User's Calculation

Delete User's Calculation

U-Calc. 1	U-Calc. 16
U-Calc. 2	U-Calc. 17
U-Calc. 3	U-Calc. 18
U-Calc. 4	U-Calc. 19
U-Calc. 5	U-Calc. 20
U-Calc. 6	U-Calc. 21
U-Calc. 7	U-Calc. 22
U-Calc. 8	U-Calc. 23
U-Calc. 9	U-Calc. 24
U-Calc. 10	U-Calc. 25
U-Calc. 11	U-Calc. 26
U-Calc. 12	U-Calc. 27
U-Calc. 13	U-Calc. 28
U-Calc. 14	U-Calc. 29
U-Calc. 15	U-Calc. 30

Exit Cancel

User's Calculation: Reserved Word (1/2)

Reserved Word Registration

Create Reserved Word

Delete Reserved Word

Reserved Word 1	Reserved Word 16
Reserved Word 2	Reserved Word 17
Reserved Word 3	Reserved Word 18
Reserved Word 4	Reserved Word 19
Reserved Word 5	Reserved Word 20
Reserved Word 6	Reserved Word 21
Reserved Word 7	Reserved Word 22
Reserved Word 8	Reserved Word 23
Reserved Word 9	Reserved Word 24
Reserved Word 10	Reserved Word 25
Reserved Word 11	Reserved Word 26
Reserved Word 12	Reserved Word 27
Reserved Word 13	Reserved Word 28
Reserved Word 14	Reserved Word 29
Reserved Word 15	Reserved Word 30

Exit Cancel

(2) Study Assignment

You can configure the menu, transferred items and report view in each study.

[Study Assignment]: Tree View display settings of Study and creation of Study by the user

Study Assignment

Select Study

Copy from Other Study

Select Display Study on the Left Tree View

Study Name	Study Name	Study Name
Basic	Tri. Basic	User6
Early	Tri. Early	User7
Extended	Tri. Extended	User8
BPP/Amnio	Tri. BPP/Amnio	User9
Anatomy	Tri. Anatomy	User10
Twin Basic	User1	
Twin Early	User2	
Twin Extended	User3	
Twin BPP/Amnio	User4	
Twin Anatomy	User5	

Exit Cancel

[OB Program > GA FW Ratio] Registration of gestational age tables, fetal weight measurement and ratio equations

GA FW Ratio

GA Table

Table	Growth Rate	Report
1 BPD Tokyo U	ON	10
2 AXT Tokyo U	ON	11
3 FL Tokyo U	ON	12
4 LV Tokyo U	ON	13
5 GS Tokyo U	ON	14
6	ON	15
7	ON	16
8	ON	17
9	ON	18

FW Equation

Equation	Growth Table	Auto	Report
1 Tokyo U	Shinozuka	ON	ON
2		OFF	ON
3		OFF	ON
4		OFF	ON
5		OFF	ON

Ratio Equation

Equation	Auto	Report
1	OFF	ON
2	OFF	ON
3	OFF	ON

Composite US-GA

Auto Display ON

Exit Cancel

[OB Program > Anatomy Check List Assign] Editing Anatomy Check List items

[OB Program > Other] Amniotic Fluid Index, fetal cardiac function and Doppler measurement settings

Other

B Mode Other

AFI

AFI Author Moore

Fetal Cardiac Selection

Report	Report
Fetal Heart Rate(M.D)	ON
Pre-IR(M.D)	ON
Post-IR(M.D)	ON
CTAR(B)	ON

Fetal Doppler Selection

Report	Report	Graph
Dop Measure	RI	Priority
Umb	Shinozuka	ON
MCA	Shinozuka	ON
UA		ON
D-Ao		ON
Renal-A		ON
PLI		ON
OB Dop1		ON
OB Dop2		ON
OB Dop3		ON

Exit Cancel

[OB Program > Graph Number] Selecting the number of graphs to display in a report

Anatomy Check List Assign (1/2) Prev Next

Anatomy Check List Assign

<Pregnant Woman>

1	Fetal Number	21	41
2		22	42
3		23	43
4		24	44
5		25	45
6		26	46
7		27	47
8		28	48
9		29	49
10		30	50
11		31	51
12		32	52
13		33	53
14		34	54
15		35	55
16		36	56
17		37	57
18		38	58
19		39	59
20		40	60

Exit Cancel

[Menu Assign]Measurement menu parameter settings

Graph Number Prev Next

Graphs Number on the Screen: 1 2 4 6

Growth Curve ☐ Gr-1 ☐ ON ☐ OFF ☐ Fetal Doppler

GA Dating Selection

☐ $\pm$ day Type ☐ $\pm$ SD Type

Exit Cancel

[Combined Report Display]Report display block settings

Menu Assign Prev Next

[Basic] Select the Study at the Top Screen of Study Assignment and then Setup Measurement Menu Format.

Select Target View Mode: B.Mode M.Mode D.Mode Prev Next

Select B/(F).Mode Items: Insert Overwrite Delete

Distance	Dist-trace	Area-Trace	Area-Ellipse
Area-Circle	Volume 1	Volume 2	Histogram
B. Index	Rt Hip J Angle	Lt Hip J Angle	Angle
Flow Profile			

BPD	AXT	FL	LV
APTD	TTD	FW1	AFI
AFV	AF Pocket	Cervix	CTR
CTAR			

Exit Cancel

[Transfer List Assign]
Setting measurement parameters whose basic measurement results can be transferred

Combined Report Display Prev Next

Study Name [Basic]

1.	Header Block	
2.	Site Block	
3.	GA,FW & Ratio	15
4.	Other(AFI,AFV)	16
5.	Fetal Cardiac(B/M)	17
6.	Fetal Doppler	18
7.	Fetal Cardiac Doppler	19
8.		20
9.		21
10.		22
11.		23
12.		24
13.		25
14.		26

Exit Cancel

[Other]
Measurement guide message display settings

Transfer List Assign Prev Next

Study Name [Basic] Assign the Transfer List by Each Method.

Select Target View Mode: B.Mode M.Mode D.Mode Prev Next

Select B/(F).Mode Items: Delete

Distance	Area	Circum	Axis	Diameter
BPD	CTAR-A		BPD	AF Pocket
APTD	CTAR-B		APTD	
TTD			TTD	
FL				
LV				
Q1				
Q2				
Q3				
Q4				
AF Pocket				

Exit Cancel

Other Prev Next

Study Name [Basic] Operational guide message display

☐ ON

Exit Cancel

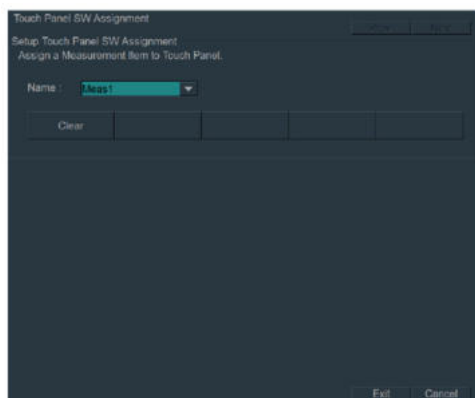


(3) SW Assignment

Assigns measurement menus to the [Meas] tab in the function menu or select the basic measurement menu that will appear when you press the [Caliper] key.

[Touch Panel SW Assignment]

Configures the items that can be assigned to the [Meas] tab in the function menu.



[+Mark Key Assignment]

Sets the measurement item to launch when the [Caliper] key is pressed.



7.5 References

7.5.1 Formulas

(1) B Mode

Gestational week (Gestational age)

Input item	Fetal age calculation formulas
by Last Menstrual Period	$LMP-GA = (Exam\ date - LMP) \div 7$
by BBT	$BBT-GA = (Exam\ date - BBT + 14) \div 7$
by EGA	$EGA-GA = (Exam\ date - EGA) \div 7 + EGA-MA$ EGA-MA: Average corresponding gestational weeks at past examination date
Average gestational week by GA measurement	$Composite\ US-GA = (USGA1 + USGA2 + \dots + USGAn) \div n$

Estimated Date of Confinement

Input item	Formula for calculating the expected date of confinement
by Last Menstrual Period	$LMP-EDC = 280 + LMP$
by BBT	$BBT-EDC = (280 - 14) + BBT$

Input item	Formula for calculating the expected date of confinement
by EGA	EGA-EDC = EGA date + (280 - EGA-MA) EGA-MA: Average corresponding gestational weeks at past examination date
by GA measurement	GA-EDC = Exam.data + (280-GA)
Average estimated date of confinement by GA measurement	Composite US-EDC = Exam.data + (280-Composite US-GA)

Complex measurements

Measurement parameters	Abbreviation and formula
Circumference	$HC = \pi \times \sqrt{\{(BPD^2 + OFD^2) \div 2\}}$
Circumference	$HC2 = 2.325 \times \sqrt{(BPD^2 + OFD^2)}$
Circumference	$AC = \pi \times \sqrt{\{(APTD^2 + TTD^2) \div 2\}}$
Area	$FTA = \pi \times (APTD \times TTD) \div 4$
Average length	$AD = (APTD + TTD) \div 2$

Fetal weight equation

Obstetrical table	Formulas
Tokyo U	$FW (g) = 1.07 \times BPD^3 + 3.42 \times APTD \times TTD \times FL$ BPD, APTD, TTD, FL: cm
Osaka U	$FW (g) = 1.25647 \times BPD^3 + 3.50665 \times FTA \times FL + 6.3$ BPD, FL: cm, FTA: cm ²
Hadlock 1	$FW (g) = 10^{(1.304 + 0.05281 \times AC + 0.1938 \times FL - 0.004 \times AC \times FL)}$ AC, FL: cm
Hadlock 2	$FW (g) = 10^{(1.326 - 0.00326 \times AC \times FL + 0.0107 \times HC + 0.0438 \times AC + 0.158 \times FL)}$ AC, HC, FL: cm
Hadlock 3	$FW (g) = 10^{(1.335 - 0.0034 \times AC \times FL + 0.0316 \times BPD + 0.0457 \times AC + 0.1623 \times FL)}$ BPD, AC, FL: cm
Hadlock 4	$FW (g) = 10^{(1.182 + 0.0273 \times HC + 0.07057 \times AC - 0.00063 \times AC^2 - 0.0002184 \times HC \times AC)}$ HC, AC: cm
Hadlock 5	$FW (g) = 10^{(1.3596 - 0.00386 \times AC \times FL + 0.0064 \times HC + 0.00061 \times BPD \times AC + 0.0424 \times AC + 0.174 \times FL)}$ BPD, HC, AC, FL: cm
Shepard	$FW (g) = 10^{((3 - 1.7492) + 0.166 \times BPD + 0.046 \times AC - 2.646 \times AC \times BPD \div 1000)}$ BPD, AC: cm
Shinozuka/ JSUM	$FW (g) = 1.07 \times BPD^3 + 0.3 \times AC^2 \times FL$ BPD, AC, FL: cm

Obstetrical table	Formulas
Hansmann	FW (kg) = $-0.105775 \times \text{BPD} + 0.000930707 \times \text{BPD}^2 + 0.0649145 \times \text{TTD} - 0.000205620 \times \text{TTD}^2 + 0.515263$ BPD, TTD: mm
Warsof	FW (kg) = $10^{(-1.599 + 0.144 \times \text{BPD} + 0.032 \times \text{AC} - 0.111 \times \text{BPD}^2 \times \text{AC} \div 1000)}$ BPD, AC: cm
Campbell	FW (g) = $2.718282^{(-4.564 + 0.0282 \times \text{AC} - 0.00331 \times \text{AC}^2 + \log_e 1000)}$
Cephalic Index	CI = $\text{BPOo} \div \text{OFDo}$ ($14 \leq \text{LMP-GA} \leq 40\text{wks}$)
Amniotic Fluid Index	AFI = Q1 + Q2 + Q3 + Q4
Thoracic area ratio	CTR = $A \div B$ A: Cardiac cross sectional circumference (diameter), B: Thoracic cross sectional perimeter (diameter) CTAR = $A \div B \times 100$ A: Cardiac cross-sectional area, B: Thoracic cross-sectional area
Interval Growth Rate	Interval Growth Rate = (Current Study data - Previous Study data) mm $\div$ (Current GA data - Previous GA data) week Reference: Levon N

(2) M Mode

Measurement parameters	Abbreviation and formula
Heart rate	FHR = $\# \times 60 \div (\text{Time for } \# \text{ cardiac cycle})$ PreFHR = $\# \times 60 \div (\text{Time for } \# \text{ cardiac cycle})$ PostFHR = $\# \times 60 \div (\text{Time for } \# \text{ cardiac cycle})$
LV Function	
Left ventricular end diastolic volume	EDV = LVIDd^3 (Pombo method)
Left ventricular end systolic volume	ESV = LVIDs^3 (Pombo method)
Stroke volume	SV = EDV - ESV
Left ventricular ejection fraction	EF (%) = $(\text{SV} \div \text{EDV}) \times 100$
Fractional shortening	FS (%) = $\{(\text{LVIDd} - \text{LVIDs}) \div \text{LVIDd}\} \times 100$

(3) D Mode

Measurement parameters	Abbreviation and formula
Index	PI = $(\text{PSV} - \text{EDV}) \div \text{MeanV}$ RI = $(\text{PSV} - \text{EDV}) \div \text{PSV}$ S/D = Systolic Velocity $\div$ Diastolic Velocity PLI = $ A / SF $
LVOT Flow	

Measurement parameters	Abbreviation and formula
Cross Sectional Area	$CSA = \pi/4 \times CSD^2$
1 stroke volume	$SV = CSALVOT \times VTI$ $Qp/Qs = SVRVOT \div SVLVOT$

7.5.2 Anatomy Check List

1. Pregnant Woman: Checklist for Mother's Uterus

Heading	Selectable	Yes	Typical	Multiple	See Comment	
Fetal Number	Single	WNL	Poorly Seen	Not Seen	See Comment	
Gender	WNL	Poorly Seen	Not Seen	See Comment		
Uterus	Anterverted	Anterverted	Anterverted	Anterverted	See Comment	See Comment
Endometrium	Prominent	Normal	Fluid	Fluid	See Comment	
Myometrium	Unremarkable	Heterogeneous	See Comment	See Comment		
Right Ovary	WNL	Enlarged	Not Seen	Absent	See Comment	
Left Ovary	WNL	Enlarged	Not Seen	Absent	See Comment	
Right Fallopian Tube	Hydrosalpinx	Pyosalpinx	Not Seen	See Comment		
Left Fallopian Tube	Hydrosalpinx	Pyosalpinx	Not Seen	See Comment		
Right Adnexa	WNL	Absent	Free Fluid	See Comment		
Left Adnexa	WNL	Absent	Free Fluid	See Comment		

2. Fetus: Checklist for Fetus

Heading	Selectable	Breach	Transverse	Oblique	See Comment	
Fetal Presentation	Vertex	Posterior	Posterior	R-Left/L-Right	See Comment	See Comment
Placental Position	Anterior	Posterior	Posterior	Posterior	See Comment	
Placental Location	Fundal	Mid	Low	Partial Previa	See Comment	
Placental Grade	0	1	2	3	See Comment	
APV	Normal	Increased	Decreased	See Comment		
Head	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Cerebral Ventricles	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Cisterna Magna	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Choroid Plexus	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Pons	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Medulla	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Spinal Cord	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Neck	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Thorax	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Abdomen	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Genitalia	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Heart	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Cardiac Activity	Regular	Irregular	Absent	See Comment		
Heart 4 Chamber View	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Outflow Tract	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
RVOT	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
LVOT	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Lungs	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Abdominal Wall	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Diaphragm	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Liver	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Spleen	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Stomach	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Small Intestine	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Large Intestine	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Right Kidney	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Left Kidney	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Renals	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Uterine Bladder	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Spine	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Spine-Lumbar	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Spine-Cervical	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Spine-Thoracic	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Spine-Sacral	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Right Arm	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Left Arm	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Right Leg	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Left Leg	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Right Hand	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Left Hand	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Right Foot	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Left Foot	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Upper Extremities	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Lower Extremities	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Limbs	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Digits	WNL	Poorly Seen	Not Seen	Abnormal	See Comment	
Gender	Not Seen	Male	Female	See Comment		

7.5.3 Biophysical Profile Scoring (BPP Scoring)

(1) Criteria for Scoring Biophysical Variables According to Vintzelios

Parameter	Present Score of 2	Equivocal Score of 1	Not Present Score of 0
Non stress test	5 or more FHR accelerations of at least 15 bpm in amplitude and at least 15-seconds duration associated with fetal movement in a 20-minute period. (NST 2)	22 or 4 accelerations of at least 15 bpm and at least 15-seconds duration associated with fetal movements in a 20-minute period. (NST 1)	1 or 0 acceleration in a 20-minute period. (NST 0)

Parameter	Present Score of 2	Equivocal Score of 1	Not Present Score of 0
Fetal movement	At least 3 gross (trunk and limbs) episodes of fetal movements within 30 minutes. Simultaneous limb and trunk movements are counted as a single movement. (FM 2)	1 or 2 fetal movements within 30 minutes. (FM1)	Absence of fetal movements within 30 minutes. (FM 0)
Fetal breathing movement	At least 1 episode of fetal breathing of at least 60-seconds duration within a 30-minute observation period. (FBM 2)	At least 1 episode of fetal breathing lasting 30 to 60 seconds within 30 minutes. (FBM 1)	Absence of fetal breathing, or breathing lasting less than 30 seconds within 30 minutes. (FBM 0)
Fetal tone	At least 1 episode of extension of extremities with return to position of flexion and also 1 episode of extension of spine with return to position of flexion. (FT 2)	At least 1 episode of extension of extremities with return to position of flexion or 1 episode of extension of spine with return to point of flexion. (FT 1)	Extremities in extension. Fetal movements not followed by return to flexion. Open hand. (FT 0)
Amniotic fluid volume	Fluid evident throughout the uterine cavity. A pocket that measures 2 cm or more in vertical diameter. (AF 2)	A pocket that measures less than 2cm but more than 1cm vertical diameter. (AF 1)	Crowding of fetal small parts. Largest pocket less than 1cm in vertical diameter. (AF 0)
Placental grading	Placental grade 0, 1, or 2. (PL2)	Placenta posterior; difficult to evaluate. (PL 1)	Placental grade 3. (PL 0)

Reference

Vintzileos A.M., Campbell W.A., Ingardia C.J., Nochimson D.J., "The fetal biophysical profile and its predictive value," *Obstet Gynecol.*, 62 (3): 271-278, September 1983

(2) Biophysical profile scoring According to Manning and Coworkers

Parameter	Present Score of 2	Not Present Score of 0
Breathing	30 seconds or more of breathing noted in 30-minute period.	Less than 30-second period or no breathing in 30 minutes.
Movement	3 or more gross body/limb movements in 30-minute period.	Less than 3 gross body/limb movements in 30 minutes.
Tone	At least 1 episode of flexion or extension with return to normal position in a 30-minute period.	Failure to observe any flexion or extension in a 30-minute period.
Fluid	One pocket of a amniotic fluid measuring 2 cm in both vertical and horizontal planes.	Failure to identify fluid pocket measuring 2 cm in any plane.
Nonstress test	Negative or reactive test.	Less than 2 accelerations of at least 15 bpm.
TOTAL POSSIBLE SCORE 10		

Reference

Manning F.A., Platt L.D., Sipos L., "Antepartum fetal evaluation: development of a fetal biophysical profile," Am. J Obstet Gynecol., 136 (6): 787-795, March 1980

7.5.4 References

(1) GA Tables

Tokyo U

Author's Name	Tokyo U	Tokyo U																																																											
Measurement	GS	CRL																																																											
Data interval	1.0 week	1.0 week																																																											
Data Form	Week ± Day	Week ± Day																																																											
Method	Caliper	Caliper																																																											
Range of Data	4 - 12 weeks	8 - 15 weeks																																																											
	<table><tr><th>wk</th><th>cm</th><th>aday</th></tr><tr><td>4.0</td><td>1.00</td><td>7</td></tr><tr><td>5.0</td><td>1.60</td><td>8</td></tr><tr><td>6.0</td><td>2.20</td><td>11</td></tr><tr><td>7.0</td><td>2.70</td><td>12</td></tr><tr><td>8.0</td><td>3.40</td><td>13</td></tr><tr><td>9.0</td><td>4.10</td><td>14</td></tr><tr><td>10.0</td><td>4.90</td><td>15</td></tr><tr><td>11.0</td><td>5.70</td><td>16</td></tr><tr><td>12.0</td><td>6.70</td><td>17</td></tr></table>	wk	cm	aday	4.0	1.00	7	5.0	1.60	8	6.0	2.20	11	7.0	2.70	12	8.0	3.40	13	9.0	4.10	14	10.0	4.90	15	11.0	5.70	16	12.0	6.70	17	<table><tr><th>wk</th><th>cm</th><th>aday</th></tr><tr><td>8.0</td><td>1.40</td><td>7</td></tr><tr><td>9.0</td><td>2.10</td><td>7</td></tr><tr><td>10.0</td><td>2.90</td><td>7</td></tr><tr><td>11.0</td><td>3.70</td><td>7</td></tr><tr><td>12.0</td><td>4.60</td><td>7</td></tr><tr><td>13.0</td><td>5.70</td><td>7</td></tr><tr><td>14.0</td><td>7.10</td><td>9</td></tr><tr><td>15.0</td><td>8.80</td><td>14</td></tr></table>	wk	cm	aday	8.0	1.40	7	9.0	2.10	7	10.0	2.90	7	11.0	3.70	7	12.0	4.60	7	13.0	5.70	7	14.0	7.10	9	15.0	8.80	14		
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13.0	5.70	7																																																											
14.0	7.10	9																																																											
15.0	8.80	14																																																											

Author's Name	Tokyo U	Tokyo U	Tokyo U	Tokyo U																																																																																																																																																																																																																																																																																																												
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	<table><tr><th>wk</th><th>cm</th><th>aday</th></tr><tr><td>12.0</td><td>2.00</td><td>7</td></tr><tr><td>13.0</td><td>2.40</td><td>7</td></tr><tr><td>14.0</td><td>2.78</td><td>7</td></tr><tr><td>15.0</td><td>3.10</td><td>7</td></tr><tr><td>16.0</td><td>3.38</td><td>8</td></tr><tr><td>17.0</td><td>3.72</td><td>8</td></tr><tr><td>18.0</td><td>4.05</td><td>9</td></tr><tr><td>19.0</td><td>4.39</td><td>10</td></tr><tr><td>20.0</td><td>4.71</td><td>10</td></tr><tr><td>21.0</td><td>5.04</td><td>10</td></tr><tr><td>22.0</td><td>5.35</td><td>10</td></tr><tr><td>23.0</td><td>5.67</td><td>11</td></tr><tr><td>24.0</td><td>5.97</td><td>11</td></tr><tr><td>25.0</td><td>6.27</td><td>12</td></tr><tr><td>26.0</td><td>6.56</td><td>13</td></tr><tr><td>27.0</td><td>6.84</td><td>13</td></tr><tr><td>28.0</td><td>7.12</td><td>13</td></tr><tr><td>29.0</td><td>7.38</td><td>14</td></tr><tr><td>30.0</td><td>7.64</td><td>15</td></tr><tr><td>31.0</td><td>7.88</td><td>16</td></tr><tr><td>32.0</td><td>8.12</td><td>16</td></tr><tr><td>33.0</td><td>8.34</td><td>18</td></tr><tr><td>34.0</td><td>8.55</td><td>20</td></tr><tr><td>35.0</td><td>8.74</td><td>25</td></tr><tr><td>36.0</td><td>8.92</td><td>25</td></tr><tr><td>37.0</td><td>9.08</td><td>25</td></tr><tr><td>38.0</td><td>9.23</td><td>25</td></tr><tr><td>39.0</td><td>9.36</td><td>25</td></tr><tr><td>40.0</td><td>9.47</td><td>25</td></tr></table>	wk	cm	aday	12.0	2.00	7	13.0	2.40	7	14.0	2.78	7	15.0	3.10	7	16.0	3.38	8	17.0	3.72	8	18.0	4.05	9	19.0	4.39	10	20.0	4.71	10	21.0	5.04	10	22.0	5.35	10	23.0	5.67	11	24.0	5.97	11	25.0	6.27	12	26.0	6.56	13	27.0	6.84	13	28.0	7.12	13	29.0	7.38	14	30.0	7.64	15	31.0	7.88	16	32.0	8.12	16	33.0	8.34	18	34.0	8.55	20	35.0	8.74	25	36.0	8.92	25	37.0	9.08	25	38.0	9.23	25	39.0	9.36	25	40.0	9.47	25	<table><tr><th>wk</th><th>cm</th><th>aday</th></tr><tr><td>20.0</td><td>3.23</td><td>17</td></tr><tr><td>21.0</td><td>3.44</td><td>18</td></tr><tr><td>22.0</td><td>3.65</td><td>19</td></tr><tr><td>23.0</td><td>3.87</td><td>21</td></tr><tr><td>24.0</td><td>4.09</td><td>22</td></tr><tr><td>25.0</td><td>4.31</td><td>24</td></tr><tr><td>26.0</td><td>4.54</td><td>25</td></tr><tr><td>27.0</td><td>4.78</td><td>25</td></tr><tr><td>28.0</td><td>4.98</td><td>25</td></tr><tr><td>29.0</td><td>5.19</td><td>28</td></tr><tr><td>30.0</td><td>5.41</td><td>30</td></tr><tr><td>31.0</td><td>5.61</td><td>32</td></tr><tr><td>32.0</td><td>5.82</td><td>35</td></tr><tr><td>33.0</td><td>6.01</td><td>38</td></tr><tr><td>34.0</td><td>6.19</td><td>42</td></tr><tr><td>35.0</td><td>6.37</td><td>46</td></tr><tr><td>36.0</td><td>6.53</td><td>50</td></tr><tr><td>37.0</td><td>6.68</td><td>54</td></tr><tr><td>38.0</td><td>6.82</td><td>57</td></tr><tr><td>39.0</td><td>6.93</td><td>60</td></tr><tr><td>40.0</td><td>7.04</td><td>64</td></tr></table>	wk	cm	aday	20.0	3.23	17	21.0	3.44	18	22.0	3.65	19	23.0	3.87	21	24.0	4.09	22	25.0	4.31	24	26.0	4.54	25	27.0	4.78	25	28.0	4.98	25	29.0	5.19	28	30.0	5.41	30	31.0	5.61	32	32.0	5.82	35	33.0	6.01	38	34.0	6.19	42	35.0	6.37	46	36.0	6.53	50	37.0	6.68	54	38.0	6.82	57	39.0	6.93	60	40.0	7.04	64	<table><tr><th>wk</th><th>cm</th><th>aday</th></tr><tr><td>21.0</td><td>4.05</td><td>7</td></tr><tr><td>22.0</td><td>4.39</td><td>9</td></tr><tr><td>23.0</td><td>4.71</td><td>11</td></tr><tr><td>24.0</td><td>5.01</td><td>12</td></tr><tr><td>25.0</td><td>5.30</td><td>14</td></tr><tr><td>26.0</td><td>5.57</td><td>17</td></tr><tr><td>27.0</td><td>5.82</td><td>19</td></tr><tr><td>28.0</td><td>6.06</td><td>21</td></tr><tr><td>29.0</td><td>6.30</td><td>24</td></tr><tr><td>30.0</td><td>6.51</td><td>25</td></tr><tr><td>31.0</td><td>6.72</td><td>28</td></tr><tr><td>32.0</td><td>6.93</td><td>31</td></tr><tr><td>33.0</td><td>7.13</td><td>34</td></tr><tr><td>34.0</td><td>7.32</td><td>35</td></tr><tr><td>35.0</td><td>7.51</td><td>38</td></tr><tr><td>36.0</td><td>7.70</td><td>40</td></tr><tr><td>37.0</td><td>7.89</td><td>42</td></tr><tr><td>38.0</td><td>8.08</td><td>44</td></tr><tr><td>39.0</td><td>8.27</td><td>46</td></tr><tr><td>40.0</td><td>8.47</td><td>48</td></tr></table>	wk	cm	aday	21.0	4.05	7	22.0	4.39	9	23.0	4.71	11	24.0	5.01	12	25.0	5.30	14	26.0	5.57	17	27.0	5.82	19	28.0	6.06	21	29.0	6.30	24	30.0	6.51	25	31.0	6.72	28	32.0	6.93	31	33.0	7.13	34	34.0	7.32	35	35.0	7.51	38	36.0	7.70	40	37.0	7.89	42	38.0	8.08	44	39.0	8.27	46	40.0	8.47	48	<table><tr><th>wk</th><th>cm²</th><th>aday</th></tr><tr><td>16.0</td><td>12.18</td><td>8</td></tr><tr><td>17.0</td><td>14.02</td><td>8</td></tr><tr><td>18.0</td><td>16.04</td><td>8</td></tr><tr><td>19.0</td><td>18.22</td><td>8</td></tr><tr><td>20.0</td><td>20.57</td><td>8</td></tr><tr><td>21.0</td><td>23.09</td><td>9</td></tr><tr><td>22.0</td><td>25.77</td><td>9</td></tr><tr><td>23.0</td><td>28.61</td><td>9</td></tr><tr><td>24.0</td><td>31.61</td><td>10</td></tr><tr><td>25.0</td><td>34.75</td><td>10</td></tr><tr><td>26.0</td><td>38.03</td><td>11</td></tr><tr><td>27.0</td><td>41.43</td><td>11</td></tr><tr><td>28.0</td><td>44.96</td><td>12</td></tr><tr><td>29.0</td><t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²	aday	16.0	12.18	8	17.0	14.02	8	18.0	16.04	8	19.0	18.22	8	20.0	20.57	8	21.0	23.09	9	22.0	25.77	9	23.0	28.61	9	24.0	31.61	10	25.0	34.75	10	26.0	38.03	11	27.0	41.43	11	28.0	44.96	12	29.0	48.59	12	30.0	52.32	13	31.0	56.12	14	32.0	59.99	15	33.0	63.91	15	34.0	67.86	16	35.0	71.82	17	36.0	75.78	17	37.0	79.71	18	38.0	83.59	18	39.0	87.39	19	40.0	91.10	19	41.0	94.89	20
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Reference

Tokyo University Takashi Okai, et al., "Studies on Fetal Growth and Functional Developments," Journal of the Japan Society of Obstetrics and Gynecology, 38 (8): 1209-1217, 1986

Osaka U

Author's Name	Osaka U			
Measurement	CRL			
Data interval	1.0 week			

Author's Name	Osaka U																											
Data Form	Week ± 1.0SD, Week ± 1.5SD, Week ± 2.0SD																											
Method	Caliper																											
Range of Data	7 - 13 weeks																											
	<table><tr><th>wk</th><th>cm</th><th>±1.5SD</th></tr><tr><td>7.0</td><td>0.87</td><td>0.24</td></tr><tr><td>8.0</td><td>1.30</td><td>0.39</td></tr><tr><td>9.0</td><td>2.04</td><td>0.56</td></tr><tr><td>10.0</td><td>3.00</td><td>0.72</td></tr><tr><td>11.0</td><td>4.12</td><td>0.87</td></tr><tr><td>12.0</td><td>5.30</td><td>1.04</td></tr><tr><td>13.0</td><td>6.49</td><td>1.19</td></tr></table>	wk	cm	±1.5SD	7.0	0.87	0.24	8.0	1.30	0.39	9.0	2.04	0.56	10.0	3.00	0.72	11.0	4.12	0.87	12.0	5.30	1.04	13.0	6.49	1.19			
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1.5SD$	14.0	5.60	1.80	15.0	7.30	2.10	16.0	9.20	2.40	17.0	11.30	2.70	18.0	13.50	3.00	19.0	15.80	3.45	20.0	18.40	3.75	21.0	21.00	4.20	22.0	23.80	4.65	23.0	26.80	5.10	24.0	29.90	5.55	25.0	33.10	6.00	26.0	36.50	6.60	27.0	39.90	7.05	28.0	43.40	7.65	29.0	47.10	8.10	30.0	50.80	8.70	31.0	54.50	9.30	32.0	58.30	10.05	33.0	62.10	10.65	34.0	65.80	11.25	35.0	69.50	12.00	36.0	73.20	12.60	37.0	76.90	13.35	38.0	80.20	14.10	39.0	83.50	14.85	40.0	86.60	15.60	<table><thead><tr><th>wk</th><th>cm</th><th>$\pm 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1.5SD$	13.0	0.84	0.32	14.0	1.26	0.33	15.0	1.57	0.33	16.0	1.88	0.33	17.0	2.19	0.35	18.0	2.47	0.35	19.0	2.75	0.36	20.0	3.03	0.36	21.0	3.30	0.36	22.0	3.57	0.38	23.0	3.83	0.38	24.0	4.08	0.38	25.0	4.32	0.39	26.0	4.56	0.39	27.0	4.78	0.41	28.0	5.01	0.41	29.0	5.22	0.41	30.0	5.43	0.42	31.0	5.63	0.42	32.0	5.82	0.44	33.0	6.01	0.44	34.0	6.19	0.44	35.0	6.36	0.45	36.0	6.53	0.45	37.0	6.69	0.47	38.0	6.84	0.47	39.0	6.98	0.47	40.0	7.12	0.48	<table><thead><tr><th>wk</th><th>cm</th><th>$\pm 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1.5SD$	13.0	1.01	0.30	14.0	1.31	0.32	15.0	1.59	0.32	16.0	1.87	0.32	17.0	2.15	0.33	18.0	2.41	0.33	19.0	2.67	0.33	20.0	2.91	0.35	21.0	3.15	0.35	22.0	3.38	0.35	23.0	3.61	0.36	24.0	3.82	0.36	25.0	4.03	0.36	26.0	4.23	0.38	27.0	4.42	0.38	28.0	4.60	0.38	29.0	4.78	0.39	30.0	4.94	0.39	31.0	5.10	0.39	32.0	5.25	0.41	33.0	5.39	0.41	34.0	5.53	0.41	35.0	5.65	0.42	36.0	5.77	0.42	37.0	5.88	0.42	38.0	5.98	0.44	39.0	6.08	0.44	40.0	6.16	0.44	<table><thead><tr><th>wk</th><th>cm</th><th>$\pm 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1.5SD$	10.0	1.33	0.29	11.0	1.72	0.30	12.0	2.09	0.32	13.0	2.46	0.33	14.0	2.82	0.35	15.0	3.18	0.36	16.0	3.52	0.38	17.0	3.86	0.39	18.0	4.20	0.41	19.0	4.53	0.42	20.0	4.85	0.44	21.0	5.17	0.44	22.0	5.48	0.45	23.0	5.79	0.47	24.0	6.09	0.48	25.0	6.39	0.48	26.0	6.67	0.50	27.0	6.95	0.51	28.0	7.23	0.51	29.0	7.49	0.53	30.0	7.74	0.53	31.0	7.98	0.54	32.0	8.21	0.54	33.0	8.43	0.56	34.0	8.62	0.56	35.0	8.80	0.56	36.0	8.96	0.57	37.0	9.10	0.57	38.0	9.21	0.57	39.0	9.30	0.58	40.0	9.36	0.58
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27.0	4.78	0.41																																																																																																																																																																																																																																																																																																																																																																				
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30.0	5.43	0.42																																																																																																																																																																																																																																																																																																																																																																				
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10.0	1.33	0.29																																																																																																																																																																																																																																																																																																																																																																				
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12.0	2.09	0.32																																																																																																																																																																																																																																																																																																																																																																				
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18.0	4.20	0.41																																																																																																																																																																																																																																																																																																																																																																				
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20.0	4.85	0.44																																																																																																																																																																																																																																																																																																																																																																				
21.0	5.17	0.44																																																																																																																																																																																																																																																																																																																																																																				
22.0	5.48	0.45																																																																																																																																																																																																																																																																																																																																																																				
23.0	5.79	0.47																																																																																																																																																																																																																																																																																																																																																																				
24.0	6.09	0.48																																																																																																																																																																																																																																																																																																																																																																				
25.0	6.39	0.48																																																																																																																																																																																																																																																																																																																																																																				
26.0	6.67	0.50																																																																																																																																																																																																																																																																																																																																																																				
27.0	6.95	0.51																																																																																																																																																																																																																																																																																																																																																																				
28.0	7.23	0.51																																																																																																																																																																																																																																																																																																																																																																				
29.0	7.49	0.53																																																																																																																																																																																																																																																																																																																																																																				
30.0	7.74	0.53																																																																																																																																																																																																																																																																																																																																																																				
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32.0	8.21	0.54																																																																																																																																																																																																																																																																																																																																																																				
33.0	8.43	0.56																																																																																																																																																																																																																																																																																																																																																																				
34.0	8.62	0.56																																																																																																																																																																																																																																																																																																																																																																				
35.0	8.80	0.56																																																																																																																																																																																																																																																																																																																																																																				
36.0	8.96	0.57																																																																																																																																																																																																																																																																																																																																																																				
37.0	9.10	0.57																																																																																																																																																																																																																																																																																																																																																																				
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39.0	9.30	0.58																																																																																																																																																																																																																																																																																																																																																																				
40.0	9.36	0.58																																																																																																																																																																																																																																																																																																																																																																				

Reference

Mineo Aoki, "IUGR Diagnosis and Treatment 1.IUGR Diagnosis Using Ultrasonic Measurements of Fetal Build," Perinatal Care, 9 (5): 407-442, May 1990

Hadlock

Author's Name	Osaka UHadlock	Hadlock	Hadlock	Tokyo U
Measurement	FBPD ¹⁾	HC ²⁾	AC ³⁾	FL ⁴⁾
Data interval	0.1 cm	0.5 cm	0.5 cm	0.1 cm
Data Form	Measurement $\pm$ Day	Measurement $\pm$ Day	Measurement $\pm$ Day	Measurement $\pm$ Day
Method	Caliper	Ellipse-Circle	Ellipse-Circle	Caliper
Range of Data	2 - 10 cm	8.0 - 36.0 cm	10.0 - 36.5 cm	1.0 - 7.9 cm

Author's Name	Osaka UHadlock	Hadlock	Hadlock	Tokyo U
	cm w d asday 2.0 12 w 1 d 6 2.1 12 w 4 d 6 2.2 12 w 6 d 6 2.3 13 w 1 d 6 2.4 13 w 2 d 6 2.5 13 w 4 d 6 2.6 13 w 6 d 6 2.7 14 w 1 d 6 2.8 14 w 4 d 6 2.9 14 w 5 d 6 3.0 15 w 0 d 6 3.1 15 w 2 d 6 3.2 15 w 4 d 6 3.3 15 w 6 d 6 3.4 16 w 1 d 6 3.5 16 w 4 d 6 3.6 16 w 6 d 6 3.7 17 w 1 d 6 3.8 17 w 3 d 6 3.9 17 w 5 d 6 4.0 18 w 0 d 10 4.1 18 w 2 d 10 4.2 18 w 4 d 10 4.3 18 w 6 d 10 4.4 19 w 1 d 10 4.5 19 w 4 d 10 4.6 19 w 6 d 10 4.7 20 w 1 d 10 4.8 20 w 4 d 10 4.9 20 w 6 d 10 5.0 21 w 1 d 10 5.1 21 w 4 d 10 5.2 21 w 6 d 10 5.3 22 w 1 d 10 5.4 22 w 4 d 10 5.5 22 w 6 d 10 5.6 23 w 1 d 10 5.7 23 w 4 d 10 5.8 23 w 6 d 10 5.9 24 w 1 d 9 6.0 24 w 4 d 9 6.1 25 w 0 d 9 6.2 25 w 2 d 9 6.3 25 w 5 d 9 6.4 26 w 1 d 9 6.5 26 w 3 d 9 6.6 26 w 6 d 9 6.7 27 w 1 d 9 6.8 27 w 4 d 9 6.9 28 w 0 d 9 7.0 28 w 2 d 9 7.1 28 w 5 d 9 7.2 29 w 1 d 9 7.3 29 w 4 d 9 7.4 29 w 6 d 9 7.5 30 w 3 d 14 7.6 30 w 6 d 14 7.7 31 w 1 d 14 7.8 31 w 4 d 14 7.9 32 w 0 d 14 8.0 32 w 4 d 14 8.1 32 w 6 d 14 8.2 33 w 2 d 14 8.3 33 w 6 d 14 8.4 34 w 1 d 14 8.5 34 w 5 d 14 8.6 35 w 1 d 14 8.7 35 w 4 d 14 8.8 36 w 1 d 25 8.9 36 w 4 d 25 9.0 37 w 0 d 25 9.1 37 w 4 d 25 9.2 38 w 0 d 25 9.3 38 w 4 d 25 9.4 38 w 6 d 25 9.5 39 w 3 d 25 9.6 39 w 6 d 25 9.7 40 w 4 d 25 9.8 41 w 0 d 25 9.9 41 w 4 d 25 10.0 42 w 0 d 25	cm w d asday 8.0 13 w 3 d 9 8.5 13 w 5 d 9 9.0 14 w 0 d 9 9.5 14 w 2 d 9 10.0 14 w 4 d 9 10.5 15 w 0 d 9 11.0 15 w 2 d 9 11.5 15 w 4 d 9 12.0 15 w 6 d 9 12.5 16 w 2 d 9 13.0 16 w 4 d 9 13.5 17 w 0 d 9 14.0 17 w 2 d 9 14.5 17 w 5 d 9 15.0 18 w 1 d 11 15.5 18 w 3 d 11 16.0 18 w 6 d 11 16.5 19 w 1 d 11 17.0 19 w 4 d 11 17.5 20 w 0 d 11 18.0 20 w 3 d 11 18.5 20 w 6 d 11 19.0 21 w 1 d 11 19.5 21 w 4 d 11 20.0 22 w 1 d 11 20.5 22 w 4 d 11 21.0 23 w 0 d 11 21.5 23 w 3 d 11 22.0 23 w 6 d 11 22.5 24 w 3 d 16 23.0 24 w 6 d 16 23.5 25 w 3 d 16 24.0 25 w 6 d 16 24.5 26 w 3 d 16 25.0 26 w 6 d 16 25.5 27 w 4 d 16 26.0 28 w 0 d 16 26.5 28 w 1 d 16 27.0 29 w 1 d 16 27.5 29 w 6 d 16 28.0 30 w 2 d 19 28.5 31 w 0 d 19 29.0 31 w 4 d 19 29.5 32 w 1 d 19 30.0 32 w 6 d 19 30.5 33 w 4 d 19 31.0 34 w 1 d 19 31.5 34 w 6 d 19 32.0 35 w 4 d 19 32.5 36 w 2 d 24 33.0 37 w 0 d 24 33.5 37 w 5 d 24 34.0 38 w 4 d 24 34.5 39 w 1 d 24 35.0 40 w 0 d 24 35.5 40 w 6 d 24 36.0 41 w 4 d 24	cm w d asday 10.0 15 w 4 d 13 10.5 16 w 1 d 13 11.0 16 w 4 d 13 11.5 16 w 6 d 13 12.0 17 w 2 d 13 12.5 17 w 6 d 13 13.0 18 w 1 d 14 13.5 18 w 4 d 14 14.0 19 w 1 d 14 14.5 19 w 4 d 14 15.0 20 w 0 d 14 15.5 20 w 3 d 14 16.0 20 w 6 d 14 16.5 21 w 2 d 14 17.0 21 w 5 d 14 17.5 22 w 1 d 14 18.0 22 w 4 d 14 18.5 23 w 1 d 14 19.0 23 w 4 d 15 19.5 24 w 0 d 15 20.0 24 w 4 d 15 20.5 24 w 6 d 15 21.0 25 w 3 d 15 21.5 25 w 6 d 15 22.0 26 w 2 d 15 22.5 26 w 6 d 15 23.0 27 w 2 d 15 23.5 27 w 6 d 15 24.0 28 w 1 d 15 24.5 28 w 5 d 15 25.0 29 w 1 d 15 25.5 29 w 5 d 15 26.0 30 w 1 d 21 26.5 30 w 4 d 21 27.0 31 w 1 d 21 27.5 31 w 4 d 21 28.0 32 w 1 d 21 28.5 32 w 4 d 21 29.0 33 w 1 d 21 29.5 33 w 4 d 21 30.0 34 w 1 d 21 30.5 34 w 4 d 21 31.0 35 w 1 d 21 31.5 35 w 4 d 21 32.0 36 w 1 d 18 32.5 36 w 4 d 18 33.0 37 w 1 d 18 33.5 37 w 4 d 18 34.0 38 w 1 d 18 34.5 38 w 5 d 18 35.0 39 w 1 d 18 35.5 39 w 5 d 18 36.0 40 w 1 d 18 36.5 40 w 6 d 19	cm w d asday 1.0 12 w 6 d 10 1.1 13 w 1 d 10 1.2 13 w 3 d 10 1.3 13 w 4 d 10 1.4 13 w 6 d 10 1.5 14 w 1 d 10 1.6 14 w 4 d 10 1.7 14 w 6 d 10 1.8 15 w 1 d 10 1.9 15 w 3 d 10 2.0 15 w 5 d 10 2.1 16 w 0 d 10 2.2 16 w 2 d 10 2.3 16 w 4 d 10 2.4 16 w 6 d 10 2.5 17 w 1 d 10 2.6 17 w 4 d 10 2.7 17 w 6 d 10 2.8 18 w 1 d 10 2.9 18 w 4 d 10 3.0 18 w 6 d 10 3.1 19 w 1 d 10 3.2 19 w 4 d 10 3.3 19 w 6 d 10 3.4 20 w 2 d 10 3.5 20 w 5 d 10 3.6 21 w 0 d 10 3.7 21 w 3 d 10 3.8 21 w 6 d 10 3.9 22 w 1 d 10 4.0 22 w 4 d 10 4.1 22 w 6 d 10 4.2 23 w 2 d 22 4.3 23 w 5 d 22 4.4 24 w 1 d 22 4.5 24 w 4 d 22 4.6 24 w 6 d 22 4.7 25 w 2 d 22 4.8 25 w 5 d 22 4.9 26 w 1 d 22 5.0 26 w 4 d 22 5.1 27 w 0 d 22 5.2 27 w 3 d 22 5.3 27 w 6 d 22 5.4 28 w 1 d 22 5.5 28 w 4 d 22 5.6 29 w 1 d 22 5.7 29 w 4 d 22 5.8 30 w 0 d 22 5.9 30 w 3 d 22 6.0 30 w 6 d 22 6.1 31 w 3 d 22 6.2 31 w 6 d 22 6.3 32 w 2 d 22 6.4 32 w 5 d 22 6.5 33 w 2 d 22 6.6 33 w 5 d 22 6.7 34 w 1 d 22 6.8 34 w 4 d 22 6.9 35 w 1 d 22 7.0 35 w 4 d 22 7.1 36 w 1 d 22 7.2 36 w 4 d 22 7.3 37 w 1 d 22 7.4 37 w 4 d 22 7.5 38 w 2 d 22 7.6 38 w 5 d 22 7.7 39 w 2 d 22 7.8 39 w 5 d 22 7.9 40 w 3 d 22

Author's Name	Hadlock
Measurement	CRL ⁵⁾
Data interval	0.1 cm
Data Form	Measurement $\pm$ Day
Method	Caliper
Range of Data	0.2 - 12.1 cm

Author's Name	Hadlock																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Reference

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Had-90%

Author's Name	Had-90%	Had-90%	Had-90%	
Measurement	HC	AC	FL	
Data interval	1.0 week	1.0 week	1.0 week	
Data Form	10 - 90 %ile	10 - 90 %ile	10 - 90 %ile	
Method	Ellipse-Circ.	Ellipse-Circ.	Caliper	
Range of Data	14 - 40 weeks	14 - 40 weeks	14 - 40 weeks	

Author's Name	Had-90%				Had-90%				Had-90%				
	wk	10%	50%	90%	wk	10%	50%	90%	wk	10%	50%	90%	
	14.0	9.10	9.70	10.30	14.0	6.70	7.30	7.90	14.0	1.30	1.40	1.50	
	15.0	10.40	11.00	11.60	15.0	7.90	8.60	9.30	15.0	1.60	1.70	1.90	
	16.0	11.70	12.40	13.10	16.0	9.10	9.90	10.70	16.0	1.80	2.00	2.20	
	17.0	13.00	13.80	14.60	17.0	10.30	11.20	12.10	17.0	2.20	2.40	2.60	
	18.0	14.20	15.10	16.00	18.0	11.50	12.50	13.50	18.0	2.50	2.70	2.90	
	19.0	15.50	16.40	17.40	19.0	12.60	13.70	14.80	19.0	2.70	3.00	3.30	
	20.0	16.70	17.70	18.70	20.0	13.80	15.00	16.30	20.0	3.00	3.30	3.60	
	21.0	17.90	18.90	20.00	21.0	14.90	16.20	17.60	21.0	3.20	3.50	3.80	
	22.0	19.00	20.10	21.30	22.0	16.00	17.40	18.80	22.0	3.50	3.80	4.10	
	23.0	20.10	21.30	22.50	23.0	17.00	18.50	20.00	23.0	3.70	4.10	4.50	
	24.0	21.10	22.40	23.70	24.0	18.10	19.70	21.30	24.0	4.00	4.40	4.80	
	25.0	22.20	23.50	24.90	25.0	19.10	20.80	22.50	25.0	4.20	4.60	5.00	
	26.0	23.20	24.60	26.00	26.0	20.10	21.90	23.70	26.0	4.50	4.90	5.30	
	27.0	24.10	25.60	27.10	27.0	21.10	23.00	24.90	27.0	4.60	5.10	5.60	
	28.0	25.10	26.60	28.10	28.0	22.00	24.00	26.00	28.0	4.90	5.40	5.90	
	29.0	25.90	27.50	29.10	29.0	23.00	25.10	27.20	29.0	5.10	5.60	6.10	
	30.0	26.80	28.40	30.00	30.0	23.90	26.10	28.30	30.0	5.30	5.80	6.30	
	31.0	27.60	29.30	31.00	31.0	24.90	27.10	29.40	31.0	5.50	6.00	6.50	
	32.0	28.40	30.10	31.80	32.0	25.80	28.10	30.40	32.0	5.60	6.20	6.80	
	33.0	29.00	30.80	32.60	33.0	26.70	29.10	31.50	33.0	5.80	6.40	7.00	
	34.0	29.70	31.50	33.30	34.0	27.50	30.00	32.50	34.0	6.00	6.60	7.20	
	35.0	30.40	32.20	34.10	35.0	28.30	30.90	33.50	35.0	6.20	6.80	7.40	
	36.0	30.90	32.80	34.70	36.0	29.20	31.80	34.40	36.0	6.40	7.00	7.60	
	37.0	31.40	33.30	35.20	37.0	30.00	32.70	35.40	37.0	6.60	7.20	7.90	
	38.0	31.90	33.80	35.80	38.0	30.80	33.60	36.40	38.0	6.70	7.40	8.10	
	39.0	32.20	34.20	36.20	39.0	31.60	34.40	37.30	39.0	6.80	7.50	8.20	
	40.0	32.60	34.60	36.60	40.0	32.40	35.30	38.20	40.0	7.00	7.70	8.40	

Reference

F. P. Hadlock, R. L. Deter, R. B. Harrist, and S. K. Park, "Estimating fetal age: computer-assisted analysis of multiple fetal growth parameters," Radiology 152 (2), 497-501, August 1984

Table data: 90 percentile data form [Growth format]

Hadlock84

Author's Name	Hadlock84	Hadlock84	Hadlock84	
Measurement	BPD	HC	AC	
Data interval	0.1 cm	0.1 cm	0.1 cm	
Data Form	Measurement $\pm$ Day	Measurement $\pm$ Day	Measurement $\pm$ Day	
Method	Caliper	Ellipse-Circ.	Ellipse-Circ.	
Range of Data	1.5 - 10.2 cm	5.5 - 35.8 cm	5.0 - 38.1 cm	

Author's Name	Hadlock84	Hadlock84	Hadlock84																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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13</td></tr><tr><td>4.0</td><td>22</td><td>w</td><td>6 d 13</td></tr><tr><td>4.1</td><td>23</td><td>w</td><td>2 d 13</td></tr><tr><td>4.2</td><td>23</td><td>w</td><td>5 d 13</td></tr><tr><td>4.3</td><td>24</td><td>w</td><td>0 d 15</td></tr><tr><td>4.4</td><td>24</td><td>w</td><td>3 d 15</td></tr><tr><td>4.5</td><td>24</td><td>w</td><td>6 d 15</td></tr><tr><td>4.6</td><td>25</td><td>w</td><td>2 d 15</td></tr><tr><td>4.7</td><td>25</td><td>w</td><td>5 d 15</td></tr><tr><td>4.8</td><td>26</td><td>w</td><td>1 d 15</td></tr><tr><td>4.9</td><td>26</td><td>w</td><td>3 d 15</td></tr><tr><td>5.0</td><td>26</td><td>w</td><td>6 d 15</td></tr><tr><td>5.1</td><td>27</td><td>w</td><td>2 d 15</td></tr><tr><td>5.2</td><td>27</td><td>w</td><td>5 d 15</td></tr><tr><td>5.3</td><td>28</td><td>w</td><td>1 d 15</td></tr><tr><td>5.4</td><td>28</td><td>w</td><td>4 d 15</td></tr><tr><td>5.5</td><td>29</td><td>w</td><td>0 d 15</td></tr><tr><td>5.6</td><td>29</td><td>w</td><td>3 d 15</td></tr><tr><td>5.7</td><td>29</td><td>w</td><td>6 d 15</td></tr><tr><td>5.8</td><td>30</td><td>w</td><td>2 d 21</td></tr><tr><td>5.9</td><td>30</td><td>w</td><td>5 d 21</td></tr><tr><td>6.0</td><td>31</td><td>w</td><td>2 d 21</td></tr><tr><td>6.1</td><td>31</td><td>w</td><td>5 d 21</td></tr><tr><td>6.2</td><td>32</td><td>w</td><td>1 d 21</td></tr><tr><td>6.3</td><td>32</td><td>w</td><td>4 d 21</td></tr></table> <table><tr><th>cm</th><th>w</th><th>d</th><th>age</th></tr><tr><td>6.4</td><td>33</td><td>w</td><td>0 d 21</td></tr><tr><td>6.5</td><td>33</td><td>w</td><td>4 d 21</td></tr><tr><td>6.6</td><td>34</td><td>w</td><td>0 d 21</td></tr><tr><td>6.7</td><td>34</td><td>w</td><td>3 d 21</td></tr><tr><td>6.8</td><td>35</td><td>w</td><td>0 d 21</td></tr><tr><td>6.9</td><td>35</td><td>w</td><td>3 d 21</td></tr><tr><td>7.0</td><td>35</td><td>w</td><td>6 d 21</td></tr><tr><td>7.1</td><td>36</td><td>w</td><td>3 d 22</td></tr><tr><td>7.2</td><td>36</td><td>w</td><td>6 d 22</td></tr><tr><td>7.3</td><td>37</td><td>w</td><td>3 d 22</td></tr><tr><td>7.4</td><td>37</td><td>w</td><td>6 d 22</td></tr><tr><td>7.5</td><td>38</td><td>w</td><td>3 d 22</td></tr><tr><td>7.6</td><td>38</td><td>w</td><td>6 d 22</td></tr><tr><td>7.7</td><td>39</td><td>w</td><td>3 d 22</td></tr><tr><td>7.8</td><td>39</td><td>w</td><td>6 d 22</td></tr><tr><td>7.9</td><td>40</td><td>w</td><td>3 d 22</td></tr><tr><td>8.0</td><td>40</td><td>w</td><td>6 d 22</td></tr><tr><td>8.1</td><td>41</td><td>w</td><td>3 d 22</td></tr><tr><td>8.2</td><td>42</td><td>w</td><td>0 d 22</td></tr></table>	cm	w	d	age	0.7	12	w	1 d 10	0.8	12	w	3 d 10	0.9	12	w	5 d 10	1.0	13	w	0 d 10	1.1	13	w	2 d 10	1.2	13	w	4 d 10	1.3	13	w	6 d 10	1.4	14	w	1 d 10	1.5	14	w	3 d 10	1.6	14	w	5 d 10	1.7	15	w	0 d 10	1.8	15	w	2 d 10	1.9	15	w	4 d 10	2.0	16	w	0 d 10	2.1	16	w	2 d 10	2.2	16	w	4 d 10	2.3	16	w	6 d 10	2.4	17	w	2 d 10	2.5	17	w	4 d 10	2.6	17	w	6 d 10	2.7	18	w	2 d 13	2.8	18	w	4 d 13	2.9	18	w	6 d 13	3.0	19	w	2 d 13	3.1	19	w	4 d 13	3.2	20	w	0 d 13	3.3	20	w	2 d 13	3.4	20	w	5 d 13	3.5	21	w	0 d 13	3.6	21	w	3 d 13	3.7	21	w	5 d 13	3.8	22	w	1 d 13	3.9	22	w	4 d 13	4.0	22	w	6 d 13	4.1	23	w	2 d 13	4.2	23	w	5 d 13	4.3	24	w	0 d 15	4.4	24	w	3 d 15	4.5	24	w	6 d 15	4.6	25	w	2 d 15	4.7	25	w	5 d 15	4.8	26	w	1 d 15	4.9	26	w	3 d 15	5.0	26	w	6 d 15	5.1	27	w	2 d 15	5.2	27	w	5 d 15	5.3	28	w	1 d 15	5.4	28	w	4 d 15	5.5	29	w	0 d 15	5.6	29	w	3 d 15	5.7	29	w	6 d 15	5.8	30	w	2 d 21	5.9	30	w	5 d 21	6.0	31	w	2 d 21	6.1	31	w	5 d 21	6.2	32	w	1 d 21	6.3	32	w	4 d 21	cm	w	d	age	6.4	33	w	0 d 21	6.5	33	w	4 d 21	6.6	34	w	0 d 21	6.7	34	w	3 d 21	6.8	35	w	0 d 21	6.9	35	w	3 d 21	7.0	35	w	6 d 21	7.1	36	w	3 d 22	7.2	36	w	6 d 22	7.3	37	w	3 d 22	7.4	37	w	6 d 22	7.5	38	w	3 d 22	7.6	38	w	6 d 22	7.7	39	w	3 d 22	7.8	39	w	6 d 22	7.9	40	w	3 d 22	8.0	40	w	6 d 22	8.1	41	w	3 d 22	8.2	42	w	0 d 22			
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FL data is stored in 0.1 cm units internally.

Reference

F. P. Hadlock, R. L. Deter, R. B. Harrist, and S. K. Park, "Estimating fetal age: computer-assisted analysis of multiple fetal growth parameters," Radiology 152 (2), 497-501, August 1984
Table 1 and Table 2

Jeanty

Author's Name	Jeanty	Jeanty	Jeanty	Jeanty
Measurement	FL	HL	TIB	ULNA
Data interval	0.1	0.1	0.1	0.1
Data Form	Measurement ± Day	Measurement ± Day	Measurement ± Day	Measurement ± Day
Method	Caliper	Caliper	Caliper	Caliper
Range of Data	1.0 - 8.0 cm	1.0 - 6.9 cm	1.0 - 6.9 cm	1.0 - 6.4 cm

Author's Name	Jeanty	Jeanty	Jeanty	Jeanty
	cm w d aday 1.0 12 w 4 d 16 1.1 12 w 6 d 16 1.2 13 w 2 d 16 1.3 13 w 4 d 16 1.4 13 w 6 d 16 1.5 14 w 1 d 16 1.6 14 w 4 d 16 1.7 14 w 6 d 16 1.8 15 w 1 d 16 1.9 15 w 4 d 16 2.0 15 w 6 d 16 2.1 16 w 2 d 16 2.2 16 w 4 d 16 2.3 16 w 6 d 16 2.4 17 w 2 d 16 2.5 17 w 4 d 16 2.6 18 w 0 d 15 2.7 18 w 2 d 16 2.8 18 w 5 d 15 2.9 19 w 0 d 15 3.0 19 w 3 d 16 3.1 19 w 6 d 16 3.2 20 w 1 d 16 3.3 20 w 4 d 16 3.4 20 w 6 d 16 3.5 21 w 1 d 16 3.6 21 w 4 d 16 3.7 22 w 0 d 15 3.8 22 w 3 d 16 3.9 22 w 5 d 15 4.0 23 w 1 d 16 4.1 23 w 4 d 16 4.2 23 w 6 d 16 4.3 24 w 2 d 16 4.4 24 w 5 d 15 4.5 25 w 0 d 15 4.6 25 w 3 d 16 4.7 25 w 6 d 16 4.8 26 w 1 d 16 4.9 26 w 4 d 16 5.0 27 w 0 d 15 5.1 27 w 3 d 16 5.2 27 w 6 d 16 5.3 28 w 1 d 16 5.4 28 w 4 d 16 5.5 29 w 1 d 16 5.6 29 w 4 d 16 5.7 29 w 6 d 16 5.8 30 w 2 d 16 5.9 30 w 5 d 15 6.0 31 w 1 d 16 6.1 31 w 4 d 16 6.2 32 w 0 d 15 6.3 32 w 3 d 16 6.4 32 w 6 d 16 6.5 33 w 2 d 16 6.6 33 w 5 d 15 6.7 34 w 1 d 16 6.8 34 w 4 d 16 6.9 35 w 0 d 15 7.0 35 w 4 d 16 7.1 35 w 6 d 16 7.2 36 w 3 d 16 7.3 36 w 6 d 16 7.4 37 w 2 d 16 7.5 37 w 5 d 15 7.6 38 w 1 d 16 7.7 38 w 4 d 16 7.8 39 w 1 d 16 7.9 39 w 4 d 16 8.0 40 w 0 d 15	cm w d aday 1.0 12 w 4 d 19 1.1 12 w 6 d 19 1.2 13 w 1 d 19 1.3 13 w 4 d 19 1.4 13 w 6 d 19 1.5 14 w 1 d 19 1.6 14 w 4 d 19 1.7 14 w 6 d 19 1.8 15 w 1 d 19 1.9 15 w 4 d 19 2.0 15 w 6 d 20 2.1 16 w 2 d 20 2.2 16 w 5 d 20 2.3 17 w 1 d 20 2.4 17 w 3 d 19 2.5 17 w 6 d 19 2.6 18 w 1 d 19 2.7 18 w 4 d 20 2.8 19 w 0 d 20 2.9 19 w 3 d 19 3.0 19 w 6 d 19 3.1 20 w 2 d 19 3.2 20 w 5 d 20 3.3 21 w 1 d 19 3.4 21 w 4 d 19 3.5 22 w 0 d 20 3.6 22 w 4 d 19 3.7 22 w 6 d 20 3.8 23 w 3 d 20 3.9 23 w 6 d 19 4.0 24 w 2 d 20 4.1 24 w 6 d 20 4.2 25 w 2 d 19 4.3 25 w 5 d 20 4.4 26 w 1 d 19 4.5 26 w 5 d 20 4.6 27 w 1 d 19 4.7 27 w 5 d 20 4.8 28 w 1 d 19 4.9 28 w 6 d 20 5.0 29 w 2 d 19 5.1 29 w 6 d 19 5.2 30 w 2 d 20 5.3 30 w 6 d 19 5.4 31 w 3 d 19 5.5 32 w 0 d 20 5.6 32 w 4 d 19 5.7 33 w 1 d 20 5.8 33 w 4 d 20 5.9 34 w 1 d 19 6.0 34 w 6 d 20 6.1 35 w 2 d 20 6.2 35 w 6 d 20 6.3 36 w 4 d 19 6.4 37 w 1 d 19 6.5 37 w 5 d 20 6.6 38 w 2 d 20 6.7 38 w 6 d 20 6.8 39 w 4 d 19 6.9 40 w 1 d 19	cm w d aday 1.0 13 w 3 d 20 1.1 13 w 5 d 20 1.2 14 w 1 d 21 1.3 14 w 3 d 20 1.4 14 w 6 d 21 1.5 15 w 1 d 21 1.6 15 w 4 d 21 1.7 15 w 6 d 21 1.8 16 w 1 d 21 1.9 16 w 4 d 21 2.0 17 w 0 d 20 2.1 17 w 3 d 20 2.2 17 w 6 d 21 2.3 18 w 1 d 21 2.4 18 w 4 d 21 2.5 18 w 6 d 21 2.6 19 w 2 d 20 2.7 19 w 5 d 20 2.8 20 w 1 d 21 2.9 20 w 4 d 21 3.0 21 w 0 d 20 3.1 21 w 3 d 20 3.2 21 w 6 d 21 3.3 22 w 1 d 21 3.4 22 w 4 d 21 3.5 23 w 1 d 21 3.6 23 w 4 d 21 3.7 23 w 6 d 21 3.8 24 w 3 d 20 3.9 24 w 6 d 21 4.0 25 w 2 d 20 4.1 25 w 5 d 20 4.2 26 w 1 d 21 4.3 26 w 4 d 21 4.4 27 w 1 d 21 4.5 27 w 4 d 21 4.6 28 w 0 d 20 4.7 28 w 4 d 21 4.8 29 w 0 d 20 4.9 29 w 3 d 20 5.0 29 w 6 d 21 5.1 30 w 3 d 20 5.2 30 w 6 d 21 5.3 31 w 3 d 20 5.4 31 w 6 d 21 5.5 32 w 3 d 20 5.6 32 w 6 d 21 5.7 33 w 3 d 20 5.8 33 w 6 d 21 5.9 34 w 3 d 20 6.0 34 w 6 d 21 6.1 35 w 3 d 20 6.2 35 w 6 d 21 6.3 36 w 4 d 21 6.4 37 w 0 d 20 6.5 37 w 4 d 21 6.6 38 w 0 d 21 6.7 38 w 4 d 21 6.8 39 w 1 d 21 6.9 39 w 5 d 20	cm w d aday 1.0 13 w 1 d 21 1.1 13 w 4 d 21 1.2 13 w 6 d 21 1.3 14 w 1 d 22 1.4 14 w 4 d 22 1.5 15 w 0 d 22 1.6 15 w 3 d 22 1.7 15 w 6 d 22 1.8 16 w 1 d 21 1.9 16 w 4 d 21 2.0 16 w 6 d 22 2.1 17 w 2 d 22 2.2 17 w 5 d 22 2.3 18 w 1 d 21 2.4 18 w 4 d 21 2.5 18 w 6 d 22 2.6 19 w 3 d 22 2.7 19 w 6 d 21 2.8 20 w 2 d 22 2.9 20 w 6 d 22 3.0 21 w 1 d 22 3.1 21 w 5 d 22 3.2 22 w 1 d 21 3.3 22 w 5 d 22 3.4 23 w 1 d 21 3.5 23 w 4 d 22 3.6 24 w 1 d 21 3.7 24 w 4 d 22 3.8 25 w 1 d 21 3.9 25 w 4 d 22 4.0 26 w 1 d 21 4.1 26 w 5 d 22 4.2 27 w 1 d 22 4.3 27 w 5 d 22 4.4 28 w 2 d 22 4.5 28 w 6 d 21 4.6 29 w 3 d 22 4.7 29 w 6 d 22 4.8 30 w 4 d 22 4.9 31 w 1 d 22 5.0 31 w 4 d 22 5.1 32 w 1 d 22 5.2 32 w 6 d 22 5.3 33 w 3 d 22 5.4 34 w 0 d 22 5.5 34 w 4 d 22 5.6 35 w 1 d 22 5.7 35 w 6 d 21 5.8 36 w 3 d 22 5.9 37 w 1 d 22 6.0 37 w 5 d 22 6.1 38 w 2 d 22 6.2 39 w 0 d 22 6.3 39 w 4 d 22 6.4 40 w 2 d 22

Author's Name	Jeanty			
Measurement	BD			
Data interval	0.1			
Data Form	Measurement $\pm$ Day			
Method	Caliper			
Range of Data	1.5 - 6.5 cm			

Author's Name	Jeanty			
	cm w d arday 1.5 10 w 3 d 24 1.6 11 w 0 d 24 1.7 11 w 4 d 24 1.8 12 w 1 d 24 1.9 12 w 6 d 23 2.0 13 w 3 d 23 2.1 14 w 0 d 23 2.2 14 w 4 d 23 2.3 15 w 1 d 24 2.4 15 w 6 d 23 2.5 16 w 3 d 23 2.6 17 w 0 d 23 2.7 17 w 4 d 23 2.8 18 w 1 d 24 2.9 18 w 6 d 23 3.0 19 w 3 d 23 3.1 20 w 0 d 24 3.2 20 w 4 d 24 3.3 21 w 1 d 24 3.4 21 w 5 d 24 3.5 22 w 2 d 24 3.6 22 w 6 d 24 3.7 23 w 4 d 24 3.8 24 w 1 d 23 3.9 24 w 5 d 23 4.0 25 w 2 d 23 4.1 25 w 6 d 23 4.2 26 w 4 d 24 4.3 27 w 1 d 23 4.4 27 w 5 d 23 4.5 28 w 2 d 23 4.6 28 w 6 d 23 4.7 29 w 4 d 24 4.8 30 w 1 d 23 4.9 30 w 5 d 24 5.0 31 w 2 d 24 5.1 31 w 6 d 23 5.2 32 w 4 d 24 5.3 33 w 0 d 24 5.4 33 w 4 d 24 5.5 34 w 1 d 24 5.6 34 w 5 d 23 5.7 35 w 3 d 23 5.8 36 w 0 d 23 5.9 36 w 4 d 23 6.0 37 w 1 d 24 6.1 37 w 5 d 23 6.2 38 w 3 d 23 6.3 39 w 0 d 23 6.4 39 w 4 d 23 6.5 40 w 1 d 24			

Reference

P. Jeanty, F. Rodesch, D. Delbeke, and J. E. Dumont, "Estimation of gestational age from measurements of fetal long bones," J. Ultrasound Med. 3 (2), 75-79, 1984

Jeanty 95%

Author's Name	Jeanty	Jeanty	Jeanty	Jeanty
Measurement	FL	HL	TIB	ULNA
Data interval	1.0 week	1.0 week	1.0 week	1.0 week
Data Form	5 - 95%ile	5 - 95%ile	5 - 95%ile	5 - 95%ile
Method	Caliper	Caliper	Caliper	Caliper
Range of Data	11 - 40 weeks	11 - 40 weeks	11 - 40 weeks	11 - 40 weeks
	wk 5% 50% 95% 11.0 0.60 0.80 1.00 12.0 0.90 1.20 1.80 13.0 0.60 1.20 1.90 14.0 0.50 1.50 1.90 15.0 1.10 1.80 2.60 16.0 1.30 2.20 2.40 17.0 2.00 2.50 2.90 18.0 1.90 2.80 3.10 19.0 2.30 3.10 3.80 20.0 2.20 3.30 3.90 21.0 2.70 3.80 4.50 22.0 2.90 3.90 4.40 23.0 3.50 4.10 4.80 24.0 3.40 4.40 4.90 25.0 3.80 4.60 5.40 26.0 3.90 4.90 5.30 27.0 4.50 5.10 5.70 28.0 4.50 5.30 5.70 29.0 4.90 5.60 6.20 30.0 4.90 5.80 6.20 31.0 5.30 6.00 6.70 32.0 5.30 6.20 6.70 33.0 5.60 6.40 7.10 34.0 5.70 6.50 7.00 35.0 6.10 6.70 7.30 36.0 6.10 6.80 7.40 37.0 6.40 7.10 7.70 38.0 6.20 7.20 7.90 39.0 6.40 7.40 8.30 40.0 6.60 7.50 8.10	wk 5% 50% 95% 11.0 0.60 0.80 1.00 12.0 0.30 0.90 1.00 13.0 0.50 1.30 2.00 14.0 0.50 1.60 2.00 15.0 1.10 1.80 2.60 16.0 1.20 2.10 2.50 17.0 1.90 2.40 2.90 18.0 1.90 2.70 3.00 19.0 2.20 2.90 3.60 20.0 2.30 3.20 3.60 21.0 2.80 3.40 4.00 22.0 2.80 3.60 4.00 23.0 3.20 3.80 4.50 24.0 3.10 4.10 4.60 25.0 3.50 4.30 5.10 26.0 3.60 4.50 4.90 27.0 4.20 4.80 5.10 28.0 4.10 4.80 5.20 29.0 4.40 5.00 5.60 30.0 4.40 5.20 5.60 31.0 4.70 5.30 5.90 32.0 4.70 5.50 5.90 33.0 5.00 5.60 6.20 34.0 5.00 5.70 6.20 35.0 5.20 5.80 6.50 36.0 5.30 6.00 6.30 37.0 5.70 6.10 6.40 38.0 5.50 6.10 6.60 39.0 5.60 6.20 6.90 40.0 5.60 6.30 6.90	wk 5% 50% 95% 11.0 0.40 0.70 1.00 12.0 0.40 1.00 1.70 13.0 0.20 1.30 1.90 14.0 0.50 1.80 2.70 15.0 0.70 1.90 2.50 16.0 1.50 2.20 2.90 17.0 1.40 2.40 2.90 18.0 1.90 2.70 3.50 19.0 1.90 2.90 3.50 20.0 1.90 3.20 3.50 21.0 2.40 3.20 3.90 22.0 2.50 3.40 3.90 23.0 3.00 3.60 4.30 24.0 2.80 3.90 4.50 25.0 3.10 4.10 5.00 26.0 3.30 4.30 4.90 27.0 3.90 4.50 5.10 28.0 3.90 4.70 5.20 29.0 4.00 4.90 5.70 30.0 4.10 5.10 5.60 31.0 4.60 5.20 5.80 32.0 4.60 5.40 5.90 33.0 4.90 5.60 6.20 34.0 4.70 5.70 6.40 35.0 4.80 5.90 6.90 36.0 4.90 6.00 6.80 37.0 5.20 6.10 7.10 38.0 5.40 6.20 6.90 39.0 5.80 6.40 6.90 40.0 5.90 6.50 6.90	wk 5% 50% 95% 11.0 0.50 0.80 1.00 12.0 0.30 1.10 1.80 13.0 0.40 1.30 1.70 14.0 0.40 1.60 2.20 15.0 1.00 1.80 2.20 16.0 0.80 1.90 2.40 17.0 1.10 2.10 3.20 18.0 1.30 2.40 3.00 19.0 2.00 2.80 3.20 20.0 2.10 2.90 3.20 21.0 2.50 3.10 3.60 22.0 2.40 3.30 3.70 23.0 2.70 3.50 4.30 24.0 2.90 3.70 4.10 25.0 3.40 3.90 4.40 26.0 3.40 4.10 4.40 27.0 3.70 4.30 4.80 28.0 3.70 4.40 4.80 29.0 4.00 4.60 5.10 30.0 3.80 4.70 5.40 31.0 3.90 4.80 5.90 32.0 4.00 5.00 5.80 33.0 4.30 5.20 6.00 34.0 4.40 5.30 5.90 35.0 4.70 5.40 6.10 36.0 4.70 5.50 6.10 37.0 4.90 5.60 6.20 38.0 4.80 5.70 6.30 39.0 4.90 5.70 6.60 40.0 5.00 5.80 6.50

Author's Name	Jeanty 95%			
Measurement	RAD			
Data interval	1.0 week			
Data Form	5 - 95%ile			
Method	Caliper			

Author's Name	Jeanty 95%																																																																																																																															
Range of Data	11 - 40 weeks																																																																																																																															
	<table><tr><th>wk</th><th>5%</th><th>50%</th><th>95%</th></tr><tr><td>11.0</td><td></td><td>0.50</td><td></td></tr><tr><td>12.0</td><td></td><td>0.70</td><td></td></tr><tr><td>13.0</td><td></td><td>1.00</td><td></td></tr><tr><td>14.0</td><td>0.80</td><td>1.30</td><td>1.20</td></tr><tr><td>15.0</td><td>1.20</td><td>1.50</td><td>1.80</td></tr><tr><td>16.0</td><td>0.90</td><td>1.80</td><td>2.10</td></tr><tr><td>17.0</td><td>1.10</td><td>2.00</td><td>2.80</td></tr><tr><td>18.0</td><td>1.40</td><td>2.20</td><td>2.60</td></tr><tr><td>19.0</td><td>2.00</td><td>2.40</td><td>2.90</td></tr><tr><td>20.0</td><td>2.10</td><td>2.70</td><td>2.80</td></tr><tr><td>21.0</td><td>2.50</td><td>2.90</td><td>3.20</td></tr><tr><td>22.0</td><td>2.40</td><td>3.10</td><td>3.40</td></tr><tr><td>23.0</td><td>2.60</td><td>3.20</td><td>3.90</td></tr><tr><td>24.0</td><td>2.70</td><td>3.40</td><td>3.80</td></tr><tr><td>25.0</td><td>3.10</td><td>3.60</td><td>4.00</td></tr><tr><td>26.0</td><td>3.00</td><td>3.70</td><td>4.10</td></tr><tr><td>27.0</td><td>3.30</td><td>3.90</td><td>4.50</td></tr><tr><td>28.0</td><td>3.30</td><td>4.00</td><td>4.50</td></tr><tr><td>29.0</td><td>3.60</td><td>4.20</td><td>4.70</td></tr><tr><td>30.0</td><td>3.40</td><td>4.30</td><td>4.90</td></tr><tr><td>31.0</td><td>3.40</td><td>4.40</td><td>5.30</td></tr><tr><td>32.0</td><td>3.70</td><td>4.50</td><td>5.10</td></tr><tr><td>33.0</td><td>4.10</td><td>4.60</td><td>5.10</td></tr><tr><td>34.0</td><td>3.90</td><td>4.70</td><td>5.30</td></tr><tr><td>35.0</td><td>3.80</td><td>4.80</td><td>5.70</td></tr><tr><td>36.0</td><td>4.10</td><td>4.80</td><td>5.40</td></tr><tr><td>37.0</td><td>4.50</td><td>4.90</td><td>5.30</td></tr><tr><td>38.0</td><td>4.50</td><td>4.90</td><td>5.30</td></tr><tr><td>39.0</td><td>4.80</td><td>5.00</td><td>5.40</td></tr><tr><td>40.0</td><td>4.60</td><td>5.00</td><td>5.40</td></tr></table>	wk	5%	50%	95%	11.0		0.50		12.0		0.70		13.0		1.00		14.0	0.80	1.30	1.20	15.0	1.20	1.50	1.80	16.0	0.90	1.80	2.10	17.0	1.10	2.00	2.80	18.0	1.40	2.20	2.60	19.0	2.00	2.40	2.90	20.0	2.10	2.70	2.80	21.0	2.50	2.90	3.20	22.0	2.40	3.10	3.40	23.0	2.60	3.20	3.90	24.0	2.70	3.40	3.80	25.0	3.10	3.60	4.00	26.0	3.00	3.70	4.10	27.0	3.30	3.90	4.50	28.0	3.30	4.00	4.50	29.0	3.60	4.20	4.70	30.0	3.40	4.30	4.90	31.0	3.40	4.40	5.30	32.0	3.70	4.50	5.10	33.0	4.10	4.60	5.10	34.0	3.90	4.70	5.30	35.0	3.80	4.80	5.70	36.0	4.10	4.80	5.40	37.0	4.50	4.90	5.30	38.0	4.50	4.90	5.30	39.0	4.80	5.00	5.40	40.0	4.60	5.00	5.40			
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Reference

P Jeanty , "Fetal limb biometry," Radiology 147 (2), 601-602, May 1983

Table data: 95 percentile data form[Growth format]

Campbell

Author's Name	Campbell	Campbell	Campbell	Campbell																																																																																																																																																																																																																																																																																																																																																
Measurement	BPD	HC	AC	FL																																																																																																																																																																																																																																																																																																																																																
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Reference

Materials provided:

Professor Campbell's Group at Harris Birthright Centre, King's College Hospital

Merz

Author's Name	Merz	Merz	Merz	Jeanty
Measurement	BPD	OFD	HC2	TTD
Data interval	1.0 week	1.0 week	1.0 week	1.0 week
Data Form	5 - 95% ile	5 - 95% ile	5 - 95% ile	Week $\pm$ Day
Method	Caliper	Caliper	Ellipse-Circ.	Caliper
Range of Data	13 - 41 weeks	13 - 41 weeks	13 - 41 weeks	13 - 41 weeks

Author's Name	Merz	Merz	Merz	Jeanty
	wk 5% 50% 95% 13.0 2.30 2.60 3.00 14.0 2.50 2.90 3.30 15.0 2.80 3.20 3.60 16.0 3.10 3.50 3.90 17.0 3.50 3.90 4.30 18.0 3.80 4.20 4.60 19.0 4.10 4.60 5.00 20.0 4.50 4.90 5.30 21.0 4.80 5.20 5.70 22.0 5.10 5.60 6.00 23.0 5.40 5.90 6.40 24.0 5.70 6.20 6.70 25.0 6.10 6.60 7.00 26.0 6.40 6.80 7.30 27.0 6.60 7.10 7.70 28.0 6.90 7.40 7.90 29.0 7.20 7.70 8.20 30.0 7.40 8.00 8.50 31.0 7.70 8.20 8.80 32.0 7.90 8.50 9.00 33.0 8.10 8.70 9.20 34.0 8.30 8.90 9.50 35.0 8.50 9.10 9.70 36.0 8.70 9.20 9.80 37.0 8.90 9.40 9.90 38.0 8.90 9.50 10.10 39.0 9.00 9.60 10.30 40.0 9.10 9.70 10.30 41.0 9.10 9.80 10.40	wk 5% 50% 95% 13.0 2.80 3.20 3.60 14.0 3.10 3.50 4.00 15.0 3.50 3.90 4.30 16.0 3.80 4.30 4.80 17.0 4.30 4.70 5.20 18.0 4.70 5.20 5.60 19.0 5.10 5.60 6.10 20.0 5.50 6.00 6.50 21.0 6.00 6.50 6.90 22.0 6.40 6.90 7.40 23.0 6.80 7.30 7.80 24.0 7.20 7.70 8.20 25.0 7.50 8.10 8.60 26.0 7.90 8.40 9.00 27.0 8.20 8.80 9.30 28.0 8.60 9.10 9.70 29.0 8.90 9.40 10.00 30.0 9.20 9.70 10.30 31.0 9.40 10.00 10.60 32.0 9.70 10.20 10.80 33.0 9.90 10.50 11.10 34.0 10.10 10.70 11.30 35.0 10.30 10.90 11.50 36.0 10.40 11.00 11.60 37.0 10.50 11.20 11.80 38.0 10.60 11.30 11.90 39.0 10.70 11.40 12.00 40.0 10.80 11.40 12.10 41.0 10.80 11.50 12.10	wk 5% 50% 95% 13.0 8.40 9.60 10.80 14.0 9.40 10.60 11.80 15.0 10.50 11.80 13.00 16.0 11.50 13.00 14.30 17.0 13.00 14.30 15.60 18.0 14.20 15.50 16.80 19.0 15.50 16.80 18.10 20.0 16.70 18.10 19.40 21.0 18.00 19.30 20.70 22.0 19.20 20.60 22.00 23.0 20.40 21.80 23.20 24.0 21.60 23.00 24.40 25.0 22.70 24.10 25.60 26.0 23.80 25.30 26.70 27.0 24.80 26.30 27.80 28.0 25.80 27.30 28.90 29.0 26.80 28.30 29.90 30.0 27.70 29.20 30.80 31.0 28.20 30.10 31.70 32.0 29.30 30.90 32.50 33.0 30.50 31.60 33.30 34.0 30.70 32.30 34.00 35.0 31.30 32.90 34.60 36.0 31.80 33.50 35.20 37.0 32.20 33.90 35.80 38.0 32.60 34.30 36.10 39.0 32.90 34.60 36.40 40.0 33.10 34.90 36.60 41.0 33.20 35.00 36.80	wk 5% 50% 95% 13.0 1.80 2.20 2.60 14.0 2.10 2.50 2.90 15.0 2.50 2.90 3.30 16.0 2.80 3.20 3.60 17.0 3.10 3.60 4.00 18.0 3.50 3.90 4.40 19.0 3.80 4.30 4.80 20.0 4.10 4.60 5.10 21.0 4.40 5.00 5.50 22.0 4.80 5.30 5.80 23.0 5.10 5.60 6.20 24.0 5.40 6.00 6.50 25.0 5.70 6.30 6.90 26.0 6.00 6.60 7.20 27.0 6.30 7.00 7.60 28.0 6.70 7.30 7.90 29.0 7.00 7.60 8.30 30.0 7.30 7.90 8.60 31.0 7.60 8.20 8.90 32.0 7.80 8.50 9.20 33.0 8.10 8.80 9.50 34.0 8.40 9.10 9.90 35.0 8.70 9.40 10.20 36.0 8.90 9.70 10.50 37.0 9.20 10.00 10.80 38.0 9.40 10.20 11.00 39.0 9.70 10.50 11.30 40.0 9.90 10.70 11.60 41.0 10.10 10.90 11.80

Author's Name	Merz	Merz	Merz	Jeanty
Measurement	APTD	AC	FL	TIB
Data interval	1.0 week	1.0 week	1.0 week	1.0 week
Data Form	5 - 95% ile	5 - 95% ile	5 - 95% ile	Week $\pm$ Day
Method	Caliper	Ellipse-Circ	Caliper	Caliper
Range of Data	13 - 41 weeks	13 - 41 weeks	13 - 41 weeks	13 - 41 weeks
	wk 5% 50% 95% 13.0 1.70 2.10 2.50 14.0 2.00 2.40 2.80 15.0 2.30 2.80 3.20 16.0 2.70 3.10 3.60 17.0 3.00 3.50 3.90 18.0 3.30 3.80 4.30 19.0 3.70 4.20 4.70 20.0 4.00 4.50 5.00 21.0 4.30 4.80 5.40 22.0 4.60 5.20 5.70 23.0 5.00 5.50 6.10 24.0 5.30 5.80 6.40 25.0 5.60 6.20 6.80 26.0 5.90 6.50 7.10 27.0 6.20 6.80 7.50 28.0 6.50 7.20 7.80 29.0 6.80 7.50 8.10 30.0 7.10 7.80 8.50 31.0 7.40 8.10 8.80 32.0 7.70 8.40 9.10 33.0 8.00 8.70 9.40 34.0 8.30 9.00 9.70 35.0 8.50 9.30 10.00 36.0 8.80 9.60 10.30 37.0 9.00 9.80 10.60 38.0 9.30 10.10 10.90 39.0 9.50 10.30 11.10 40.0 9.70 10.60 11.40 41.0 9.90 10.80 11.60	wk 5% 50% 95% 13.0 5.50 6.70 8.00 14.0 6.50 7.80 9.10 15.0 7.60 8.90 10.20 16.0 8.60 10.00 11.40 17.0 9.60 11.10 12.50 18.0 10.70 12.20 13.60 19.0 11.70 13.20 14.60 20.0 12.70 14.30 15.90 21.0 13.80 15.40 17.00 22.0 14.80 16.50 18.10 23.0 15.80 17.50 19.30 24.0 16.80 18.60 20.40 25.0 17.80 19.60 21.50 26.0 18.80 20.70 22.60 27.0 19.80 21.70 23.60 28.0 20.70 22.70 24.70 29.0 21.70 23.70 25.70 30.0 22.50 24.70 26.80 31.0 23.50 25.70 27.80 32.0 24.40 26.60 28.80 33.0 25.30 27.60 29.80 34.0 26.20 28.50 30.80 35.0 27.00 29.40 31.70 36.0 27.90 30.30 32.70 37.0 28.70 31.10 33.60 38.0 29.40 31.90 34.40 39.0 30.10 32.70 35.20 40.0 30.80 33.40 36.00 41.0 31.40 34.10 36.70	wk 5% 50% 95% 13.0 0.80 1.10 1.40 14.0 1.10 1.50 1.80 15.0 1.50 1.90 2.10 16.0 1.80 2.10 2.50 17.0 2.10 2.40 2.80 18.0 2.40 2.70 3.10 19.0 2.70 3.00 3.40 20.0 2.90 3.30 3.70 21.0 3.20 3.60 4.00 22.0 3.50 3.90 4.20 23.0 3.70 4.10 4.50 24.0 4.00 4.40 4.80 25.0 4.20 4.60 5.00 26.0 4.50 4.90 5.30 27.0 4.70 5.10 5.50 28.0 4.90 5.30 5.80 29.0 5.10 5.60 6.00 30.0 5.30 5.80 6.20 31.0 5.50 6.00 6.40 32.0 5.70 6.20 6.70 33.0 5.90 6.40 6.90 34.0 6.10 6.60 7.10 35.0 6.30 6.80 7.30 36.0 6.50 7.00 7.40 37.0 6.60 7.10 7.60 38.0 6.80 7.30 7.80 39.0 6.90 7.40 7.90 40.0 7.10 7.60 8.10 41.0 7.20 7.70 8.20	wk 5% 50% 95% 13.0 0.60 0.90 1.20 14.0 0.90 1.20 1.50 15.0 1.20 1.50 1.80 16.0 1.50 1.80 2.10 17.0 1.80 2.10 2.40 18.0 2.10 2.40 2.70 19.0 2.30 2.60 3.00 20.0 2.60 2.90 3.20 21.0 2.80 3.10 3.50 22.0 3.00 3.40 3.70 23.0 3.30 3.60 4.00 24.0 3.50 3.80 4.20 25.0 3.70 4.10 4.40 26.0 3.90 4.30 4.70 27.0 4.10 4.50 4.90 28.0 4.30 4.70 5.10 29.0 4.50 4.90 5.30 30.0 4.60 5.10 5.50 31.0 4.80 5.20 5.60 32.0 5.00 5.40 5.80 33.0 5.10 5.60 6.00 34.0 5.30 5.70 6.20 35.0 5.40 5.90 6.30 36.0 5.60 6.00 6.40 37.0 5.70 6.20 6.60 38.0 5.80 6.30 6.70 39.0 5.90 6.40 6.90 40.0 6.00 6.50 7.00 41.0 6.10 6.60 7.10

Author's Name	Merz	Merz	Merz	Jeanty
Measurement	FIB	HL	RAD	ULNA
Data interval	1.0 week	1.0 week	1.0 week	1.0 week
Data Form	5 - 95% ile	5 - 95% ile	5 - 95% ile	Week $\pm$ Day
Method	Caliper	Caliper	Caliper	Caliper
Range of Data	13 - 41 weeks	13 - 41 weeks	13 - 41 weeks	13 - 41 weeks
	wk 5% 50% 95% 13.0 0.50 0.80 1.10 14.0 0.80 1.10 1.40 15.0 1.10 1.40 1.70 16.0 1.40 1.70 2.00 17.0 1.70 2.00 2.30 18.0 1.90 2.30 2.60 19.0 2.20 2.50 2.90 20.0 2.40 2.80 3.10 21.0 2.70 3.00 3.40 22.0 2.90 3.30 3.60 23.0 3.10 3.50 3.80 24.0 3.30 3.70 4.10 25.0 3.50 3.90 4.30 26.0 3.80 4.10 4.50 27.0 3.90 4.30 4.70 28.0 4.10 4.50 4.90 29.0 4.30 4.70 5.10 30.0 4.50 4.90 5.30 31.0 4.70 5.10 5.50 32.0 4.80 5.20 5.70 33.0 5.00 5.40 5.80 34.0 5.10 5.60 6.00 35.0 5.30 5.70 6.10 36.0 5.40 5.80 6.30 37.0 5.50 6.00 6.40 38.0 5.60 6.10 6.50 39.0 5.70 6.20 6.60 40.0 5.80 6.30 6.70 41.0 5.90 6.30 6.80	wk 5% 50% 95% 13.0 0.70 1.00 1.30 14.0 1.00 1.30 1.70 15.0 1.40 1.70 2.00 16.0 1.70 2.00 2.30 17.0 2.00 2.30 2.60 18.0 2.20 2.60 2.90 19.0 2.50 2.80 3.20 20.0 2.70 3.10 3.40 21.0 3.00 3.30 3.70 22.0 3.20 3.60 3.90 23.0 3.40 3.80 4.20 24.0 3.70 4.00 4.40 25.0 3.90 4.20 4.60 26.0 4.10 4.50 4.80 27.0 4.30 4.70 5.00 28.0 4.50 4.80 5.20 29.0 4.60 5.00 5.40 30.0 4.80 5.20 5.60 31.0 5.00 5.40 5.80 32.0 5.10 5.50 6.00 33.0 5.30 5.70 6.10 34.0 5.40 5.90 6.30 35.0 5.60 6.00 6.40 36.0 5.70 6.10 6.60 37.0 5.80 6.30 6.70 38.0 5.90 6.40 6.80 39.0 6.00 6.50 6.90 40.0 6.10 6.60 7.00 41.0 6.20 6.60 7.10	wk 5% 50% 95% 13.0 0.30 0.60 0.90 14.0 0.60 1.00 1.30 15.0 1.00 1.30 1.60 16.0 1.20 1.60 1.90 17.0 1.50 1.80 2.20 18.0 1.70 2.10 2.40 19.0 2.00 2.30 2.60 20.0 2.20 2.50 2.90 21.0 2.40 2.80 3.10 22.0 2.60 3.00 3.30 23.0 2.80 3.20 3.50 24.0 3.00 3.30 3.70 25.0 3.20 3.50 3.90 26.0 3.30 3.70 4.10 27.0 3.50 3.90 4.30 28.0 3.60 4.00 4.40 29.0 3.80 4.20 4.50 30.0 3.90 4.30 4.70 31.0 4.00 4.40 4.80 32.0 4.20 4.60 5.00 33.0 4.30 4.70 5.10 34.0 4.40 4.80 5.20 35.0 4.60 5.00 5.40 36.0 4.60 5.00 5.40 37.0 4.70 5.10 5.50 38.0 4.80 5.20 5.60 39.0 4.90 5.30 5.70 40.0 4.90 5.30 5.80 41.0 5.00 5.40 5.80	wk 5% 50% 95% 13.0 0.50 0.80 1.10 14.0 0.80 1.10 1.40 15.0 1.20 1.50 1.80 16.0 1.50 1.80 2.10 17.0 1.70 2.10 2.40 18.0 2.00 2.30 2.70 19.0 2.30 2.60 2.90 20.0 2.50 2.80 3.20 21.0 2.70 3.10 3.40 22.0 3.00 3.30 3.70 23.0 3.20 3.50 3.90 24.0 3.40 3.70 4.10 25.0 3.60 3.90 4.30 26.0 3.80 4.10 4.50 27.0 4.00 4.30 4.70 28.0 4.20 4.50 4.90 29.0 4.30 4.70 5.10 30.0 4.50 4.90 5.20 31.0 4.60 5.00 5.40 32.0 4.80 5.20 5.60 33.0 4.90 5.30 5.70 34.0 5.10 5.50 5.90 35.0 5.20 5.60 6.00 36.0 5.30 5.70 6.10 37.0 5.40 5.80 6.30 38.0 5.50 5.90 6.40 39.0 5.60 6.00 6.50 40.0 5.70 6.10 6.60 41.0 5.80 6.20 6.60



Reference

Merz, E.; Wellek, S., "Das normale fetale Wachstumsprofil - ein einheitliches Modell zur Berechnung von Normkurven für die gängigen Kopf - und Abdomenparameter sowie die großen Extremitätenknochen , " Ultraschall in der Medizin 17 (4), 153-162, August 1996
English title: Normal Fetal Development Profiles - A Model to Obtain Standard Development Graphs for the Head and Abdominal Parameters and the Long Limb Bones

Table data: 95 percentile data form [Growth format]

Shinozuka

Author's Name	Shinozuka	Shinozuka	Shinozuka	Shinozuka																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Measurement	BPD	A×T	AC	FL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Data interval	1 mm	2.0 cm ²	0.5 cm	1 mm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Data Form	Measurement ± Day	Measurement ± Day	Measurement ± Day	Measurement ± Day																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Method	Caliper	Ellipse	Ellipse-Circ.	Caliper																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Reference

Norio Shinozuka, Haruo Masuda, Hideyuki Kagawa, Yuji Taketani "Standard Values of Ultrasonographic Fetal Biometry," J. Med. Ultrasonics, 23, 877-888, 1996
Table 2, Table 3, Table 4 and Table 5.

Hansmann

Author's Name	Hansmann	Hansmann	Hansmann	Hansmann																																																																																																																																																																																																																																																																																																																														
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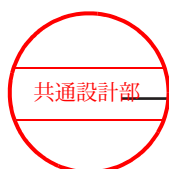
Reference

Hansmann, H. & B.J. Hackelöer & A. Staudach, "Ultraschalldiagnostik in Geburtshilfe und Gynäkologie," Springer-Verlag, Berlin Heidelberg New York Tokyo, 1985

English version:

Hansmann, H. & B.J. Hackelöer & A. Staudach, "Ultrasound Diagnosis in Obstetrics and Gynecology," Springer-Verlag, New York, Heidelberg Berlin, Tokyo, 1985

Rempen



Author's Name	Rempen	Rempen	Rempen	
Measurement	mGS	CRL	BPD	
Data interval	0.1 cm	0.1 cm	0.1 cm	
Data Form	Measurement ± Day	Measurement ± Day	Measurement ± Day	
Method	3 Caliper (mean)	Caliper	Caliper	
Range of Data	0.2 - 7.3 cm	0.2 - 7.8 cm	0.3 - 2.7 cm	
	cm w d sday 0.2 4 w 6 d 10 0.3 5 w 0 d 10 0.4 5 w 1 d 10 0.5 5 w 2 d 10 0.6 5 w 2 d 10 0.7 5 w 3 d 10 0.8 5 w 4 d 10 0.9 5 w 5 d 10 1.0 5 w 5 d 10 1.1 5 w 6 d 10 1.2 6 w 0 d 10 1.3 6 w 1 d 10 1.4 6 w 2 d 10 1.5 6 w 2 d 10 1.6 6 w 3 d 10 1.7 6 w 4 d 10 1.8 6 w 5 d 10 1.9 6 w 6 d 10 2.0 6 w 6 d 10 2.1 7 w 0 d 10 2.2 7 w 1 d 10 2.3 7 w 2 d 10 2.4 7 w 3 d 10 2.5 7 w 4 d 10 2.6 7 w 4 d 10 2.7 7 w 5 d 10 2.8 7 w 6 d 10 2.9 8 w 0 d 10 3.0 8 w 1 d 10 3.1 8 w 2 d 10 3.2 8 w 3 d 10 3.3 8 w 3 d 10 3.4 8 w 4 d 10 3.5 8 w 5 d 10 3.6 8 w 6 d 10 3.7 9 w 0 d 10 3.8 9 w 1 d 10 3.9 9 w 2 d 10 4.0 9 w 3 d 10 4.1 9 w 4 d 10 4.2 9 w 5 d 10 4.3 9 w 6 d 10 4.4 9 w 6 d 10 4.5 10 w 0 d 10 4.6 10 w 1 d 10 4.7 10 w 2 d 10 4.8 10 w 3 d 10 4.9 10 w 4 d 10 5.0 10 w 5 d 10 5.1 10 w 6 d 10 5.2 11 w 0 d 10 5.3 11 w 1 d 10 5.4 11 w 2 d 10 5.5 11 w 3 d 10 5.6 11 w 4 d 10 5.7 11 w 5 d 10 5.8 11 w 6 d 10 5.9 12 w 0 d 10 6.0 12 w 1 d 10 6.1 12 w 2 d 10 6.2 12 w 3 d 10 6.3 12 w 4 d 10 6.4 12 w 5 d 10 6.5 12 w 6 d 10 6.6 13 w 0 d 10 6.7 13 w 1 d 10 6.8 13 w 2 d 10 6.9 13 w 3 d 10 7.0 13 w 4 d 10 7.1 13 w 5 d 10 7.2 14 w 0 d 10 7.3 14 w 1 d 10	cm w d sday 0.2 6 w 0 d 6 0.3 6 w 1 d 6 0.4 6 w 2 d 6 0.5 6 w 3 d 6 0.6 6 w 4 d 6 0.7 6 w 5 d 6 0.8 6 w 6 d 6 0.9 7 w 0 d 6 1.0 7 w 1 d 6 1.1 7 w 2 d 6 1.2 7 w 3 d 6 1.3 7 w 4 d 6 1.4 7 w 5 d 6 1.5 7 w 6 d 6 1.6 7 w 6 d 6 1.7 8 w 0 d 6 1.8 8 w 1 d 6 1.9 8 w 2 d 6 2.0 8 w 3 d 6 2.1 8 w 4 d 6 2.2 8 w 5 d 6 2.3 8 w 5 d 6 2.4 8 w 6 d 6 2.5 9 w 0 d 6 2.6 9 w 1 d 6 2.7 9 w 2 d 6 2.8 9 w 3 d 6 2.9 9 w 4 d 6 3.0 9 w 4 d 6 3.1 9 w 5 d 6 3.2 9 w 6 d 6 3.3 9 w 6 d 6 3.4 10 w 0 d 6 3.5 10 w 1 d 6 3.6 10 w 2 d 6 3.7 10 w 2 d 6 3.8 10 w 3 d 6 3.9 10 w 4 d 6 4.0 10 w 5 d 6 4.1 10 w 5 d 6 4.2 10 w 6 d 6 4.3 11 w 0 d 6 4.4 11 w 0 d 6 4.5 11 w 1 d 6 4.6 11 w 2 d 6 4.7 11 w 2 d 6 4.8 11 w 3 d 6 4.9 11 w 4 d 6 5.0 11 w 4 d 6 5.1 11 w 5 d 6 5.2 11 w 5 d 6 5.3 11 w 6 d 6 5.4 12 w 0 d 6 5.5 12 w 0 d 6 5.6 12 w 1 d 6 5.7 12 w 1 d 6 5.8 12 w 2 d 6 5.9 12 w 3 d 6 6.0 12 w 3 d 6 6.1 12 w 4 d 6 6.2 12 w 4 d 6 6.3 12 w 5 d 6 6.4 12 w 5 d 6 6.5 12 w 6 d 6 6.6 12 w 6 d 6 6.7 13 w 0 d 6 6.8 13 w 0 d 6 6.9 13 w 1 d 6 7.0 13 w 1 d 6 7.1 13 w 2 d 6 7.2 13 w 2 d 6 7.3 13 w 3 d 6 7.4 13 w 3 d 6 7.5 13 w 4 d 6 7.6 13 w 4 d 6 7.7 13 w 4 d 6 7.8 13 w 5 d 6	cm w d sday 0.3 6 w 6 d 8 0.4 7 w 1 d 8 0.5 7 w 3 d 8 0.6 7 w 5 d 8 0.7 8 w 0 d 8 0.8 8 w 2 d 8 0.9 8 w 4 d 8 1.0 8 w 6 d 8 1.1 9 w 1 d 8 1.2 9 w 3 d 8 1.3 9 w 5 d 8 1.4 10 w 0 d 8 1.5 10 w 2 d 8 1.6 10 w 4 d 8 1.7 10 w 6 d 8 1.8 11 w 1 d 8 1.9 11 w 3 d 8 2.0 11 w 5 d 8 2.1 12 w 0 d 8 2.2 12 w 2 d 8 2.3 12 w 4 d 8 2.4 12 w 6 d 8 2.5 13 w 1 d 8 2.6 13 w 3 d 8 2.7 13 w 5 d 8	

Reference

Biometrie in der Fruhgraviditat (1.Trmenon)

Der Frauenarzt, 32, 4/1991

Chitkara U et al

Author's Name	Chitkara U et al	Chitkara U et al		
Measurement	TC	TL		
Data interval	1.0 week	1.0 week		
Data Form	10 - 90% ile	10 - 90% ile		
Method	Ellipse-Circ	Caliper		
Range of Data	16 - 40 weeks	16 - 40 weeks		

Author's Name	Chitkara U et al	Chitkara U et al																																																																																																																																																																																																																		
	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>16.0</td><td>7.00</td><td>9.10</td><td>11.30</td></tr><tr><td>17.0</td><td>7.90</td><td>10.00</td><td>12.20</td></tr><tr><td>18.0</td><td>8.80</td><td>11.00</td><td>13.10</td></tr><tr><td>19.0</td><td>9.70</td><td>11.90</td><td>14.00</td></tr><tr><td>20.0</td><td>10.60</td><td>12.80</td><td>15.00</td></tr><tr><td>21.0</td><td>11.60</td><td>13.70</td><td>15.80</td></tr><tr><td>22.0</td><td>12.50</td><td>14.60</td><td>16.70</td></tr><tr><td>23.0</td><td>13.40</td><td>15.50</td><td>17.60</td></tr><tr><td>24.0</td><td>14.30</td><td>16.40</td><td>18.50</td></tr><tr><td>25.0</td><td>15.20</td><td>17.30</td><td>19.40</td></tr><tr><td>26.0</td><td>16.10</td><td>18.20</td><td>20.30</td></tr><tr><td>27.0</td><td>17.00</td><td>19.10</td><td>21.30</td></tr><tr><td>28.0</td><td>17.90</td><td>20.00</td><td>22.20</td></tr><tr><td>29.0</td><td>18.80</td><td>21.00</td><td>23.10</td></tr><tr><td>30.0</td><td>19.70</td><td>21.90</td><td>24.00</td></tr><tr><td>31.0</td><td>20.60</td><td>22.80</td><td>24.90</td></tr><tr><td>32.0</td><td>21.50</td><td>23.70</td><td>25.80</td></tr><tr><td>33.0</td><td>22.50</td><td>24.60</td><td>26.70</td></tr><tr><td>34.0</td><td>23.40</td><td>25.50</td><td>27.60</td></tr><tr><td>35.0</td><td>24.30</td><td>26.40</td><td>28.50</td></tr><tr><td>36.0</td><td>25.20</td><td>27.30</td><td>29.40</td></tr><tr><td>37.0</td><td>26.10</td><td>28.20</td><td>30.30</td></tr><tr><td>38.0</td><td>27.00</td><td>29.10</td><td>31.20</td></tr><tr><td>39.0</td><td>27.90</td><td>30.00</td><td>32.20</td></tr><tr><td>40.0</td><td>28.80</td><td>30.90</td><td>33.10</td></tr></table>	wk	10%	50%	90%	16.0	7.00	9.10	11.30	17.0	7.90	10.00	12.20	18.0	8.80	11.00	13.10	19.0	9.70	11.90	14.00	20.0	10.60	12.80	15.00	21.0	11.60	13.70	15.80	22.0	12.50	14.60	16.70	23.0	13.40	15.50	17.60	24.0	14.30	16.40	18.50	25.0	15.20	17.30	19.40	26.0	16.10	18.20	20.30	27.0	17.00	19.10	21.30	28.0	17.90	20.00	22.20	29.0	18.80	21.00	23.10	30.0	19.70	21.90	24.00	31.0	20.60	22.80	24.90	32.0	21.50	23.70	25.80	33.0	22.50	24.60	26.70	34.0	23.40	25.50	27.60	35.0	24.30	26.40	28.50	36.0	25.20	27.30	29.40	37.0	26.10	28.20	30.30	38.0	27.00	29.10	31.20	39.0	27.90	30.00	32.20	40.0	28.80	30.90	33.10	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>16.0</td><td>1.30</td><td>2.00</td><td>2.80</td></tr><tr><td>17.0</td><td>1.50</td><td>2.20</td><td>3.00</td></tr><tr><td>18.0</td><td>1.70</td><td>2.40</td><td>3.20</td></tr><tr><td>19.0</td><td>1.80</td><td>2.70</td><td>3.40</td></tr><tr><td>20.0</td><td>2.00</td><td>2.80</td><td>3.60</td></tr><tr><td>21.0</td><td>2.20</td><td>3.00</td><td>3.70</td></tr><tr><td>22.0</td><td>2.40</td><td>3.20</td><td>3.90</td></tr><tr><td>23.0</td><td>2.60</td><td>3.40</td><td>4.10</td></tr><tr><td>24.0</td><td>2.80</td><td>3.50</td><td>4.30</td></tr><tr><td>25.0</td><td>3.00</td><td>3.70</td><td>4.50</td></tr><tr><td>26.0</td><td>3.20</td><td>3.90</td><td>4.70</td></tr><tr><td>27.0</td><td>3.30</td><td>4.10</td><td>4.90</td></tr><tr><td>28.0</td><td>3.50</td><td>4.30</td><td>5.00</td></tr><tr><td>29.0</td><td>3.70</td><td>4.50</td><td>5.20</td></tr><tr><td>30.0</td><td>3.90</td><td>4.70</td><td>5.40</td></tr><tr><td>31.0</td><td>4.10</td><td>4.90</td><td>5.60</td></tr><tr><td>32.0</td><td>4.30</td><td>5.00</td><td>5.80</td></tr><tr><td>33.0</td><td>4.50</td><td>5.20</td><td>6.00</td></tr><tr><td>34.0</td><td>4.70</td><td>5.40</td><td>6.20</td></tr><tr><td>35.0</td><td>4.80</td><td>5.60</td><td>6.40</td></tr><tr><td>36.0</td><td>5.00</td><td>5.80</td><td>6.60</td></tr><tr><td>37.0</td><td>5.20</td><td>6.00</td><td>6.70</td></tr><tr><td>38.0</td><td>5.40</td><td>6.20</td><td>6.90</td></tr><tr><td>39.0</td><td>5.60</td><td>6.40</td><td>7.10</td></tr><tr><td>40.0</td><td>5.80</td><td>6.60</td><td>7.30</td></tr></table>	wk	10%	50%	90%	16.0	1.30	2.00	2.80	17.0	1.50	2.20	3.00	18.0	1.70	2.40	3.20	19.0	1.80	2.70	3.40	20.0	2.00	2.80	3.60	21.0	2.20	3.00	3.70	22.0	2.40	3.20	3.90	23.0	2.60	3.40	4.10	24.0	2.80	3.50	4.30	25.0	3.00	3.70	4.50	26.0	3.20	3.90	4.70	27.0	3.30	4.10	4.90	28.0	3.50	4.30	5.00	29.0	3.70	4.50	5.20	30.0	3.90	4.70	5.40	31.0	4.10	4.90	5.60	32.0	4.30	5.00	5.80	33.0	4.50	5.20	6.00	34.0	4.70	5.40	6.20	35.0	4.80	5.60	6.40	36.0	5.00	5.80	6.60	37.0	5.20	6.00	6.70	38.0	5.40	6.20	6.90	39.0	5.60	6.40	7.10	40.0	5.80	6.60	7.30		
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Reference

Chitkara U., Rosenberg J., Chervenak F. A., Berkowitz G. S., Levine R., Fagerstrom R. M., Walker B., Berkowitz R. L., "Prenatal sonographic assessment of the fetal thorax: normal values," American Journal of Obstetrics and Gynecology, 156 (5): 1069-1074, May 1987
Table 2

Kurtz

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Reference

Alfred B. Kurtz, Ronald J. Wapner, Robert J. Kurtz, D. David Dershaw, Carl S. Rubin, Catherine Cole-Beuglet and Barry B. Goldberg, "Analysis of biparietal diameter as an accurate indicator of gestational age," Journal of Clinical Ultrasound, 8(4): 319-326, August 1980

Sabbagha

Author's Name	Sabbagha
Measurement	BPD
Data interval	0.1 cm
Data Form	Measurement $\pm$ Day
Method	Caliper

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Reference

Sabbagha R. E., Barton F. B., Barton B. A., "Sonar biparietal diameter. I. Analysis of percentile growth differences in two normal populations using same methodology.," American Journal of Obstetrics and Gynecology, 126 (4): 479-484, October 1976

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Reference

Hill L.M., Guzick D., Fries J., Hixson J., Rivello D., "The transverse cerebellar diameter in estimating gestational age in the large for gestational age fetus," Obstetrics and Gynecology, 75(6): 981-985, June 1990

Goldstein

Author's Name	Goldstein	Goldstein
Measurement	CD ¹⁾	EES ²⁾
Data interval	1.0 week	1 mm
Data Form	10 - 90% ile	Measurement $\pm$ Day
Method	Caliper	Caliper
Range of Data	15 - 39 weeks	1 - 25 mm

Author's Name	Goldstein	Goldstein																																																																																																																																																																																																																
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Table 1

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Figure 3

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Reference

Hellman L. M., Kobayashi M., Fillisti L., Lavenhar M., Cromb E., "Growth and development of the human fetus prior to the twentieth week of gestation," American Journal of Obstetrics and Gynecology, 103(6): 789-800, March 1969

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Reference

Daya S., "Accuracy of gestational age estimation by means of fetal crown-rump length measurement," American Journal of Obstetrics and Gynecology, 168(3 Pt1): 903-908, March 1993

Table Data: 9 [Dating Format]

Nelson

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9.0	15	0	d																																																																																																																																																																						

Reference

Nelson L. H., "Comparison of methods for determining crown-rump measurement by real-time ultrasound," Journal of Clinical Ultrasound, 9(2): 67-70, February 1981

Table Data: 9 [Dating Format]

Hohler

Author's Name	Hohler
Measurement	FL
Data interval	0.1 cm
Data Form	Measurement $\pm$ Day
Method	Caliper
Range of Data	1.0 - 8.0 cm

Author's Name	Hohler																																																																																																																																																																																																																																																																																																				
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Reference

Hohler C. W., Quetel T. A., "Fetal femur length: equations for computer calculation of gestational age from ultrasound measurements," American Journal of Obstetrics and Gynecology, 143(4): 479-481, June 1982

O'Brien

Author's Name	O'Brien																																																																																				
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Reference

O'Brien G.D., Queenan J.T., Campbell S., "Assessment of gestational age in the second trimester by real-time ultrasound measurement of the femur length," American Journal of Obstetrics and Gynecology, 139(5): 540-545, March 1981

Warda

Author's Name	Warda
Measurement	FL
Data interval	0.2 cm

Author's Name	Warda																																																																																																																																																				
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Reference

Warda A. H., Deter R.L., Rossavik I.K., Carpenter R.J., Hadlock F.P., "Fetal femur length: a critical reevaluation of the relationship to menstrual age," Obstetrics and Gynecology, 66(1): 69-75, July 1985

Chitty

Author's Name	Chitty	Chitty	Chitty	Chitty																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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	27.0	233.5	252.7	271.9	28.0	242.9	262.5	282.1	29.0	251.9	271.8	291.9	30.0	260.3	280.7	301.2	31.0	268.3	289.2	310.2	32.0	275.9	297.3	318.7	33.0	283.1	304.9	326.7	34.0	289.8	312.0	334.3	35.0	296.0	318.7	341.3	36.0	301.7	324.8	347.9	37.0	306.9	330.4	354.0	38.0	311.5	335.5	359.5	39.0	315.6	340.0	364.5	40.0	319.2	344.0	369.9	41.0	322.1	347.4	372.7	42.0	324.5	350.3	376.0	<table><tr><th>wk</th><th>3%</th><th>50%</th><th>97%</th></tr><tr><td>12.0</td><td>48.0</td><td>55.8</td><td>63.6</td></tr><tr><td>13.0</td><td>58.5</td><td>67.4</td><td>76.3</td></tr><tr><td>14.0</td><td>68.8</td><td>78.9</td><td>88.9</td></tr><tr><td>15.0</td><td>79.1</td><td>90.3</td><td>101.5</td></tr><tr><td>16.0</td><td>89.3</td><td>101.6</td><td>113.9</td></tr><tr><td>17.0</td><td>99.5</td><td>112.9</td><td>126.4</td></tr><tr><td>18.0</td><td>109.5</td><td>124.1</td><td>138.7</td></tr><tr><td>19.0</td><td>119.5</td><td>135.2</td><td>150.9</td></tr><tr><td>20.0</td><td>129.4</td><td>146.2</td><td>163.1</td></tr><tr><td>21.0</td><td>139.2</td><td>157.1</td><td>175.1</td></tr><tr><td>22.0</td><td>148.9</td><td>168.0</td><td>187.1</td></tr><tr><td>23.0</td><td>158.5</td><td>178.7</td><td>198.9</td></tr><tr><td>24.0</td><td>167.9</td><td>189.3</td><td>210.7</td></tr><tr><td>25.0</td><td>177.3</td><td>199.8</td><td>222.3</td></tr><tr><td>26.0</td><td>186.6</td><td>210.2</td><td>233.8</td></tr><tr><td>27.0</td><td>195.7</td><td>220.4</td><td>245.2</td></tr><tr><td>28.0</td><td>204.7</td><td>230.6</td><td>256.4</td></tr><tr><td>29.0</td><td>213.5</td><td>240.5</td><td>267.6</td></tr><tr><td>30.0</td><td>222.3</td><td>250.4</td><td>278.6</td></tr><tr><td>31.0</td><td>230.8</td><td>260.1</td><td>289.4</td></tr><tr><td>32.0</td><td>239.3</td><td>269.7</td><td>300.1</td></tr><tr><td>33.0</td><td>247.6</td><td>279.1</td><td>310.6</td></tr><tr><td>34.0</td><td>255.7</td><td>288.4</td><td>321.0</td></tr><tr><td>35.0</td><td>263.7</td><td>297.5</td><td>331.3</td></tr><tr><td>36.0</td><td>271.5</td><td>306.4</td><td>341.3</td></tr><tr><td>37.0</td><td>279.1</td><td>315.1</td><td>351.2</td></tr><tr><td>38.0</td><td>286.5</td><td>323.7</td><td>360.9</td></tr><tr><td>39.0</td><td>293.8</td><td>332.1</td><td>370.5</td></tr><tr><td>40.0</td><td>300.9</td><td>340.4</td><td>379.8</td></tr><tr><td>41.0</td><td>307.8</td><td>348.4</td><td>389.0</td></tr><tr><td>42.0</td><td>314.5</td><td>356.2</td><td>398.0</td></tr></table>	wk	3%	50%	97%	12.0	48.0	55.8	63.6	13.0	58.5	67.4	76.3	14.0	68.8	78.9	88.9	15.0	79.1	90.3	101.5	16.0	89.3	101.6	113.9	17.0	99.5	112.9	126.4	18.0	109.5	124.1	138.7	19.0	119.5	135.2	150.9	20.0	129.4	146.2	163.1	21.0	139.2	157.1	175.1	22.0	148.9	168.0	187.1	23.0	158.5	178.7	198.9	24.0	167.9	189.3	210.7	25.0	177.3	199.8	222.3	26.0	186.6	210.2	233.8	27.0	195.7	220.4	245.2	28.0	204.7	230.6	256.4	29.0	213.5	240.5	267.6	30.0	222.3	250.4	278.6	31.0	230.8	260.1	289.4	32.0	239.3	269.7	300.1	33.0	247.6	279.1	310.6	34.0	255.7	288.4	321.0	35.0	263.7	297.5	331.3	36.0	271.5	306.4	341.3	37.0	279.1	315.1	351.2	38.0	286.5	323.7	360.9	39.0	293.8	332.1	370.5	40.0	300.9	340.4	379.8	41.0	307.8	348.4	389.0	42.0	314.5	356.2	398.0	<table><tr><th>wk</th><th>3%</th><th>50%</th><th>97%</th></tr><tr><td>12.0</td><td>4.4</td><td>7.7</td><td>11.1</td></tr><tr><td>13.0</td><td>7.5</td><td>10.9</td><td>14.4</td></tr><tr><td>14.0</td><td>10.6</td><td>14.1</td><td>17.6</td></tr><tr><td>15.0</td><td>13.6</td><td>17.2</td><td>20.8</td></tr><tr><td>16.0</td><td>16.5</td><td>20.3</td><td>24.0</td></tr><tr><td>17.0</td><td>19.4</td><td>23.3</td><td>27.2</td></tr><tr><td>18.0</td><td>22.3</td><td>26.3</td><td>30.2</td></tr><tr><td>19.0</td><td>25.1</td><td>29.2</td><td>33.3</td></tr><tr><td>20.0</td><td>27.9</td><td>32.1</td><td>36.3</td></tr><tr><td>21.0</td><td>30.6</td><td>34.9</td><td>39.2</td></tr><tr><td>22.0</td><td>33.2</td><td>37.6</td><td>42.0</td></tr><tr><td>23.0</td><td>35.8</td><td>40.3</td><td>44.8</td></tr><tr><td>24.0</td><td>38.3</td><td>42.9</td><td>47.6</td></tr><tr><td>25.0</td><td>40.8</td><td>45.5</td><td>50.2</td></tr><tr><td>26.0</td><td>43.1</td><td>48.0</td><td>52.8</td></tr><tr><td>27.0</td><td>45.4</td><td>50.4</td><td>55.3</td></tr><tr><td>28.0</td><td>47.6</td><td>52.7</td><td>57.8</td></tr><tr><td>29.0</td><td>49.8</td><td>55.0</td><td>60.1</td></tr><tr><td>30.0</td><td>51.8</td><td>57.1</td><td>62.4</td></tr><tr><td>31.0</td><td>53.8</td><td>59.2</td><td>64.6</td></tr><tr><td>32.0</td><td>55.7</td><td>61.2</td><td>66.7</td></tr><tr><td>33.0</td><td>57.5</td><td>63.1</td><td>68.7</td></tr><tr><td>34.0</td><td>59.2</td><td>64.9</td><td>70.6</td></tr><tr><td>35.0</td><td>60.8</td><td>66.6</td><td>72.4</td></tr><tr><td>36.0</td><td>62.3</td><td>68.2</td><td>74.1</td></tr><tr><td>37.0</td><td>63.7</td><td>69.7</td><td>75.8</td></tr><tr><td>38.0</td><td>64.9</td><td>71.1</td><td>77.3</td></tr><tr><td>39.0</td><td>66.1</td><td>72.4</td><td>78.7</td></tr><tr><td>40.0</td><td>67.2</td><td>73.6</td><td>79.9</td></tr><tr><td>41.0</td><td>68.1</td><td>74.6</td><td>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Reference

- Chitty L. S., Altman D. G., Henderson A., Campbell S., "Charts of fetal size: 2. Head measurements," Brithish Journal of Obstetrics and Gynecology, 101(1): 35-43, January 1994



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1.5SD	10.0	12.6	3.5	11.0	15.9	3.6	12.0	19.3	3.6	13.0	22.7	3.7	14.0	26.1	3.8	15.0	29.5	3.9	16.0	32.8	4.0	17.0	36.3	4.0	18.0	39.6	4.1	19.0	43.0	4.2	20.0	46.2	4.3	21.0	49.5	4.4	22.0	52.6	4.5	23.0	55.7	4.6	24.0	58.8	4.6	25.0	61.7	4.7	26.0	64.6	4.8	27.0	67.4	4.9	28.0	70.1	5.0	29.0	72.6	5.1	30.0	75.1	5.1	31.0	77.4	5.2	32.0	79.6	5.3	33.0	81.7	5.4	34.0	83.6	5.5	35.0	85.3	5.5	36.0	86.9	5.6	37.0	88.3	5.7	38.0	89.6	5.8	39.0	90.6	5.9	40.0	91.5	5.9	41.0	92.2	6.1	42.0	92.6	6.1	<table><tr><th>wk</th><th>cm</th><th>$\pm$1.5SD</th></tr><tr><td>16.0</td><td>10.40</td><td>1.40</td></tr><tr><td>17.0</td><td>11.40</td><td>1.50</td></tr><tr><td>18.0</td><td>12.50</td><td>1.60</td></tr><tr><td>19.0</td><td>13.50</td><td>1.70</td></tr><tr><td>20.0</td><td>14.50</td><td>1.70</td></tr><tr><td>21.0</td><td>15.50</td><td>1.80</td></tr><tr><td>22.0</td><td>16.50</td><td>1.90</td></tr><tr><td>23.0</td><td>17.50</td><td>2.00</td></tr><tr><td>24.0</td><td>18.50</td><td>2.00</td></tr><tr><td>25.0</td><td>19.50</td><td>2.10</td></tr><tr><td>26.0</td><td>20.50</td><td>2.20</td></tr><tr><td>27.0</td><td>21.40</td><td>2.20</td></tr><tr><td>28.0</td><td>22.40</td><td>2.30</td></tr><tr><td>29.0</td><td>23.30</td><td>2.40</td></tr><tr><td>30.0</td><td>24.20</td><td>2.40</td></tr><tr><td>31.0</td><td>25.10</td><td>2.50</td></tr><tr><td>32.0</td><td>25.90</td><td>2.60</td></tr><tr><td>33.0</td><td>26.80</td><td>2.60</td></tr><tr><td>34.0</td><td>27.60</td><td>2.70</td></tr><tr><td>35.0</td><td>28.40</td><td>2.80</td></tr><tr><td>36.0</td><td>29.20</td><td>2.90</td></tr><tr><td>37.0</td><td>29.90</td><td>2.90</td></tr><tr><td>38.0</td><td>30.60</td><td>3.00</td></tr><tr><td>39.0</td><td>31.30</td><td>3.10</td></tr><tr><td>40.0</td><td>31.90</td><td>3.20</td></tr><tr><td>41.0</td><td>32.50</td><td>3.20</td></tr><tr><td>42.0</td><td>33.10</td><td>3.30</td></tr></table>	wk	cm	$\pm$ 1.5SD	16.0	10.40	1.40	17.0	11.40	1.50	18.0	12.50	1.60	19.0	13.50	1.70	20.0	14.50	1.70	21.0	15.50	1.80	22.0	16.50	1.90	23.0	17.50	2.00	24.0	18.50	2.00	25.0	19.50	2.10	26.0	20.50	2.20	27.0	21.40	2.20	28.0	22.40	2.30	29.0	23.30	2.40	30.0	24.20	2.40	31.0	25.10	2.50	32.0	25.90	2.60	33.0	26.80	2.60	34.0	27.60	2.70	35.0	28.40	2.80	36.0	29.20	2.90	37.0	29.90	2.90	38.0	30.60	3.00	39.0	31.30	3.10	40.0	31.90	3.20	41.0	32.50	3.20	42.0	33.10	3.30	<table><tr><th>wk</th><th>mm</th><th>$\pm$1.5SD</th></tr><tr><td>16.0</td><td>20.1</td><td>4.0</td></tr><tr><td>17.0</td><td>22.7</td><td>4.0</td></tr><tr><td>18.0</td><td>25.3</td><td>4.1</td></tr><tr><td>19.0</td><td>27.8</td><td>4.1</td></tr><tr><td>20.0</td><td>30.4</td><td>4.2</td></tr><tr><td>21.0</td><td>32.9</td><td>4.2</td></tr><tr><td>22.0</td><td>35.4</td><td>4.3</td></tr><tr><td>23.0</td><td>37.9</td><td>4.4</td></tr><tr><td>24.0</td><td>40.3</td><td>4.4</td></tr><tr><td>25.0</td><td>42.7</td><td>4.4</td></tr><tr><td>26.0</td><td>45.0</td><td>4.5</td></tr><tr><td>27.0</td><td>47.3</td><td>4.5</td></tr><tr><td>28.0</td><td>49.6</td><td>4.6</td></tr><tr><td>29.0</td><td>51.7</td><td>4.6</td></tr><tr><td>30.0</td><td>53.8</td><td>4.7</td></tr><tr><td>31.0</td><td>55.8</td><td>4.8</td></tr><tr><td>32.0</td><td>57.8</td><td>4.8</td></tr><tr><td>33.0</td><td>59.6</td><td>4.8</td></tr><tr><td>34.0</td><td>61.4</td><td>4.9</td></tr><tr><td>35.0</td><td>63.0</td><td>5.0</td></tr><tr><td>36.0</td><td>64.6</td><td>5.0</td></tr><tr><td>37.0</td><td>66.0</td><td>5.1</td></tr><tr><td>38.0</td><td>67.4</td><td>5.1</td></tr><tr><td>39.0</td><td>68.6</td><td>5.2</td></tr><tr><td>40.0</td><td>69.6</td><td>5.2</td></tr><tr><td>41.0</td><td>70.6</td><td>5.2</td></tr><tr><td>42.0</td><td>71.4</td><td>5.3</td></tr></table>	wk	mm	$\pm$ 1.5SD	16.0	20.1	4.0	17.0	22.7	4.0	18.0	25.3	4.1	19.0	27.8	4.1	20.0	30.4	4.2	21.0	32.9	4.2	22.0	35.4	4.3	23.0	37.9	4.4	24.0	40.3	4.4	25.0	42.7	4.4	26.0	45.0	4.5	27.0	47.3	4.5	28.0	49.6	4.6	29.0	51.7	4.6	30.0	53.8	4.7	31.0	55.8	4.8	32.0	57.8	4.8	33.0	59.6	4.8	34.0	61.4	4.9	35.0	63.0	5.0	36.0	64.6	5.0	37.0	66.0	5.1	38.0	67.4	5.1	39.0	68.6	5.2	40.0	69.6	5.2	41.0	70.6	5.2	42.0	71.4	5.3
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23.0	55.7	4.6																																																																																																																																																																																																																																																																																																																																																								
24.0	58.8	4.6																																																																																																																																																																																																																																																																																																																																																								
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26.0	64.6	4.8																																																																																																																																																																																																																																																																																																																																																								
27.0	67.4	4.9																																																																																																																																																																																																																																																																																																																																																								
28.0	70.1	5.0																																																																																																																																																																																																																																																																																																																																																								
29.0	72.6	5.1																																																																																																																																																																																																																																																																																																																																																								
30.0	75.1	5.1																																																																																																																																																																																																																																																																																																																																																								
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34.0	83.6	5.5																																																																																																																																																																																																																																																																																																																																																								
35.0	85.3	5.5																																																																																																																																																																																																																																																																																																																																																								
36.0	86.9	5.6																																																																																																																																																																																																																																																																																																																																																								
37.0	88.3	5.7																																																																																																																																																																																																																																																																																																																																																								
38.0	89.6	5.8																																																																																																																																																																																																																																																																																																																																																								
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16.0	10.40	1.40																																																																																																																																																																																																																																																																																																																																																								
17.0	11.40	1.50																																																																																																																																																																																																																																																																																																																																																								
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23.0	17.50	2.00																																																																																																																																																																																																																																																																																																																																																								
24.0	18.50	2.00																																																																																																																																																																																																																																																																																																																																																								
25.0	19.50	2.10																																																																																																																																																																																																																																																																																																																																																								
26.0	20.50	2.20																																																																																																																																																																																																																																																																																																																																																								
27.0	21.40	2.20																																																																																																																																																																																																																																																																																																																																																								
28.0	22.40	2.30																																																																																																																																																																																																																																																																																																																																																								
29.0	23.30	2.40																																																																																																																																																																																																																																																																																																																																																								
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23.0	37.9	4.4																																																																																																																																																																																																																																																																																																																																																								
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25.0	42.7	4.4																																																																																																																																																																																																																																																																																																																																																								
26.0	45.0	4.5																																																																																																																																																																																																																																																																																																																																																								
27.0	47.3	4.5																																																																																																																																																																																																																																																																																																																																																								
28.0	49.6	4.6																																																																																																																																																																																																																																																																																																																																																								
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42.0	71.4	5.3																																																																																																																																																																																																																																																																																																																																																								

Reference

"Regarding the Publication of Standardization of Ultrasonic Biometry and Standard Values of Japanese", J Med Ultrasonics, 30 (3): 415-440, 2003

Sonek

Author's Name	Sonek			
Measurement	NBL			
Data interval	1.0 week			
Data Form	5 - 95%ile			
Method	Caliper			
Range of Data	11 - 40 weeks			

Author's Name	Sonek																																																																																																																															
	<table><tr><th>wk</th><th>5%</th><th>50%</th><th>95%</th></tr><tr><td>11.0</td><td>1.4</td><td>2.3</td><td>3.3</td></tr><tr><td>12.0</td><td>1.8</td><td>2.8</td><td>4.2</td></tr><tr><td>13.0</td><td>2.3</td><td>3.1</td><td>4.8</td></tr><tr><td>14.0</td><td>2.5</td><td>3.8</td><td>5.3</td></tr><tr><td>15.0</td><td>3.0</td><td>4.3</td><td>5.7</td></tr><tr><td>16.0</td><td>3.4</td><td>4.7</td><td>6.2</td></tr><tr><td>17.0</td><td>4.0</td><td>5.3</td><td>6.6</td></tr><tr><td>18.0</td><td>4.3</td><td>5.7</td><td>7.0</td></tr><tr><td>19.0</td><td>5.0</td><td>6.3</td><td>7.9</td></tr><tr><td>20.0</td><td>5.2</td><td>6.7</td><td>8.3</td></tr><tr><td>21.0</td><td>5.6</td><td>7.1</td><td>9.0</td></tr><tr><td>22.0</td><td>5.8</td><td>7.5</td><td>9.3</td></tr><tr><td>23.0</td><td>6.4</td><td>7.9</td><td>9.6</td></tr><tr><td>24.0</td><td>6.8</td><td>8.3</td><td>10.0</td></tr><tr><td>25.0</td><td>6.5</td><td>8.5</td><td>10.7</td></tr><tr><td>26.0</td><td>7.4</td><td>8.9</td><td>10.9</td></tr><tr><td>27.0</td><td>7.5</td><td>9.2</td><td>11.3</td></tr><tr><td>28.0</td><td>7.6</td><td>9.8</td><td>12.1</td></tr><tr><td>29.0</td><td>7.7</td><td>9.8</td><td>11.8</td></tr><tr><td>30.0</td><td>7.8</td><td>10.0</td><td>12.6</td></tr><tr><td>31.0</td><td>8.2</td><td>10.4</td><td>12.6</td></tr><tr><td>32.0</td><td>8.6</td><td>10.5</td><td>13.6</td></tr><tr><td>33.0</td><td>8.7</td><td>10.8</td><td>12.8</td></tr><tr><td>34.0</td><td>9.1</td><td>10.9</td><td>12.8</td></tr><tr><td>35.0</td><td>8.5</td><td>11.0</td><td>14.1</td></tr><tr><td>36.0</td><td>7.9</td><td>10.9</td><td>12.8</td></tr><tr><td>37.0</td><td>8.7</td><td>11.4</td><td>14.5</td></tr><tr><td>38.0</td><td>9.3</td><td>11.7</td><td>15.7</td></tr><tr><td>39.0</td><td>9.2</td><td>10.9</td><td>14.0</td></tr><tr><td>40.0</td><td>10.4</td><td>12.1</td><td>14.5</td></tr></table>	wk	5%	50%	95%	11.0	1.4	2.3	3.3	12.0	1.8	2.8	4.2	13.0	2.3	3.1	4.8	14.0	2.5	3.8	5.3	15.0	3.0	4.3	5.7	16.0	3.4	4.7	6.2	17.0	4.0	5.3	6.6	18.0	4.3	5.7	7.0	19.0	5.0	6.3	7.9	20.0	5.2	6.7	8.3	21.0	5.6	7.1	9.0	22.0	5.8	7.5	9.3	23.0	6.4	7.9	9.6	24.0	6.8	8.3	10.0	25.0	6.5	8.5	10.7	26.0	7.4	8.9	10.9	27.0	7.5	9.2	11.3	28.0	7.6	9.8	12.1	29.0	7.7	9.8	11.8	30.0	7.8	10.0	12.6	31.0	8.2	10.4	12.6	32.0	8.6	10.5	13.6	33.0	8.7	10.8	12.8	34.0	9.1	10.9	12.8	35.0	8.5	11.0	14.1	36.0	7.9	10.9	12.8	37.0	8.7	11.4	14.5	38.0	9.3	11.7	15.7	39.0	9.2	10.9	14.0	40.0	10.4	12.1	14.5			
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Reference

Sonek J. D., McKenna D., Webb D., Croom C., Nicolaides K., "Nasal bone length throughout gestation: normal ranges based on 3537 fetal ultrasound measurements", *Ultrasound in Obstetrics and Gynecology*, 21(2): 152-155, February 2003

(2) FW growth table (Normal Range)

Author's Name	Brenner ¹⁾	Osaka U ²⁾	Hadlock ³⁾	Shinozuka ⁴⁾																																																																																																																																																																																																																																																																																																																																																																																													
FW Unit	gram	gram	gram	gram																																																																																																																																																																																																																																																																																																																																																																																													
Data interval	1.0 week	1.0 week	1.0 week	1.0 week																																																																																																																																																																																																																																																																																																																																																																																													
Data Form	10 - 90%ile	Week ± 1.5SD	10 - 90%ile	Week ± 1.5SD																																																																																																																																																																																																																																																																																																																																																																																													
Range of Data	21 - 44 weeks	16 - 40 weeks	10 - 40 weeks	18 - 41 weeks																																																																																																																																																																																																																																																																																																																																																																																													
	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>21.0</td><td>280</td><td>410</td><td>860</td></tr><tr><td>22.0</td><td>320</td><td>480</td><td>920</td></tr><tr><td>23.0</td><td>370</td><td>550</td><td>990</td></tr><tr><td>24.0</td><td>420</td><td>640</td><td>1080</td></tr><tr><td>25.0</td><td>490</td><td>740</td><td>1180</td></tr><tr><td>26.0</td><td>570</td><td>860</td><td>1320</td></tr><tr><td>27.0</td><td>660</td><td>990</td><td>1470</td></tr><tr><td>28.0</td><td>770</td><td>1150</td><td>1660</td></tr><tr><td>29.0</td><td>890</td><td>1310</td><td>1890</td></tr><tr><td>30.0</td><td>1030</td><td>1460</td><td>2100</td></tr><tr><td>31.0</td><td>1180</td><td>1630</td><td>2290</td></tr><tr><td>32.0</td><td>1310</td><td>1810</td><td>2500</td></tr><tr><td>33.0</td><td>1490</td><td>2010</td><td>2690</td></tr><tr><td>34.0</td><td>1670</td><td>2220</td><td>2880</td></tr><tr><td>35.0</td><td>1870</td><td>2430</td><td>3090</td></tr><tr><td>36.0</td><td>2190</td><td>2650</td><td>3290</td></tr><tr><td>37.0</td><td>2310</td><td>2870</td><td>3470</td></tr><tr><td>38.0</td><td>2510</td><td>3030</td><td>3610</td></tr><tr><td>39.0</td><td>2680</td><td>3170</td><td>3750</td></tr><tr><td>40.0</td><td>2750</td><td>3290</td><td>3870</td></tr><tr><td>41.0</td><td>2800</td><td>3360</td><td>3980</td></tr><tr><td>42.0</td><td>2830</td><td>3410</td><td>4060</td></tr><tr><td>43.0</td><td>2840</td><td>3420</td><td>4100</td></tr><tr><td>44.0</td><td>2790</td><td>3390</td><td>4110</td></tr></table>	wk	10%	50%	90%	21.0	280	410	860	22.0	320	480	920	23.0	370	550	990	24.0	420	640	1080	25.0	490	740	1180	26.0	570	860	1320	27.0	660	990	1470	28.0	770	1150	1660	29.0	890	1310	1890	30.0	1030	1460	2100	31.0	1180	1630	2290	32.0	1310	1810	2500	33.0	1490	2010	2690	34.0	1670	2220	2880	35.0	1870	2430	3090	36.0	2190	2650	3290	37.0	2310	2870	3470	38.0	2510	3030	3610	39.0	2680	3170	3750	40.0	2750	3290	3870	41.0	2800	3360	3980	42.0	2830	3410	4060	43.0	2840	3420	4100	44.0	2790	3390	4110	<table><tr><th>wk</th><th>gram</th><th>±1.5SD</th></tr><tr><td>16.0</td><td>137</td><td>43.50</td></tr><tr><td>17.0</td><td>178</td><td>46.50</td></tr><tr><td>18.0</td><td>223</td><td>52.50</td></tr><tr><td>19.0</td><td>290</td><td>63.00</td></tr><tr><td>20.0</td><td>347</td><td>75.00</td></tr><tr><td>21.0</td><td>425</td><td>90.00</td></tr><tr><td>22.0</td><td>512</td><td>106.50</td></tr><tr><td>23.0</td><td>611</td><td>124.50</td></tr><tr><td>24.0</td><td>720</td><td>144.00</td></tr><tr><td>25.0</td><td>839</td><td>165.00</td></tr><tr><td>26.0</td><td>968</td><td>187.50</td></tr><tr><td>27.0</td><td>1108</td><td>210.00</td></tr><tr><td>28.0</td><td>1253</td><td>232.50</td></tr><tr><td>29.0</td><td>1407</td><td>256.50</td></tr><tr><td>30.0</td><td>1568</td><td>282.00</td></tr><tr><td>31.0</td><td>1735</td><td>306.00</td></tr><tr><td>32.0</td><td>1906</td><td>333.00</td></tr><tr><td>33.0</td><td>2079</td><td>358.50</td></tr><tr><td>34.0</td><td>2254</td><td>385.50</td></tr><tr><td>35.0</td><td>2428</td><td>414.00</td></tr><tr><td>36.0</td><td>2600</td><td>444.00</td></tr><tr><td>37.0</td><td>2767</td><td>475.50</td></tr><tr><td>38.0</td><td>2928</td><td>508.50</td></tr><tr><td>39.0</td><td>3080</td><td>543.00</td></tr><tr><td>40.0</td><td>3220</td><td>580.50</td></tr></table>	wk	gram	±1.5SD	16.0	137	43.50	17.0	178	46.50	18.0	223	52.50	19.0	290	63.00	20.0	347	75.00	21.0	425	90.00	22.0	512	106.50	23.0	611	124.50	24.0	720	144.00	25.0	839	165.00	26.0	968	187.50	27.0	1108	210.00	28.0	1253	232.50	29.0	1407	256.50	30.0	1568	282.00	31.0	1735	306.00	32.0	1906	333.00	33.0	2079	358.50	34.0	2254	385.50	35.0	2428	414.00	36.0	2600	444.00	37.0	2767	475.50	38.0	2928	508.50	39.0	3080	543.00	40.0	3220	580.50	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>10.0</td><td>29</td><td>35</td><td>41</td></tr><tr><td>11.0</td><td>37</td><td>45</td><td>53</td></tr><tr><td>12.0</td><td>48</td><td>58</td><td>68</td></tr><tr><td>13.0</td><td>61</td><td>73</td><td>85</td></tr><tr><td>14.0</td><td>77</td><td>93</td><td>109</td></tr><tr><td>15.0</td><td>97</td><td>117</td><td>137</td></tr><tr><td>16.0</td><td>121</td><td>146</td><td>171</td></tr><tr><td>17.0</td><td>150</td><td>181</td><td>212</td></tr><tr><td>18.0</td><td>185</td><td>223</td><td>261</td></tr><tr><td>19.0</td><td>227</td><td>273</td><td>319</td></tr><tr><td>20.0</td><td>275</td><td>331</td><td>387</td></tr><tr><td>21.0</td><td>331</td><td>399</td><td>467</td></tr><tr><td>22.0</td><td>398</td><td>478</td><td>559</td></tr><tr><td>23.0</td><td>471</td><td>568</td><td>665</td></tr><tr><td>24.0</td><td>556</td><td>670</td><td>784</td></tr><tr><td>25.0</td><td>652</td><td>785</td><td>919</td></tr><tr><td>26.0</td><td>758</td><td>913</td><td>1068</td></tr><tr><td>27.0</td><td>876</td><td>1055</td><td>1234</td></tr><tr><td>28.0</td><td>1004</td><td>1210</td><td>1416</td></tr><tr><td>29.0</td><td>1145</td><td>1379</td><td>1613</td></tr><tr><td>30.0</td><td>1294</td><td>1559</td><td>1824</td></tr><tr><td>31.0</td><td>1453</td><td>1751</td><td>2049</td></tr><tr><td>32.0</td><td>1621</td><td>1953</td><td>2285</td></tr><tr><td>33.0</td><td>1794</td><td>2162</td><td>2530</td></tr><tr><td>34.0</td><td>1973</td><td>2377</td><td>2791</td></tr><tr><td>35.0</td><td>2154</td><td>2595</td><td>3036</td></tr><tr><td>36.0</td><td>2335</td><td>2813</td><td>3291</td></tr><tr><td>37.0</td><td>2513</td><td>3028</td><td>3543</td></tr><tr><td>38.0</td><td>2696</td><td>3235</td><td>3796</td></tr><tr><td>39.0</td><td>2851</td><td>3435</td><td>4019</td></tr><tr><td>40.0</td><td>3004</td><td>3619</td><td>4234</td></tr></table>	wk	10%	50%	90%	10.0	29	35	41	11.0	37	45	53	12.0	48	58	68	13.0	61	73	85	14.0	77	93	109	15.0	97	117	137	16.0	121	146	171	17.0	150	181	212	18.0	185	223	261	19.0	227	273	319	20.0	275	331	387	21.0	331	399	467	22.0	398	478	559	23.0	471	568	665	24.0	556	670	784	25.0	652	785	919	26.0	758	913	1068	27.0	876	1055	1234	28.0	1004	1210	1416	29.0	1145	1379	1613	30.0	1294	1559	1824	31.0	1453	1751	2049	32.0	1621	1953	2285	33.0	1794	2162	2530	34.0	1973	2377	2791	35.0	2154	2595	3036	36.0	2335	2813	3291	37.0	2513	3028	3543	38.0	2696	3235	3796	39.0	2851	3435	4019	40.0	3004	3619	4234	<table><tr><th>wk</th><th>gram</th><th>±1.5SD</th></tr><tr><td>18.0</td><td>188</td><td>45.00</td></tr><tr><td>19.0</td><td>247</td><td>61.00</td></tr><tr><td>20.0</td><td>312</td><td>77.00</td></tr><tr><td>21.0</td><td>384</td><td>94.00</td></tr><tr><td>22.0</td><td>464</td><td>112.00</td></tr><tr><td>23.0</td><td>552</td><td>130.00</td></tr><tr><td>24.0</td><td>650</td><td>149.00</td></tr><tr><td>25.0</td><td>757</td><td>169.00</td></tr><tr><td>26.0</td><td>873</td><td>189.00</td></tr><tr><td>27.0</td><td>999</td><td>211.00</td></tr><tr><td>28.0</td><td>1134</td><td>233.00</td></tr><tr><td>29.0</td><td>1277</td><td>255.00</td></tr><tr><td>30.0</td><td>1428</td><td>279.00</td></tr><tr><td>31.0</td><td>1584</td><td>303.00</td></tr><tr><td>32.0</td><td>1745</td><td>328.00</td></tr><tr><td>33.0</td><td>1910</td><td>354.00</td></tr><tr><td>34.0</td><td>2075</td><td>380.00</td></tr><tr><td>35.0</td><td>2239</td><td>407.00</td></tr><tr><td>36.0</td><td>2399</td><td>435.00</td></tr><tr><td>37.0</td><td>2554</td><td>463.00</td></tr><tr><td>38.0</td><td>2699</td><td>492.00</td></tr><tr><td>39.0</td><td>2832</td><td>522.00</td></tr><tr><td>40.0</td><td>2949</td><td>553.00</td></tr><tr><td>41.0</td><td>3047</td><td>584.00</td></tr></table>	wk	gram	±1.5SD	18.0	188	45.00	19.0	247	61.00	20.0	312	77.00	21.0	384	94.00	22.0	464	112.00	23.0	552	130.00	24.0	650	149.00	25.0	757	169.00	26.0	873	189.00	27.0	999	211.00	28.0	1134	233.00	29.0	1277	255.00	30.0	1428	279.00	31.0	1584	303.00	32.0	1745	328.00	33.0	1910	354.00	34.0	2075	380.00	35.0	2239	407.00	36.0	2399	435.00	37.0	2554	463.00	38.0	2699	492.00	39.0	2832	522.00	40.0	2949	553.00	41.0	3047	584.00
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Author's Name	Yarkoni (Twins) ⁵⁾	Doubilet ⁶⁾	JSUM'03 ⁷⁾	
FW Unit	gram	gram	gram	
Data interval	1.0 week	1.0 week	1.0 week	
Data Form	5 - 95%ile	10 - 90%ile	Week $\pm$ 1.5SD	
Range of Data	16 - 38 weeks	25 - 43 weeks	18 - 41 weeks	

Author's Name	Yarkoni (Twins) ⁵⁾	Doubilet ⁶⁾	JSUM'03 ⁷⁾																																																																																																																																																																																																																																																												
	<table><tr><th>wk</th><th>5%</th><th>50%</th><th>90%</th></tr><tr><td>16.0</td><td>132</td><td>154</td><td>207</td></tr><tr><td>17.0</td><td>173</td><td>215</td><td>249</td></tr><tr><td>18.0</td><td>214</td><td>276</td><td>291</td></tr><tr><td>19.0</td><td>223</td><td>300</td><td>412</td></tr><tr><td>20.0</td><td>232</td><td>324</td><td>534</td></tr><tr><td>21.0</td><td>275</td><td>432</td><td>705</td></tr><tr><td>22.0</td><td>319</td><td>540</td><td>876</td></tr><tr><td>23.0</td><td>347</td><td>588</td><td>880</td></tr><tr><td>24.0</td><td>376</td><td>655</td><td>895</td></tr><tr><td>25.0</td><td>549</td><td>793</td><td>1118</td></tr><tr><td>26.0</td><td>722</td><td>931</td><td>1352</td></tr><tr><td>27.0</td><td>755</td><td>1087</td><td>1563</td></tr><tr><td>28.0</td><td>789</td><td>1244</td><td>1774</td></tr><tr><td>29.0</td><td>900</td><td>1395</td><td>1883</td></tr><tr><td>30.0</td><td>1011</td><td>1546</td><td>1992</td></tr><tr><td>31.0</td><td>1198</td><td>1693</td><td>2382</td></tr><tr><td>32.0</td><td>1385</td><td>1840</td><td>2793</td></tr><tr><td>33.0</td><td>1491</td><td>2032</td><td>3000</td></tr><tr><td>34.0</td><td>1597</td><td>2234</td><td>3208</td></tr><tr><td>35.0</td><td>1703</td><td>2427</td><td>3336</td></tr><tr><td>36.0</td><td>1809</td><td>2631</td><td>3465</td></tr><tr><td>37.0</td><td>2238</td><td>2824</td><td>3679</td></tr><tr><td>38.0</td><td>2668</td><td>3017</td><td>3894</td></tr></table>	wk	5%	50%	90%	16.0	132	154	207	17.0	173	215	249	18.0	214	276	291	19.0	223	300	412	20.0	232	324	534	21.0	275	432	705	22.0	319	540	876	23.0	347	588	880	24.0	376	655	895	25.0	549	793	1118	26.0	722	931	1352	27.0	755	1087	1563	28.0	789	1244	1774	29.0	900	1395	1883	30.0	1011	1546	1992	31.0	1198	1693	2382	32.0	1385	1840	2793	33.0	1491	2032	3000	34.0	1597	2234	3208	35.0	1703	2427	3336	36.0	1809	2631	3465	37.0	2238	2824	3679	38.0	2668	3017	3894	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>25.0</td><td>490</td><td>660</td><td>889</td></tr><tr><td>26.0</td><td>568</td><td>780</td><td>1016</td></tr><tr><td>27.0</td><td>660</td><td>875</td><td>1160</td></tr><tr><td>28.0</td><td>765</td><td>1005</td><td>1322</td></tr><tr><td>29.0</td><td>894</td><td>1153</td><td>1504</td></tr><tr><td>30.0</td><td>1020</td><td>1319</td><td>1706</td></tr><tr><td>31.0</td><td>1171</td><td>1502</td><td>1928</td></tr><tr><td>32.0</td><td>1338</td><td>1702</td><td>2167</td></tr><tr><td>33.0</td><td>1519</td><td>1918</td><td>2421</td></tr><tr><td>34.0</td><td>1714</td><td>2146</td><td>2687</td></tr><tr><td>35.0</td><td>1919</td><td>2383</td><td>2958</td></tr><tr><td>36.0</td><td>2129</td><td>2622</td><td>3230</td></tr><tr><td>37.0</td><td>2340</td><td>2859</td><td>3493</td></tr><tr><td>38.0</td><td>2544</td><td>3093</td><td>3736</td></tr><tr><td>39.0</td><td>2735</td><td>3288</td><td>3952</td></tr><tr><td>40.0</td><td>2904</td><td>3482</td><td>4127</td></tr><tr><td>41.0</td><td>3042</td><td>3597</td><td>4254</td></tr><tr><td>42.0</td><td>3142</td><td>3685</td><td>4322</td></tr><tr><td>43.0</td><td>3195</td><td>3717</td><td>4324</td></tr></table>	wk	10%	50%	90%	25.0	490	660	889	26.0	568	780	1016	27.0	660	875	1160	28.0	765	1005	1322	29.0	894	1153	1504	30.0	1020	1319	1706	31.0	1171	1502	1928	32.0	1338	1702	2167	33.0	1519	1918	2421	34.0	1714	2146	2687	35.0	1919	2383	2958	36.0	2129	2622	3230	37.0	2340	2859	3493	38.0	2544	3093	3736	39.0	2735	3288	3952	40.0	2904	3482	4127	41.0	3042	3597	4254	42.0	3142	3685	4322	43.0	3195	3717	4324	<table><tr><th>wk</th><th>gram</th><th>±1.5SD</th></tr><tr><td>18.0</td><td>187</td><td>46.00</td></tr><tr><td>19.0</td><td>247</td><td>61.00</td></tr><tr><td>20.0</td><td>313</td><td>77.00</td></tr><tr><td>21.0</td><td>387</td><td>94.00</td></tr><tr><td>22.0</td><td>469</td><td>112.00</td></tr><tr><td>23.0</td><td>560</td><td>130.00</td></tr><tr><td>24.0</td><td>660</td><td>149.00</td></tr><tr><td>25.0</td><td>771</td><td>169.00</td></tr><tr><td>26.0</td><td>892</td><td>190.00</td></tr><tr><td>27.0</td><td>1023</td><td>211.00</td></tr><tr><td>28.0</td><td>1163</td><td>233.00</td></tr><tr><td>29.0</td><td>1313</td><td>256.00</td></tr><tr><td>30.0</td><td>1470</td><td>279.00</td></tr><tr><td>31.0</td><td>1635</td><td>303.00</td></tr><tr><td>32.0</td><td>1805</td><td>328.00</td></tr><tr><td>33.0</td><td>1980</td><td>354.00</td></tr><tr><td>34.0</td><td>2156</td><td>380.00</td></tr><tr><td>35.0</td><td>2333</td><td>407.00</td></tr><tr><td>36.0</td><td>2507</td><td>435.00</td></tr><tr><td>37.0</td><td>2676</td><td>463.00</td></tr><tr><td>38.0</td><td>2838</td><td>493.00</td></tr><tr><td>39.0</td><td>2999</td><td>523.00</td></tr><tr><td>40.0</td><td>3125</td><td>553.00</td></tr><tr><td>41.0</td><td>3244</td><td>584.00</td></tr></table>	wk	gram	±1.5SD	18.0	187	46.00	19.0	247	61.00	20.0	313	77.00	21.0	387	94.00	22.0	469	112.00	23.0	560	130.00	24.0	660	149.00	25.0	771	169.00	26.0	892	190.00	27.0	1023	211.00	28.0	1163	233.00	29.0	1313	256.00	30.0	1470	279.00	31.0	1635	303.00	32.0	1805	328.00	33.0	1980	354.00	34.0	2156	380.00	35.0	2333	407.00	36.0	2507	435.00	37.0	2676	463.00	38.0	2838	493.00	39.0	2999	523.00	40.0	3125	553.00	41.0	3244	584.00	
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19.0	247	61.00																																																																																																																																																																																																																																																													
20.0	313	77.00																																																																																																																																																																																																																																																													
21.0	387	94.00																																																																																																																																																																																																																																																													
22.0	469	112.00																																																																																																																																																																																																																																																													
23.0	560	130.00																																																																																																																																																																																																																																																													
24.0	660	149.00																																																																																																																																																																																																																																																													
25.0	771	169.00																																																																																																																																																																																																																																																													
26.0	892	190.00																																																																																																																																																																																																																																																													
27.0	1023	211.00																																																																																																																																																																																																																																																													
28.0	1163	233.00																																																																																																																																																																																																																																																													
29.0	1313	256.00																																																																																																																																																																																																																																																													
30.0	1470	279.00																																																																																																																																																																																																																																																													
31.0	1635	303.00																																																																																																																																																																																																																																																													
32.0	1805	328.00																																																																																																																																																																																																																																																													
33.0	1980	354.00																																																																																																																																																																																																																																																													
34.0	2156	380.00																																																																																																																																																																																																																																																													
35.0	2333	407.00																																																																																																																																																																																																																																																													
36.0	2507	435.00																																																																																																																																																																																																																																																													
37.0	2676	463.00																																																																																																																																																																																																																																																													
38.0	2838	493.00																																																																																																																																																																																																																																																													
39.0	2999	523.00																																																																																																																																																																																																																																																													
40.0	3125	553.00																																																																																																																																																																																																																																																													
41.0	3244	584.00																																																																																																																																																																																																																																																													

Reference:

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(3) Interval Growth Rate Table

Author's Name	Levon N	Levon N	Levon N	Levon N																																																																																																																																																																																																																																																																																																																																																
Measurement Label	BPD	Average AD	FL	AC																																																																																																																																																																																																																																																																																																																																																
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Data Form	10 - 90%ile	10 - 90%ile	10 - 90%ile	10 - 90%ile																																																																																																																																																																																																																																																																																																																																																
Range of Data	17 - 36 weeks	17 - 36 weeks	17 - 36 weeks	17 - 36 weeks																																																																																																																																																																																																																																																																																																																																																
(4 weeks)	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>17.0</td><td>2.5</td><td>3.5</td><td>4.4</td></tr><tr><td>18.0</td><td>2.5</td><td>3.4</td><td>4.4</td></tr><tr><td>19.0</td><td>2.4</td><td>3.4</td><td>4.4</td></tr><tr><td>20.0</td><td>2.4</td><td>3.3</td><td>4.3</td></tr><tr><td>21.0</td><td>2.3</td><td>3.3</td><td>4.3</td></tr><tr><td>22.0</td><td>2.3</td><td>3.2</td><td>4.2</td></tr><tr><td>23.0</td><td>2.2</td><td>3.2</td><td>4.1</td></tr><tr><td>24.0</td><td>2.1</td><td>3.1</td><td>4.0</td></tr><tr><td>25.0</td><td>2.0</td><td>3.0</td><td>3.9</td></tr><tr><td>26.0</td><td>1.9</td><td>2.9</td><td>3.8</td></tr><tr><td>27.0</td><td>1.8</td><td>2.8</td><td>3.7</td></tr><tr><td>28.0</td><td>1.7</td><td>2.8</td><td>3.6</td></tr><tr><td>29.0</td><td>1.5</td><td>2.5</td><td>3.5</td></tr><tr><td>30.0</td><td>1.4</td><td>2.4</td><td>3.4</td></tr><tr><td>31.0</td><td>1.3</td><td>2.2</td><td>3.2</td></tr><tr><td>32.0</td><td>1.1</td><td>2.1</td><td>3.1</td></tr><tr><td>33.0</td><td>0.9</td><td>1.9</td><td>2.9</td></tr><tr><td>34.0</td><td>0.8</td><td>1.7</td><td>2.7</td></tr><tr><td>35.0</td><td>0.6</td><td>1.6</td><td>2.5</td></tr><tr><td>36.0</td><td>0.4</td><td>1.4</td><td>2.3</td></tr></table>	wk	10%	50%	90%	17.0	2.5	3.5	4.4	18.0	2.5	3.4	4.4	19.0	2.4	3.4	4.4	20.0	2.4	3.3	4.3	21.0	2.3	3.3	4.3	22.0	2.3	3.2	4.2	23.0	2.2	3.2	4.1	24.0	2.1	3.1	4.0	25.0	2.0	3.0	3.9	26.0	1.9	2.9	3.8	27.0	1.8	2.8	3.7	28.0	1.7	2.8	3.6	29.0	1.5	2.5	3.5	30.0	1.4	2.4	3.4	31.0	1.3	2.2	3.2	32.0	1.1	2.1	3.1	33.0	0.9	1.9	2.9	34.0	0.8	1.7	2.7	35.0	0.6	1.6	2.5	36.0	0.4	1.4	2.3	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>17.0</td><td>2.3</td><td>3.7</td><td>5.1</td></tr><tr><td>18.0</td><td>2.3</td><td>3.7</td><td>5.0</td></tr><tr><td>19.0</td><td>2.2</td><td>3.6</td><td>5.0</td></tr><tr><td>20.0</td><td>2.2</td><td>3.6</td><td>5.0</td></tr><tr><td>21.0</td><td>2.2</td><td>3.5</td><td>4.9</td></tr><tr><td>22.0</td><td>2.1</td><td>3.5</td><td>4.9</td></tr><tr><td>23.0</td><td>2.1</td><td>3.5</td><td>4.8</td></tr><tr><td>24.0</td><td>2.0</td><td>3.4</td><td>4.8</td></tr><tr><td>25.0</td><td>2.0</td><td>3.4</td><td>4.8</td></tr><tr><td>26.0</td><td>1.9</td><td>3.3</td><td>4.7</td></tr><tr><td>27.0</td><td>1.9</td><td>3.3</td><td>4.6</td></tr><tr><td>28.0</td><td>1.8</td><td>3.2</td><td>4.6</td></tr><tr><td>29.0</td><td>1.7</td><td>3.1</td><td>4.5</td></tr><tr><td>30.0</td><td>1.7</td><td>3.1</td><td>4.5</td></tr><tr><td>31.0</td><td>1.6</td><td>3.0</td><td>4.4</td></tr><tr><td>32.0</td><td>1.5</td><td>2.9</td><td>4.3</td></tr><tr><td>33.0</td><td>1.4</td><td>2.8</td><td>4.2</td></tr><tr><td>34.0</td><td>1.4</td><td>2.8</td><td>4.2</td></tr><tr><td>35.0</td><td>1.3</td><td>2.7</td><td>4.1</td></tr><tr><td>36.0</td><td>1.2</td><td>2.6</td><td>4.0</td></tr></table>	wk	10%	50%	90%	17.0	2.3	3.7	5.1	18.0	2.3	3.7	5.0	19.0	2.2	3.6	5.0	20.0	2.2	3.6	5.0	21.0	2.2	3.5	4.9	22.0	2.1	3.5	4.9	23.0	2.1	3.5	4.8	24.0	2.0	3.4	4.8	25.0	2.0	3.4	4.8	26.0	1.9	3.3	4.7	27.0	1.9	3.3	4.6	28.0	1.8	3.2	4.6	29.0	1.7	3.1	4.5	30.0	1.7	3.1	4.5	31.0	1.6	3.0	4.4	32.0	1.5	2.9	4.3	33.0	1.4	2.8	4.2	34.0	1.4	2.8	4.2	35.0	1.3	2.7	4.1	36.0	1.2	2.6	4.0	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>17.0</td><td>2.1</td><td>3.1</td><td>4.2</td></tr><tr><td>18.0</td><td>2.0</td><td>3.0</td><td>4.1</td></tr><tr><td>19.0</td><td>1.9</td><td>2.9</td><td>4.0</td></tr><tr><td>20.0</td><td>1.8</td><td>2.8</td><td>3.9</td></tr><tr><td>21.0</td><td>1.7</td><td>2.7</td><td>3.8</td></tr><tr><td>22.0</td><td>1.6</td><td>2.6</td><td>3.7</td></tr><tr><td>23.0</td><td>1.5</td><td>2.6</td><td>3.6</td></tr><tr><td>24.0</td><td>1.4</td><td>2.5</td><td>3.5</td></tr><tr><td>25.0</td><td>1.4</td><td>2.4</td><td>3.4</td></tr><tr><td>26.0</td><td>1.3</td><td>2.3</td><td>3.3</td></tr><tr><td>27.0</td><td>1.2</td><td>2.2</td><td>3.3</td></tr><tr><td>28.0</td><td>1.1</td><td>2.2</td><td>3.2</td></tr><tr><td>29.0</td><td>1.1</td><td>2.1</td><td>3.1</td></tr><tr><td>30.0</td><td>1.0</td><td>2.0</td><td>3.1</td></tr><tr><td>31.0</td><td>0.9</td><td>2.0</td><td>3.0</td></tr><tr><td>32.0</td><td>0.9</td><td>1.9</td><td>3.0</td></tr><tr><td>33.0</td><td>0.8</td><td>1.9</td><td>2.9</td></tr><tr><td>34.0</td><td>0.8</td><td>1.8</td><td>2.9</td></tr><tr><td>35.0</td><td>0.7</td><td>1.8</td><td>2.8</td></tr><tr><td>36.0</td><td>0.7</td><td>1.7</td><td>2.8</td></tr></table>	wk	10%	50%	90%	17.0	2.1	3.1	4.2	18.0	2.0	3.0	4.1	19.0	1.9	2.9	4.0	20.0	1.8	2.8	3.9	21.0	1.7	2.7	3.8	22.0	1.6	2.6	3.7	23.0	1.5	2.6	3.6	24.0	1.4	2.5	3.5	25.0	1.4	2.4	3.4	26.0	1.3	2.3	3.3	27.0	1.2	2.2	3.3	28.0	1.1	2.2	3.2	29.0	1.1	2.1	3.1	30.0	1.0	2.0	3.1	31.0	0.9	2.0	3.0	32.0	0.9	1.9	3.0	33.0	0.8	1.9	2.9	34.0	0.8	1.8	2.9	35.0	0.7	1.8	2.8	36.0	0.7	1.7	2.8	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>17.0</td><td>7.2</td><td>11.5</td><td>15.8</td></tr><tr><td>18.0</td><td>7.1</td><td>11.5</td><td>15.8</td></tr><tr><td>19.0</td><td>7.0</td><td>11.4</td><td>15.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36.0	3.7	8.1	12.5																																																																																																																																																																																																																																																																																																																																																	

Author's Name	Levon N	Levon N	Levon N	Levon N
(6 weeks)	wk	10%	50%	90%
	17.0	2.8	3.5	4.1
	18.0	2.7	3.4	4.0
	19.0	2.7	3.3	4.0
	20.0	2.7	3.3	4.0
	21.0	2.6	3.3	3.9
	22.0	2.6	3.2	3.9
	23.0	2.5	3.2	3.8
	24.0	2.4	3.1	3.7
	25.0	2.3	3.0	3.6
	26.0	2.2	2.9	3.5
	27.0	2.1	2.8	3.4
	28.0	2.0	2.6	3.3
	29.0	1.9	2.5	3.2
	30.0	1.7	2.4	3.0
	31.0	1.6	2.2	2.9
	32.0	1.4	2.1	2.7
	33.0	1.3	1.9	2.6
	34.0	1.1	1.7	2.4
35.0	0.9	1.6	2.2	
36.0	0.7	1.4	2.0	
(8 weeks)	wk	10%	50%	90%
	17.0	3.0	3.5	4.0
	18.0	2.9	3.4	3.9
	19.0	2.9	3.4	3.9
	20.0	2.8	3.3	3.8
	21.0	2.8	3.3	3.8
	22.0	2.7	3.2	3.7
	23.0	2.7	3.2	3.6
	24.0	2.6	3.1	3.6
	25.0	2.5	3.0	3.5
	26.0	2.4	2.9	3.4
	27.0	2.3	2.8	3.3
	28.0	2.2	2.6	3.1
	29.0	2.0	2.5	3.0
	30.0	1.9	2.4	2.9
	31.0	1.7	2.2	2.7
	32.0	1.6	2.1	2.6
	33.0	1.4	1.9	2.4
	34.0	1.3	1.7	2.2
35.0	1.1	1.6	2.1	
36.0	0.9	1.4	1.9	
(10 weeks)	wk	10%	50%	90%
	17.0	3.1	3.5	3.9
	18.0	3.0	3.4	3.8
	19.0	3.0	3.4	3.8
	20.0	3.0	3.3	3.7
	21.0	2.9	3.3	3.7
	22.0	2.8	3.2	3.6
	23.0	2.8	3.2	3.6
	24.0	2.7	3.1	3.5
	25.0	2.6	3.0	3.4
	26.0	2.5	2.9	3.3
	27.0	2.4	2.8	3.2
	28.0	2.3	2.6	3.0
	29.0	2.1	2.5	2.9
	30.0	2.0	2.4	2.8
	31.0	1.8	2.2	2.6
	32.0	1.7	2.1	2.5
	33.0	1.5	1.9	2.3
	34.0	1.4	1.7	2.1
35.0	1.2	1.6	2.0	
36.0	1.0	1.4	1.8	

Reference

L. N. Nazarian, E. J. Halpern, A. B. Kurtz, W. W. Hauck and L. Needleman, "Normal interval fetal growth rates based on obstetrical ultrasonographic measurements," J Ultrasound Med. 14 (11): 829-836, Nov, 1995

(4) Fetal Ratio Tables

Author's Name	Hadlock ¹⁾	Hohler ²⁾	Hadlock ³⁾	Campbell ⁴⁾																																																																																																																																																																																																																																																																																																															
Parameters	BPD/OFDo	FL/BPD	FL/AC	HC/AC																																																																																																																																																																																																																																																																																																															
Data interval	1.0 week	1.0 week	1.0 week	1.0 week																																																																																																																																																																																																																																																																																																															
Data Form	Lower-Upper	Lower-Upper	Lower-Upper	Lower-Upper																																																																																																																																																																																																																																																																																																															
Range of Data	14 - 40 weeks	23 - 40 weeks	21 - 42 weeks	13 - 42 weeks																																																																																																																																																																																																																																																																																																															
	<table><tr><th>wk</th><th>Lower</th><th>Upper</th></tr><tr><td>14.0</td><td>0.70</td><td>0.86</td></tr><tr><td>15.0</td><td>0.70</td><td>0.86</td></tr><tr><td>16.0</td><td>0.70</td><td>0.86</td></tr><tr><td>17.0</td><td>0.70</td><td>0.86</td></tr><tr><td>18.0</td><td>0.70</td><td>0.86</td></tr><tr><td>19.0</td><td>0.70</td><td>0.86</td></tr><tr><td>20.0</td><td>0.70</td><td>0.86</td></tr><tr><td>21.0</td><td>0.70</td><td>0.86</td></tr><tr><td>22.0</td><td>0.70</td><td>0.86</td></tr><tr><td>23.0</td><td>0.86</td><td>0.86</td></tr><tr><td>24.0</td><td>0.70</td><td>0.86</td></tr><tr><td>25.0</td><td>0.70</td><td>0.86</td></tr><tr><td>26.0</td><td>0.70</td><td>0.86</td></tr><tr><td>27.0</td><td>0.70</td><td>0.86</td></tr><tr><td>28.0</td><td>0.70</td><td>0.86</td></tr><tr><td>29.0</td><td>0.70</td><td>0.86</td></tr><tr><td>30.0</td><td>0.70</td><td>0.86</td></tr><tr><td>31.0</td><td>0.86</td><td>0.86</td></tr><tr><td>32.0</td><td>0.70</td><td>0.86</td></tr><tr><td>33.0</td><td>0.70</td><td>0.86</td></tr><tr><td>34.0</td><td>0.70</td><td>0.86</td></tr><tr><td>35.0</td><td>0.70</td><td>0.86</td></tr><tr><td>36.0</td><td>0.70</td><td>0.86</td></tr><tr><td>37.0</td><td>0.70</td><td>0.86</td></tr><tr><td>38.0</td><td>0.70</td><td>0.86</td></tr><tr><td>39.0</td><td>0.70</td><td>0.86</td></tr><tr><td>40.0</td><td>0.70</td><td>0.86</td></tr></table>	wk	Lower	Upper	14.0	0.70	0.86	15.0	0.70	0.86	16.0	0.70	0.86	17.0	0.70	0.86	18.0	0.70	0.86	19.0	0.70	0.86	20.0	0.70	0.86	21.0	0.70	0.86	22.0	0.70	0.86	23.0	0.86	0.86	24.0	0.70	0.86	25.0	0.70	0.86	26.0	0.70	0.86	27.0	0.70	0.86	28.0	0.70	0.86	29.0	0.70	0.86	30.0	0.70	0.86	31.0	0.86	0.86	32.0	0.70	0.86	33.0	0.70	0.86	34.0	0.70	0.86	35.0	0.70	0.86	36.0	0.70	0.86	37.0	0.70	0.86	38.0	0.70	0.86	39.0	0.70	0.86	40.0	0.70	0.86	<table><tr><th>wk</th><th>Lower</th><th>Upper</th></tr><tr><td>23.0</td><td>0.71</td><td>0.87</td></tr><tr><td>24.0</td><td>0.71</td><td>0.87</td></tr><tr><td>25.0</td><td>0.71</td><td>0.87</td></tr><tr><td>26.0</td><td>0.71</td><td>0.87</td></tr><tr><td>27.0</td><td>0.71</td><td>0.87</td></tr><tr><td>28.0</td><td>0.71</td><td>0.87</td></tr><tr><td>29.0</td><td>0.71</td><td>0.87</td></tr><tr><td>30.0</td><td>0.71</td><td>0.87</td></tr><tr><td>31.0</td><td>0.71</td><td>0.87</td></tr><tr><td>32.0</td><td>0.71</td><td>0.87</td></tr><tr><td>33.0</td><td>0.71</td><td>0.87</td></tr><tr><td>34.0</td><td>0.71</td><td>0.87</td></tr><tr><td>35.0</td><td>0.71</td><td>0.87</td></tr><tr><td>36.0</td><td>0.71</td><td>0.87</td></tr><tr><td>37.0</td><td>0.71</td><td>0.87</td></tr><tr><td>38.0</td><td>0.71</td><td>0.87</td></tr><tr><td>39.0</td><td>0.71</td><td>0.87</td></tr><tr><td>40.0</td><td>0.71</td><td>0.87</td></tr></table>	wk	Lower	Upper	23.0	0.71	0.87	24.0	0.71	0.87	25.0	0.71	0.87	26.0	0.71	0.87	27.0	0.71	0.87	28.0	0.71	0.87	29.0	0.71	0.87	30.0	0.71	0.87	31.0	0.71	0.87	32.0	0.71	0.87	33.0	0.71	0.87	34.0	0.71	0.87	35.0	0.71	0.87	36.0	0.71	0.87	37.0	0.71	0.87	38.0	0.71	0.87	39.0	0.71	0.87	40.0	0.71	0.87	<table><tr><th>wk</th><th>Lower</th><th>Upper</th></tr><tr><td>21.0</td><td>0.20</td><td>0.24</td></tr><tr><td>22.0</td><td>0.20</td><td>0.24</td></tr><tr><td>23.0</td><td>0.20</td><td>0.24</td></tr><tr><td>24.0</td><td>0.20</td><td>0.24</td></tr><tr><td>25.0</td><td>0.20</td><td>0.24</td></tr><tr><td>26.0</td><td>0.20</td><td>0.24</td></tr><tr><td>27.0</td><td>0.20</td><td>0.24</td></tr><tr><td>28.0</td><td>0.20</td><td>0.24</td></tr><tr><td>29.0</td><td>0.20</td><td>0.24</td></tr><tr><td>30.0</td><td>0.20</td><td>0.24</td></tr><tr><td>31.0</td><td>0.20</td><td>0.24</td></tr><tr><td>32.0</td><td>0.20</td><td>0.24</td></tr><tr><td>33.0</td><td>0.20</td><td>0.24</td></tr><tr><td>34.0</td><td>0.20</td><td>0.24</td></tr><tr><td>35.0</td><td>0.20</td><td>0.24</td></tr><tr><td>36.0</td><td>0.20</td><td>0.24</td></tr><tr><td>37.0</td><td>0.20</td><td>0.24</td></tr><tr><td>38.0</td><td>0.20</td><td>0.24</td></tr><tr><td>39.0</td><td>0.20</td><td>0.24</td></tr><tr><td>40.0</td><td>0.20</td><td>0.24</td></tr><tr><td>41.0</td><td>0.20</td><td>0.24</td></tr><tr><td>42.0</td><td>0.20</td><td>0.24</td></tr></table>	wk	Lower	Upper	21.0	0.20	0.24	22.0	0.20	0.24	23.0	0.20	0.24	24.0	0.20	0.24	25.0	0.20	0.24	26.0	0.20	0.24	27.0	0.20	0.24	28.0	0.20	0.24	29.0	0.20	0.24	30.0	0.20	0.24	31.0	0.20	0.24	32.0	0.20	0.24	33.0	0.20	0.24	34.0	0.20	0.24	35.0	0.20	0.24	36.0	0.20	0.24	37.0	0.20	0.24	38.0	0.20	0.24	39.0	0.20	0.24	40.0	0.20	0.24	41.0	0.20	0.24	42.0	0.20	0.24	<table><tr><th>wk</th><th>Lower</th><th>Upper</th></tr><tr><td>13.0</td><td>1.14</td><td>1.31</td></tr><tr><td>14.0</td><td>1.14</td><td>1.31</td></tr><tr><td>15.0</td><td>1.05</td><td>1.39</td></tr><tr><td>16.0</td><td>1.05</td><td>1.39</td></tr><tr><td>17.0</td><td>1.07</td><td>1.29</td></tr><tr><td>18.0</td><td>1.07</td><td>1.29</td></tr><tr><td>19.0</td><td>1.09</td><td>1.26</td></tr><tr><td>20.0</td><td>1.09</td><td>1.26</td></tr><tr><td>21.0</td><td>1.06</td><td>1.25</td></tr><tr><td>22.0</td><td>1.06</td><td>1.25</td></tr><tr><t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(5) AFI Tables

Author's Name	Moore et al. ¹⁾	Phelan et al. ²⁾	Jeng et al. ³⁾	
AFI Unit	cm	cm	cm	
Data interval	1.0 week	1.0 week	2.0 week	
Data Form	5 - 95%ile	Lower-Upper	Week $\pm$ 1.0SD	
Range of Data	16 - 42 weeks	36 - 42 weeks	13 - 41 weeks	

Author's Name	Moore et al. ¹⁾	Phelan et al. ²⁾	Jeng et al. ³⁾																																																																																																																																																																																									
	<table><tr><th>wk</th><th>5%</th><th>50%</th><th>95%</th></tr><tr><td>16.0</td><td>7.90</td><td>12.10</td><td>18.50</td></tr><tr><td>17.0</td><td>8.30</td><td>12.70</td><td>19.40</td></tr><tr><td>18.0</td><td>8.70</td><td>13.30</td><td>20.20</td></tr><tr><td>19.0</td><td>9.00</td><td>13.70</td><td>20.70</td></tr><tr><td>20.0</td><td>9.30</td><td>14.10</td><td>21.20</td></tr><tr><td>21.0</td><td>9.50</td><td>14.30</td><td>21.40</td></tr><tr><td>22.0</td><td>9.70</td><td>14.50</td><td>21.60</td></tr><tr><td>23.0</td><td>9.80</td><td>14.60</td><td>21.80</td></tr><tr><td>24.0</td><td>9.80</td><td>14.70</td><td>21.90</td></tr><tr><td>25.0</td><td>9.70</td><td>14.70</td><td>22.10</td></tr><tr><td>26.0</td><td>9.70</td><td>14.70</td><td>22.30</td></tr><tr><td>27.0</td><td>9.50</td><td>14.60</td><td>22.60</td></tr><tr><td>28.0</td><td>9.40</td><td>14.60</td><td>22.80</td></tr><tr><td>29.0</td><td>9.20</td><td>14.50</td><td>23.10</td></tr><tr><td>30.0</td><td>9.00</td><td>14.50</td><td>23.40</td></tr><tr><td>31.0</td><td>8.80</td><td>14.40</td><td>23.80</td></tr><tr><td>32.0</td><td>8.60</td><td>14.40</td><td>24.20</td></tr><tr><td>33.0</td><td>8.30</td><td>14.30</td><td>24.50</td></tr><tr><td>34.0</td><td>8.10</td><td>14.20</td><td>24.80</td></tr><tr><td>35.0</td><td>7.90</td><td>14.00</td><td>24.90</td></tr><tr><td>36.0</td><td>7.70</td><td>13.80</td><td>24.90</td></tr><tr><td>37.0</td><td>7.50</td><td>13.60</td><td>24.40</td></tr><tr><td>38.0</td><td>7.30</td><td>13.20</td><td>23.90</td></tr><tr><td>39.0</td><td>7.20</td><td>12.70</td><td>22.60</td></tr><tr><td>40.0</td><td>7.10</td><td>12.30</td><td>21.40</td></tr><tr><td>41.0</td><td>7.00</td><td>11.60</td><td>19.40</td></tr><tr><td>42.0</td><td>6.90</td><td>11.00</td><td>17.00</td></tr></table>	wk	5%	50%	95%	16.0	7.90	12.10	18.50	17.0	8.30	12.70	19.40	18.0	8.70	13.30	20.20	19.0	9.00	13.70	20.70	20.0	9.30	14.10	21.20	21.0	9.50	14.30	21.40	22.0	9.70	14.50	21.60	23.0	9.80	14.60	21.80	24.0	9.80	14.70	21.90	25.0	9.70	14.70	22.10	26.0	9.70	14.70	22.30	27.0	9.50	14.60	22.60	28.0	9.40	14.60	22.80	29.0	9.20	14.50	23.10	30.0	9.00	14.50	23.40	31.0	8.80	14.40	23.80	32.0	8.60	14.40	24.20	33.0	8.30	14.30	24.50	34.0	8.10	14.20	24.80	35.0	7.90	14.00	24.90	36.0	7.70	13.80	24.90	37.0	7.50	13.60	24.40	38.0	7.30	13.20	23.90	39.0	7.20	12.70	22.60	40.0	7.10	12.30	21.40	41.0	7.00	11.60	19.40	42.0	6.90	11.00	17.00	<table><tr><th>wk</th><th>Lower</th><th>Upper</th></tr><tr><td>36.0</td><td>8.00</td><td>17.80</td></tr><tr><td>37.0</td><td>8.80</td><td>17.40</td></tr><tr><td>38.0</td><td>8.70</td><td>18.10</td></tr><tr><td>39.0</td><td>7.50</td><td>17.30</td></tr><tr><td>40.0</td><td>7.80</td><td>17.00</td></tr><tr><td>41.0</td><td>4.30</td><td>13.30</td></tr><tr><td>42.0</td><td>3.80</td><td>13.20</td></tr></table>	wk	Lower	Upper	36.0	8.00	17.80	37.0	8.80	17.40	38.0	8.70	18.10	39.0	7.50	17.30	40.0	7.80	17.00	41.0	4.30	13.30	42.0	3.80	13.20	<table><tr><th>wk</th><th>cm</th><th>±1.0SD</th></tr><tr><td>13.0</td><td>9.70</td><td>1.70</td></tr><tr><td>15.0</td><td>13.70</td><td>3.50</td></tr><tr><td>17.0</td><td>12.50</td><td>3.40</td></tr><tr><td>19.0</td><td>14.30</td><td>3.10</td></tr><tr><td>21.0</td><td>14.50</td><td>3.30</td></tr><tr><td>23.0</td><td>15.20</td><td>3.30</td></tr><tr><td>25.0</td><td>16.40</td><td>5.30</td></tr><tr><td>27.0</td><td>16.40</td><td>4.80</td></tr><tr><td>29.0</td><td>17.00</td><td>5.00</td></tr><tr><td>31.0</td><td>15.60</td><td>4.20</td></tr><tr><td>33.0</td><td>16.50</td><td>4.70</td></tr><tr><td>35.0</td><td>16.00</td><td>4.90</td></tr><tr><td>37.0</td><td>16.50</td><td>4.90</td></tr><tr><td>39.0</td><td>14.00</td><td>4.80</td></tr><tr><td>41.0</td><td>13.70</td><td>5.50</td></tr></table>	wk	cm	±1.0SD	13.0	9.70	1.70	15.0	13.70	3.50	17.0	12.50	3.40	19.0	14.30	3.10	21.0	14.50	3.30	23.0	15.20	3.30	25.0	16.40	5.30	27.0	16.40	4.80	29.0	17.00	5.00	31.0	15.60	4.20	33.0	16.50	4.70	35.0	16.00	4.90	37.0	16.50	4.90	39.0	14.00	4.80	41.0	13.70	5.50	
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Reference:

1. Moore T.R., Cayle J.E., "The amniotic fluid index in normal human pregnancy," Am J Obstet Gynecol., 162 (5): 1168-1173, May 1990
2. Phelan J.P., Smith C.V., Broussard P., Small M., "Amniotic fluid volume assessment with the four-quadrant technique at 36-42 weeks' gestation," J. Reprod Med., 32 (7): 540-542, July 1987
3. Jeng C.J., Jou T.J., Wang K.G., Yang Y.C., Lee Y.N., Lan C.C., "Amniotic fluid index measurement with the four-quadrant technique during pregnancy," J. Reprod Med., 35 (7): 674-677, July 1990

(6) RI, PI tables by Gestational Age (RI, PI range tables)

Shinozuka

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Reference

Norio Shinozuka, Ultrasound in Obstetrics and Gynecology (N. Shinozuka's Home Page).

<http://www.shinozuka.com/>

JSUM'03

Author's Name	JSUM'03 - 90%	JSUM'03 - 90%	JSUM'03 - 90%	JSUM'03 - 90%																																																																																																																																																																																																																																																																																																																																																																																
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/td><td>1.91</td></tr><tr><td>40.0</td><td>1.07</td><td>1.28</td><td>1.74</td></tr><tr><td>41.0</td><td>0.99</td><td>1.55</td><td>1.88</td></tr></table>	wk	10%	50%	90%	20.0	1.43	1.55	2.19	21.0	1.29	1.58	1.88	22.0	1.29	1.58	1.93	23.0	1.39	1.65	2.07	24.0	1.45	1.63	2.02	25.0	1.46	1.88	2.23	26.0	1.34	1.84	2.12	27.0	1.67	2.10	2.34	28.0	1.53	1.94	2.39	29.0	1.64	2.06	2.41	30.0	1.60	2.13	2.69	31.0	1.56	2.00	2.66	32.0	1.48	1.91	2.36	33.0	1.44	1.94	2.34	34.0	1.52	1.84	2.27	35.0	1.35	1.92	2.35	36.0	1.33	1.70	2.22	37.0	1.17	1.54	1.95	38.0	1.09	1.55	1.97	39.0	1.17	1.56	1.91	40.0	1.07	1.28	1.74	41.0	0.99	1.55	1.88	<table><tr><th>wk</th><th>10%</th><th>50%</th><th>90%</th></tr><tr><td>20.0</td><td>1.14</td><td>1.42</td><td>1.59</td></tr><tr><td>21.0</td><td>1.10</td><td>1.30</td><td>1.49</td></tr><tr><td>22.0</td><td>1.04</td><td>1.25</td><td>1.52</td></tr><tr><td>23.0</td><td>1.05</td><td>1.23</td><td>1.54</td></tr><tr><td>24.0</td><td>1.01</td><td>1.26</td><td>1.48</td></tr><tr><td>25.0</td><td>0.90</td><td>1.16</td><td>1.37</td></tr><tr><td>26.0</td><td>0.94</td><td>1.18</td><td>1.44</td></tr><tr><td>27.0</td><td>0.84</td><td>1.06</td><td>1.32</td></tr><tr><td>28.0</td><td>0.93</td><td>1.09</td><td>1.29</td></tr><tr><td>29.0</td><td>0.87</td><td>1.05</td><td>1.26</td></tr><tr><td>30.0</td><td>0.81</td><td>1.01</td><td>1.25</td></tr><tr><td>31.0</td><td>0.78</td><td>0.94</td><td>1.11</td></tr><tr><td>32.0</td><td>0.75</td><td>0.87</td><td>1.14</td></tr><tr><td>33.0</td><td>0.74</td><td>0.84</td><td>1.15</td></tr><tr><td>34.0</td><td>0.73</td><td>0.91</td><td>1.10</td></tr><tr><td>35.0</td><td>0.78</td><td>0.92</td><td>1.11</td></tr><tr><td>36.0</td><td>0.72</td><td>0.90</td><td>1.08</td></tr><tr><td>37.0</td><td>0.73</td><td>0.88</td><td>1.06</td></tr><tr><td>38.0</td><td>0.70</td><td>0.89</td><td>1.06</td></tr><tr><td>39.0</td><td>0.75</td><td>0.90</td><td>1.09</td></tr><tr><td>40.0</td><td>0.70</td><td>0.90</td><td>1.12</td></tr><tr><td>41.0</td><td>0.61</td><td>0.89</td><td>1.12</td></tr></table>	wk	10%	50%	90%	20.0	1.14	1.42	1.59	21.0	1.10	1.30	1.49	22.0	1.04	1.25	1.52	23.0	1.05	1.23	1.54	24.0	1.01	1.26	1.48	25.0	0.90	1.16	1.37	26.0	0.94	1.18	1.44	27.0	0.84	1.06	1.32	28.0	0.93	1.09	1.29	29.0	0.87	1.05	1.26	30.0	0.81	1.01	1.25	31.0	0.78	0.94	1.11	32.0	0.75	0.87	1.14	33.0	0.74	0.84	1.15	34.0	0.73	0.91	1.10	35.0	0.78	0.92	1.11	36.0	0.72	0.90	1.08	37.0	0.73	0.88	1.06	38.0	0.70	0.89	1.06	39.0	0.75	0.90	1.09	40.0	0.70	0.90	1.12	41.0	0.61	0.89	1.12
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25.0	1.46	1.88	2.23																																																																																																																																																																																																																																																																																																																																																																																	
26.0	1.34	1.84	2.12																																																																																																																																																																																																																																																																																																																																																																																	
27.0	1.67	2.10	2.34																																																																																																																																																																																																																																																																																																																																																																																	
28.0	1.53	1.94	2.39																																																																																																																																																																																																																																																																																																																																																																																	
29.0	1.64	2.06	2.41																																																																																																																																																																																																																																																																																																																																																																																	
30.0	1.60	2.13	2.69																																																																																																																																																																																																																																																																																																																																																																																	
31.0	1.56	2.00	2.66																																																																																																																																																																																																																																																																																																																																																																																	
32.0	1.48	1.91	2.36																																																																																																																																																																																																																																																																																																																																																																																	
33.0	1.44	1.94	2.34																																																																																																																																																																																																																																																																																																																																																																																	
34.0	1.52	1.84	2.27																																																																																																																																																																																																																																																																																																																																																																																	
35.0	1.35	1.92	2.35																																																																																																																																																																																																																																																																																																																																																																																	
36.0	1.33	1.70	2.22																																																																																																																																																																																																																																																																																																																																																																																	
37.0	1.17	1.54	1.95																																																																																																																																																																																																																																																																																																																																																																																	
38.0	1.09	1.55	1.97																																																																																																																																																																																																																																																																																																																																																																																	
39.0	1.17	1.56	1.91																																																																																																																																																																																																																																																																																																																																																																																	
40.0	1.07	1.28	1.74																																																																																																																																																																																																																																																																																																																																																																																	
41.0	0.99	1.55	1.88																																																																																																																																																																																																																																																																																																																																																																																	
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20.0	1.14	1.42	1.59																																																																																																																																																																																																																																																																																																																																																																																	
21.0	1.10	1.30	1.49																																																																																																																																																																																																																																																																																																																																																																																	
22.0	1.04	1.25	1.52																																																																																																																																																																																																																																																																																																																																																																																	
23.0	1.05	1.23	1.54																																																																																																																																																																																																																																																																																																																																																																																	
24.0	1.01	1.26	1.48																																																																																																																																																																																																																																																																																																																																																																																	
25.0	0.90	1.16	1.37																																																																																																																																																																																																																																																																																																																																																																																	
26.0	0.94	1.18	1.44																																																																																																																																																																																																																																																																																																																																																																																	
27.0	0.84	1.06	1.32																																																																																																																																																																																																																																																																																																																																																																																	
28.0	0.93	1.09	1.29																																																																																																																																																																																																																																																																																																																																																																																	
29.0	0.87	1.05	1.26																																																																																																																																																																																																																																																																																																																																																																																	
30.0	0.81	1.01	1.25																																																																																																																																																																																																																																																																																																																																																																																	
31.0	0.78	0.94	1.11																																																																																																																																																																																																																																																																																																																																																																																	
32.0	0.75	0.87	1.14																																																																																																																																																																																																																																																																																																																																																																																	
33.0	0.74	0.84	1.15																																																																																																																																																																																																																																																																																																																																																																																	
34.0	0.73	0.91	1.10																																																																																																																																																																																																																																																																																																																																																																																	
35.0	0.78	0.92	1.11																																																																																																																																																																																																																																																																																																																																																																																	
36.0	0.72	0.90	1.08																																																																																																																																																																																																																																																																																																																																																																																	
37.0	0.73	0.88	1.06																																																																																																																																																																																																																																																																																																																																																																																	
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41.0	0.61	0.89	1.12																																																																																																																																																																																																																																																																																																																																																																																	

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Data Form	5 - 95%ile	5 - 95%ile	5 - 95%ile	5 - 95%ile																																																																																																																																																																																																																																																																																																																																																																																
Range of Data	20 - 41 weeks	20 - 41 weeks	20 - 41 weeks	20 - 41 weeks																																																																																																																																																																																																																																																																																																																																																																																
	<table><tr><th>wk</th><th>5%</th><th>50%</th><th>95%</th></tr><tr><td>20.0</td><td>0.75</td><td>0.79</td><td>0.93</td></tr><tr><td>21.0</td><td>0.71</td><td>0.79</td><td>0.87</td></tr><tr><td>22.0</td><td>0.72</td><td>0.79</td><td>0.87</td></tr><tr><td>23.0</td><td>0.71</td><td>0.81</td><td>0.89</td></tr><tr><td>24.0</td><td>0.74</td><td>0.81</td><td>0.89</td></tr><tr><td>25.0</td><td>0.75</td><td>0.84</td><td>0.95</td></tr><tr><td>26.0</td><td>0.70</td><td>0.78</td><td>0.92</td></tr><tr><td>27.0</td><td>0.79</td><td>0.86</td><td>0.91</td></tr><tr><td>28.0</td><td>0.77</td><td>0.84</td><td>0.92</td></tr><tr><td>29.0</td><td>0.77</td><td>0.87</td><td>0.93</td></tr><tr><td>30.0</td><td>0.78</td><td>0.87</td><td>0.94</td></tr><tr><td>31.0</td><td>0.78</td><td>0.85</td><td>1.00</td></tr><tr><td>32.0</td><td>0.74</td><td>0.84</td><td>0.91</td></tr><tr><td>33.0</td><td>0.73</td><td>0.84</td><td>0.89</td></tr><tr><td>34.0</td><td>0.70</td><td>0.83</td><td>0.91</td></tr><tr><td>35.0</td><td>0.72</td><td>0.84</td><td>0.92</td></tr><tr><td>36.0</td><td>0.68</td><td>0.80</td><td>0.92</td></tr><tr><td>37.0</td><td>0.64</td><td>0.76</td><td>0.89</td></tr><tr><td>38.0</td><td>0.65</td><td>0.78</td><td>0.87</td></tr><tr><td>39.0</td><td>0.60</td><td>0.79</td><td>0.84</td></tr><tr><td>40.0</td><td>0.65</td><td>0.71</td><td>0.84</td></tr><tr><td>41.0</td><td>0.58</td><td>0.74</td><td>0.85</td></tr></table>	wk	5%	50%	95%	20.0	0.75	0.79	0.93	21.0	0.71	0.79	0.87	22.0	0.72	0.79	0.87	23.0	0.71	0.81	0.89	24.0	0.74	0.81	0.89	25.0	0.75	0.84	0.95	26.0	0.70	0.78	0.92	27.0	0.79	0.86	0.91	28.0	0.77	0.84	0.92	29.0	0.77	0.87	0.93	30.0	0.78	0.87	0.94	31.0	0.78	0.85	1.00	32.0	0.74	0.84	0.91	33.0	0.73	0.84	0.89	34.0	0.70	0.83	0.91	35.0	0.72	0.84	0.92	36.0	0.68	0.80	0.92	37.0	0.64	0.76	0.89	38.0	0.65	0.78	0.87	39.0	0.60	0.79	0.84	40.0	0.65	0.71	0.84	41.0	0.58	0.74	0.85	<table><tr><th>wk</th><th>5%</th><th>50%</th><th>95%</th></tr><tr><td>20.0</td><td>0.70</td><td>0.78</td><td>0.83</td></tr><tr><td>21.0</td><td>0.68</td><td>0.76</td><td>0.82</td></tr><tr><td>22.0</td><td>0.65</td><td>0.73</td><td>0.86</td></tr><tr><td>23.0</td><td>0.66</td><td>0.71</td><td>0.78</td></tr><tr><td>24.0</td><td>0.66</td><td>0.75</td><td>0.81</td></tr><tr><td>25.0</td><td>0.60</td><td>0.71</td><td>0.78</td></tr><tr><td>26.0</td><td>0.62</td><td>0.72</td><td>0.81</td></tr><tr><td>27.0</td><td>0.56</td><td>0.68</td><td>0.78</td></tr><tr><td>28.0</td><td>0.60</td><td>0.69</td><td>0.79</td></tr><tr><td>29.0</td><td>0.57</td><td>0.68</td><td>0.77</td></tr><tr><td>30.0</td><td>0.55</td><td>0.65</td><td>0.77</td></tr><tr><td>31.0</td><td>0.55</td><td>0.63</td><td>0.74</td></tr><tr><td>32.0</td><td>0.52</td><td>0.64</td><td>0.74</td></tr><tr><td>33.0</td><td>0.52</td><td>0.62</td><td>0.73</td></tr><tr><td>34.0</td><td>0.50</td><td>0.61</td><td>0.70</td></tr><tr><td>35.0</td><td>0.52</td><td>0.61</td><td>0.71</td></tr><tr><td>36.0</td><td>0.50</td><td>0.60</td><td>0.69</td></tr><tr><td>37.0</td><td>0.51</td><td>0.58</td><td>0.68</td></tr><tr><td>38.0</td><td>0.49</td><td>0.58</td><td>0.68</td></tr><tr><td>39.0</td><td>0.50</td><td>0.62</td><td>0.70</td></tr><tr><td>40.0</td><td>0.48</td><td>0.60</td><td>0.69</td></tr><tr><td>41.0</td><td>0.45</td><td>0.58</td><td>0.69</td></tr></table>	wk	5%	50%	95%	20.0	0.70	0.78	0.83	21.0	0.68	0.76	0.82	22.0	0.65	0.73	0.86	23.0	0.66	0.71	0.78	24.0	0.66	0.75	0.81	25.0	0.60	0.71	0.78	26.0	0.62	0.72	0.81	27.0	0.56	0.68	0.78	28.0	0.60	0.69	0.79	29.0	0.57	0.68	0.77	30.0	0.55	0.65	0.77	31.0	0.55	0.63	0.74	32.0	0.52	0.64	0.74	33.0	0.52	0.62	0.73	34.0	0.50	0.61	0.70	35.0	0.52	0.61	0.71	36.0	0.50	0.60	0.69	37.0	0.51	0.58	0.68	38.0	0.49	0.58	0.68	39.0	0.50	0.62	0.70	40.0	0.48	0.60	0.69	41.0	0.45	0.58	0.69	<table><tr><th>wk</th><th>5%</th><th>50%</th><th>95%</th></tr><tr><td>20.0</td><td>1.43</td><td>1.55</td><td>2.32</td></tr><tr><td>21.0</td><td>1.35</td><td>1.58</td><td>1.99</td></tr><tr><td>22.0</td><td>1.22</td><td>1.58</td><td>2.11</td></tr><tr><td>23.0</td><td>1.34</td><td>1.65</td><td>2.15</td></tr><tr><td>24.0</td><td>1.38</td><td>1.63</td><td>2.23</td></tr><tr><td>25.0</td><td>1.38</td><td>1.88</td><td>2.25</td></tr><tr><td>26.0</td><td>1.24</td><td>1.84</td><td>2.37</td></tr><tr><td>27.0</td><td>1.52</td><td>2.10</td><td>2.48</td></tr><tr><td>28.0</td><td>1.50</td><td>1.94</td><td>2.49</td></tr><tr><td>29.0</td><td>1.56</td><td>2.06</td><td>2.91</td></tr><tr><td>30.0</td><td>1.51</td><td>2.13</td><td>2.72</td></tr><tr><td>31.0</td><td>1.51</td><td>2.00</td><td>2.91</td></tr><tr><td>32.0</td><td>1.42</td><td>1.91</td><td>2.41</td></tr><tr><td>33.0</td><td>1.35</td><td>1.94</td><td>2.31</td></tr><tr><td>34.0</td><td>1.24</td><td>1.84</td><td>2.31</td></tr><tr><td>35.0</td><td>1.26</td><td>1.92</td><td>2.47</td></tr><tr><td>36.0</td><td>1.19</td><td>1.70</td><td>2.41</td></tr><tr><td>37.0</td><td>1.08</td><td>1.54</td><td>1.99</td></tr><tr><td>38.0</td><td>1.04</td><td>1.55</td><td>2.09</td></tr><tr><td>39.0</td><td>1.01</td><td>1.56</td><td>1.92</td></tr><tr><td>40.0</td><td>1.07</td><td>1.28</td><td>1.85</td></tr><tr><td>41.0</td><td>0.93</td><td>1.55</td><td>1.92</td></tr></table>	wk	5%	50%	95%	20.0	1.43	1.55	2.32	21.0	1.35	1.58	1.99	22.0	1.22	1.58	2.11	23.0	1.34	1.65	2.15	24.0	1.38	1.63	2.23	25.0	1.38	1.88	2.25	26.0	1.24	1.84	2.37	27.0	1.52	2.10	2.48	28.0	1.50	1.94	2.49	29.0	1.56	2.06	2.91	30.0	1.51	2.13	2.72	31.0	1.51	2.00	2.91	32.0	1.42	1.91	2.41	33.0	1.35	1.94	2.31	34.0	1.24	1.84	2.31	35.0	1.26	1.92	2.47	36.0	1.19	1.70	2.41	37.0	1.08	1.54	1.99	38.0	1.04	1.55	2.09	39.0	1.01	1.56	1.92	40.0	1.07	1.28	1.85	41.0	0.93	1.55	1.92	<table><tr><th>wk</th><th>5%</th><th>50%</th><th>95%</th></tr><tr><td>20.0</td><td>1.13</td><td>1.42</td><td>1.63</td></tr><tr><td>21.0</td><td>1.08</td><td>1.30</td><td>1.52</td></tr><tr><td>22.0</td><td>0.97</td><td>1.25</td><td>1.56</td></tr><tr><td>23.0</td><td>1.05</td><td>1.23</td><td>1.62</td></tr><tr><td>24.0</td><td>1.00</td><td>1.26</td><td>1.59</td></tr><tr><td>25.0</td><td>0.88</td><td>1.16</td><td>1.49</td></tr><tr><td>26.0</td><td>0.87</td><td>1.18</td><td>1.59</td></tr><tr><td>27.0</td><td>0.78</td><td>1.06</td><td>1.38</td></tr><tr><td>28.0</td><td>0.88</td><td>1.09</td><td>1.38</td></tr><tr><td>29.0</td><td>0.83</td><td>1.05</td><td>1.30</td></tr><tr><td>30.0</td><td>0.77</td><td>1.01</td><td>1.32</td></tr><tr><td>31.0</td><td>0.74</td><td>0.94</td><td>1.20</td></tr><tr><td>32.0</td><td>0.70</td><td>0.87</td><td>1.19</td></tr><tr><td>33.0</td><td>0.69</td><td>0.94</td><td>1.19</td></tr><tr><td>34.0</td><td>0.68</td><td>0.91</td><td>1.14</td></tr><tr><td>35.0</td><td>0.71</td><td>0.92</td><td>1.20</td></tr><tr><td>36.0</td><td>0.69</td><td>0.90</td><td>1.14</td></tr><tr><td>37.0</td><td>0.71</td><td>0.89</td><td>1.09</td></tr><tr><td>38.0</td><td>0.66</td><td>0.89</td><td>1.17</td></tr><tr><td>39.0</td><td>0.71</td><td>0.90</td><td>1.14</td></tr><tr><td>40.0</td><td>0.65</td><td>0.90</td><td>1.15</td></tr><tr><td>41.0</td><td>0.59</td><td>0.89</td><td>1.15</td></tr></table>	wk	5%	50%	95%	20.0	1.13	1.42	1.63	21.0	1.08	1.30	1.52	22.0	0.97	1.25	1.56	23.0	1.05	1.23	1.62	24.0	1.00	1.26	1.59	25.0	0.88	1.16	1.49	26.0	0.87	1.18	1.59	27.0	0.78	1.06	1.38	28.0	0.88	1.09	1.38	29.0	0.83	1.05	1.30	30.0	0.77	1.01	1.32	31.0	0.74	0.94	1.20	32.0	0.70	0.87	1.19	33.0	0.69	0.94	1.19	34.0	0.68	0.91	1.14	35.0	0.71	0.92	1.20	36.0	0.69	0.90	1.14	37.0	0.71	0.89	1.09	38.0	0.66	0.89	1.17	39.0	0.71	0.90	1.14	40.0	0.65	0.90	1.15	41.0	0.59	0.89	1.15
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37.0	0.51	0.58	0.68																																																																																																																																																																																																																																																																																																																																																																																	
38.0	0.49	0.58	0.68																																																																																																																																																																																																																																																																																																																																																																																	
39.0	0.50	0.62	0.70																																																																																																																																																																																																																																																																																																																																																																																	
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21.0	1.35	1.58	1.99																																																																																																																																																																																																																																																																																																																																																																																	
22.0	1.22	1.58	2.11																																																																																																																																																																																																																																																																																																																																																																																	
23.0	1.34	1.65	2.15																																																																																																																																																																																																																																																																																																																																																																																	
24.0	1.38	1.63	2.23																																																																																																																																																																																																																																																																																																																																																																																	
25.0	1.38	1.88	2.25																																																																																																																																																																																																																																																																																																																																																																																	
26.0	1.24	1.84	2.37																																																																																																																																																																																																																																																																																																																																																																																	
27.0	1.52	2.10	2.48																																																																																																																																																																																																																																																																																																																																																																																	
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38.0	1.04	1.55	2.09																																																																																																																																																																																																																																																																																																																																																																																	
39.0	1.01	1.56	1.92																																																																																																																																																																																																																																																																																																																																																																																	
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(8) Terms and Abbreviations

Abbreviation	Meaning	Meaning
AB	Abortus	Number of abortions or miscarriages
AC	Abdominal Circumference	Abdominal Circumference
AD	Abdominal Diameter	Abdominal diameter
AF	Amniotic Fluid	Amniotic Fluid
AFI	Amniotic Fluid Index	Amniotic fluid index
AF Pocket	Amnio Fluid Pocket	Amnio Fluid Pocket
AFV	Amniotic Fluid Volume	Amniotic Fluid Volume
APTD or (APD)	Antero Posterior Trunk Diameter	Anteroposterior trunk diameter
A×T	APTD × TTD	Anteroposterior trunk diameter × Transverse trunk diameter
B	B (CTR, CTAR)	Thoracic circumference (cross-sectional area)
BBT	Based on Basal Body Temperature	Estimated ovulation date
BD	Binocular Distance	Measurement of the binocular distance
BPD	Biparietal Diameter	Biparietal diameter (outer - inner)
BPD _o	Biparietal Diameter (outer to outer)	Biparietal diameter (outer - outer)
CD	Cerebral Diameter	Cerebellum diameter
CI	Cephalic Index	Head aspect ratio
CRL	Crown Rump Length	Crown rump length
CSA	Cross Sectional Area	Cross-sectional area of a diameter
CTAR	Cardio thoracic Area Ratio	Cardio thoracic area ratio
CTR	Cardio thoracic Ratio	Cardio thoracic ratio
D-Ao	Descending Aorta	Descending Aorta
ECTOP	Ectopic	Number of ectopic pregnancies
EDC	Estimated Date of Confinement	Expected Date of Delivery
EDV	End Diastolic Velocity	End diastolic velocity
EDV	End Diastolic Volume	Left ventricular end diastolic volume
EES	Early Embryonic Size	Early Embryonic Size
EF	Ejection Fraction	Ejection Fraction
ESV	End Systolic Volume	Left ventricular end systolic volume
FHR	Fetus Heart Rate	Fetus Heart Rate
FIB	Fibula	Fibula length

Abbreviation	Meaning	Meaning
FL	Femur Length	Femur length
FS	Fractional Shortening	Left ventricular percent fractional shortening
FTA	Fetal Trunk cross-sectional Area	Fetal trunk cross-sectional area
FW	Fetus Weight	Fetus Weight
GA	Gestational Age	Gestational age
Grav	Gravida	Gravida
GS	Gestational Sac	Gestational Sac
HC	Head Circumference	Head Circumference
HL	Humerus Length	Humerus length
HW	Hemispheric Width	Hemispheric diameter of the cerebrum
IOD	Inner Orbital Diameter	Inner Orbital Diameter
LMP	Last Menstrual Period	First day of the patient's last menstrual period
Lt	Left	Left
LV	Length of Vertebrae	Length of vertebrae
LV Function	Left Ventricular Function	Left Ventricular Function
LVIDd,s	Left ventricular Internal Diameter (Diastole, Systole)	Left ventricular Internal Diameter (Diastole, Systole)
LVOT	Left Ventricular Out Tract diameter	Left Ventricular Out Tract diameter
LVOT Flow	Left Ventricular Outflow Tract Flow	Left ventricular ejection flow
LVW	Lateral Ventricular Width	Lateral ventricular diameter
MCA	Middle Cerebral Artery	Middle Cerebral Artery
mGS	mean Gestational Sac	Gestational sac (average of 3 axes)
MnV	Mean Velocity	Mean velocity
NBL	Nasal Bone Length	Nasal Bone Length
NT	Nuchal Translucency	Nuchal Translucency
OB Dop	OB Doppler	
OFD	Occipital Frontal Diameter	Occipital Frontal Diameter (outer to inner)
OFDo	Occipital Frontal Diameter (outer to outer)	Occipital Frontal Diameter (outer to outer)
OOD	Outer Orbital Diameter	Outer Orbital Diameter
Para	Para	Number of para
PI	Pulsatility Index	Pulsatility Index
PLI	Preload Index	Preload Index
PreFHR	Fetus Heart Rate Before Biopsy	Fetal heart rate before puncturing
Pst FHR	Fetus Heart Rate after Biopsy	Fetal heart rate after puncturing
PSV	Peak Systolic Velocity	Peak systolic velocity
pV	peak Velocity	Peak velocity

Abbreviation	Meaning	Meaning
RAD	Radius length	Radius length
Renal-A	Renal Artery	Renal artery
RI	Resistance Index	Vascular resistance
Rt	Right	Right
Rt./Lt.	Right/Left	Right/Left
RVDd	Right Ventricular Diameter (diastole)	Right ventricular diameter (end diastole)
RVOT	Right Ventricular Out Tract diameter	Right Ventricular Out Tract Diameter (mesosystolic)
RVOT Flow	Right Ventricular Outflow Tract Flow	Right ventricular ejection flow
S/D	S/D ratio	Systolic/Diastolic Velocity Ratio
SF	Systolic forward Flow PLI	SF wave (PLI measurement)
SV	Stroke Volume	Stroke Volume
TC	Thoracic Circumference	Thoracic circumference
TIB	Tibia length	Tibia length
TL	Thoracic Length	Thoracic Length
TTD(or TAD)	Transverse Trunk Diameter (or Transverse Abdominal Diameter)	Transverse Trunk Diameter
ULNA	Ulna length	Ulna length
UmA	Umbilical Artery	Umbilical Artery
US-EDC	Estimated Date of Confinement by Ultrasound all GA parameters	Expected date of delivery calculated from US-GA
US-GA	Composite GA by Ultrasound	Average gestational week from GA measurement by ultrasonic diagnosis
UtA	Uterine Artery	Uterine artery
Vm	Mean Velocity	Mean velocity (Mean method)
VTI	Velocity Time Integral	Velocity Time Integral



Cardiology Measurements

- 8.1 Overview of Cardiology Measurement Functions
- 8.2 Measurement Methods
- 8.3 Reports
- 8.4 Presets
- 8.5 References

8.1 Overview of Cardiology Measurement Functions

8.1.1 Cardiology Measurement Menu

The following measurement menu and items are available for Cardiology.

Table1: B mode LV Volume

Measurement name	Menu	Measurement parameters			
Left ventricular function measurements	Simpson (Disc)	LVL4d	LVLA4d	LVL2d	LVLA2d
		LVL4s	LVLA4s	LVL2s	LVLA2s
		HR	EDV	ESV	
		SV	CO	EF	BSA
		SVI	COI	AreaEF4	AreaEF2
		%difD	%difS		
	Area-Length	LVLd	LVLAAd	LVLs	LVLAAs
		HR	EDV	ESV	
		SV	CO	EF	BSA
		SVI	COI	AreaEF	
	BP-Ellipse	LVLd	LVLAAd	LVSAMVd	LVSLMVd
		LVLs	LVLAAs	LVSAMVs	LVSLMVs
		HR	EDV	ESV	
		SV	CO	EF	BSA
		SVI	COI	AreaEF	
	Bullet	LVLd	LVSAPMd	LVLs	LVSAPMs
		HR	EDV	ESV	
		SV	CO	EF	BSA
		SVI	COI	AreaEF	
	M-Simpson	LVLd	LVSAMVd	LVSAPMd	
		LVLs	LVSAMVs	LVSAPMs	
		HR	EDV	ESV	
		SV	CO	EF	BSA
		SVI	COI	AreaEF	
	Pombo Teichholz Gibson	LVIDd	LVIDs	HR	EDV
		ESV	SV	CO	EF
		RVDd	RVDs	IVSd	IVSs
		LVPWd	LVPWs	%IVSTF	%PWTF
		IVS/LVPW	BSA	SVI	COI
		FS	LVM	LVM/BSA	mFS

Table2: B Mode, Other Measurements

Measurement name	Menu	Measurement parameters			
Left ventricular myocardial mass measurement	LV Mass	Aepi	Aend	LVLd	thick
		LVM	LVM/BSA		
Right ventricular diameter measurement	RVD	RVAWd	RVAWs	RVDd	RVDs
Left atrial diameter/ aortic diameter measurement	LA/AO	LADs	AODd	LA/AO	
		LADd	AODs		
Myocardial wall thickness ratio measurement	Ratio	IVSd	LVPWd	IVS/LVPW	
		IVSs	LVPWs	LVIDd	
		%IVSTF	%PWTF		
		LVM	BSA	LVM/BSA	
Valve area measurement (mitral valve)	MVA	MVA	a-axis	b-axis	
Valve area measurement (Aortic Valve)	AVA	AVA	a-axis	b-axis	
Inferior vena cava diameter measurement	IVC	Insp	Exp	%Collapse	
Left atrial volume measurement	LA Volume (Simpson)	LAL4s	LALA4s	LAL2s	LALA2s
		LA Vol.	%difS	LAvol/BSA	
	LA Volume (Area-Length)	LAL4s	LALA4s	LAL2s	LALA2s
		LA Vol.	%difS	LAvol/BSA	
Right atrial volume measurement	RA Volume (Simpson)	RAL4s	RALA4s	RAL2s	RALA2s
		RA Vol.	%difS	RAvol/BSA	
	RA Volume (Area-Length)	RAL4s	RALA4s	RAL2s	RALA2s
		RA Vol.	%difS	RAvol/BSA	

Table3: M mode

Measurement name	Menu	Measurement parameters			
Left ventricular function measurements	Pombo Teichholz Gibson	LVIDd	LVIDs	HR	EDV
		ESV	SV	CO	EF
		RVDd	RVDs	IVSd	IVSs
		LVPWd	LVPWs	%IVSTF	%PWTF
		IVS/LVPW	BSA	SVI	COI
		FS	MVCF	ET	
		LVM	LVM/BSA	mFS	
Left atrial diameter/ aortic diameter measurement	LA/AO	LADs	AODd	LA/AO	
		LADd	AODs	AVDs	
Mitral valve measurement	Mitral V	C-E amp	C-A amp	E-F slop	EPSS
		A/E	E/A		
Tricuspid valve measurement	Tricuspid V	C-E amp	C-A amp	D-E amp	
		E-F slop	D-E slop	A/E	E/A
Pulmonary valve measurement	Pulmonary V	A wave amp	E-F slop	B-C slop	B-C amp
Inferior vena cava diameter measurement	IVC	Insp	Exp	%Collapse	
Asynchrony measurement	IntraV.Async	SPWMD	T1	T2	T3

Table4: D mode

Measureme nt name	Menu	Measurement parameters				
Aortic valve measurement						
Left ventricular ejection flow measureme nt	LVOT Flow	VTI	LVOT	SV	HR	
		CO	pV	PG	MnV	MPG
		PEP	ET	PEP/ET	AccT	AccT/ET
		Qp/Qs	BSA	SVI	COI	
Aortic stenosis flow measureme nt	AS Flow	pV	PG	MnV	MPG	VTI
		CSA	LVOT	VTI(LVOT)	AVA	
Aortic valve regurgitation flow measureme nt	AR Flow	pV	PG	MnV	MPG	P1/2T

Measureme nt name	Menu	Measurement parameters				
PISA measureme nt	AR Vol. PISA	PISA Radius		FR	EROA	RV
		RF	Angle			
Mitral valve measurement						
Left ventricular inflow measureme nt	Trans M Flow	eV	aV	AVE	EPG	APG
		MnV	MPG	IRT	AccT	DecT
		E/A	P1/2T	MVA	VTI	Edur
		Adur	LVDFT	RR	LVDFT/RR	
Mitral stenosis flow measureme nt	MS Flow	pV	PG	MnV	MPG	P1/2T
		MVA	FlowT			
Mitral regurgitant flow measureme nt	MR Flow	pV	PG	MnV	MPG	dP/dt
		FlowT				
PISA measureme nt	MR Vol. PISA	PISA Radius		FR	EROA	RV
		RF	Angle			
Pulmonary valve measurement						
Right ventricular ejection flow measureme nt	RVOT Flow	VTI	CSA(LVOT)		SV	HR
		CO	pV	PG	MnV	MPG
		PEP	ET	PEP/ET	AccT	AccT/ET
		Qp/Qs	BSA	SVI	COI	
Pulmonary stenosis flow measureme nt	PS Flow	pV	PG	MnV	MPG	
Pulmonary valve regurgitant flow measureme nt	PR Flow	pV	PG	MnV	MPG	
PISA measureme nt	PR Vol. PISA	PISA Radius		FR	EROA	RV
		RF	Angle			
Tricuspid valve measurement						

Measureme nt name	Menu	Measurement parameters				
Tricuspid stenosis flow measureme nt	TS Flow	pV	PG	MnV	MPG	P1/2T
		FlowT				
Tricuspid valve regurgitant flow measureme nt	TR Flow	pV	PG	MnV	MPG	dP/dt
		FlowT	RVSP	RAP		
		(Select dP/dt for view to display the following items.)				
		PG1	V1	PG2	V2	
PISA measureme nt	TR Vol. PISA	PISA Radius		FR	EROA	RV
		RF	Angle			
Other Measurements						
Pulmonary vein flow measureme nt	PV Flow	PVS	PVD	PVA	S/D	PVAdur
		DecT	SF	S-VTI	D-VTI	
TDI PW measureme nt	TDI PW MA TDI PW1 TDI PW2	Sm1	sMnV	Sm2	Em	Am
		dMnV	Em/Am	E/Em	RIVRT	RIVCT
		time	Vel1	Vel2	AccT	ACC
Coronary measureme nt	pLAD(Rest), pLAD(Peak) , dLAD(Rest), dLAD(Peak) , RCA(Rest), RCA(Peak), LCX(Rest),L CX(Peak), C.A.1(Rest), C.A. 1(Peak), C.A. 2(Rest),C.A. 2(Peak), C.A.3(Rest), C.A. 3(Peak),Gra ft(Rest), Graft(Peak)	S	D	pDSVR	S-MnV	D-MnV
		mDSVR	S-VTI	D-VTI	D-AccT	DDecT
	VHT	pCFVR	mCFVR			
	C.A.Stenosi s	Pre D-pV	Steno D-pV		Steno D-pVPre/Steno D-pV	
		Pre D-MnV	Steno D-MnV		Pre/Steno D-MnV	

Measurement name	Menu	Measurement parameters				
Asynchrony measurement	AV Asynchrony	LVOFT	RR	LVOT/RR		
	InterV. Async.	LVPEP	RVPEP	IMD		
	Time to Onset	BS	BL	RV	BP	
		Intra	Inter	Intra+Inter		
	Time to Peak	A4CH	BS	BL	MS	ML
		A2CH	BI	BA	MI	MA
		ALAX	BP	BAS	MP	MAS
			avg	SD		

8.1.2 Cardiology Measurement Study

Cardiology measurements are comprised of the following studies.

- Cardiac Func: Cardiac function
- Coronary: Coronary artery
- TDI: For TDI PW measurement
- Asynchrony: For Asynchrony measurement

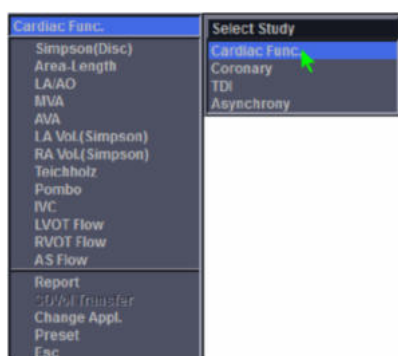
Measurement menu and report display vary by selected study.

(1) Switching the Study

Switches the Study within the same application.

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select the item at the very top (current study name) from the Measurement menu.



3. Select the Study you want to use.

(2) Switch the Study Using a Different Application

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select [Change Appl.].
3. Select the desired application.
4. Select Study.



Example of menu display: Switching from Basic under Abdomen
Switches to the study of the selected application.

8.2 Measurement Methods

This chapter explains measurement methods.

8.2.1 B Mode

The following ultrasonic image views are used in B mode.



Left ventricle long-axis image
(left sternal border)



Left ventricular short-axis image
(aortic valve level)



Left ventricular short-axis image
(mitral valve level)



Left ventricular short-axis image
(papillary muscle level)



Apical Four Chamber View



Apical long-axis view



Apical Two Chamber View

(1) Left Ventricular Function Measurements

These measurements enable you to evaluate the pumping performance efficiency based on the blood flow volume during systole of the cardiac function.

To evaluate the pumping function, accurate measurement of left ventricular volume is very important.

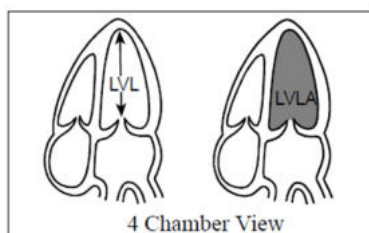
- SV (stroke volume) and SVI
Blood volume ejected from the left ventricle during systole. It is expressed as the difference in volume between the end diastole and end systole.
SVI is a SV value divided by the body surface area to correct for body size differences.
- EF (ejection fraction)
This is a ratio of SV in relation to the left ventricle end-diastolic volume.
- CO (cardiac output) and COI
Blood volume per minute ejected from the left ventricle to aorta.
COI is a CO value divided by the body surface area to correct for body size differences.
- FS (fractional shortening)
This value is calculated as the difference between the left ventricle end-diastolic diameter and left ventricle end-systolic diameter, divided by the left ventricle end-diastolic diameter, then expressed as a percentage.

The left ventricle function measurements are explained based on B/B (2B) mode. If you switch to B/B mode after freezing in 1B mode, the same images from cine memory will be displayed. You can use one of the images to search for the end systolic and the other image to search for the end diastolic.

Left Ventricular Function Measurements: Area-Length

Use the Area-Length method to measure the left ventricular chamber area (LVLA) and left ventricular long-axis length (LVL) on the apical two-chamber or four-chamber cross sectional view.

This calculates indexes such as left ventricular volume, stroke volume, cardiac output, and ejection fraction.



4 Chamber View

The Area-Length method for measuring the left ventricular chamber area includes two modes: Auto, which requires you to assign 3 points of both annulus and left ventricular long-axis length; and Manual, which traces the left ventricular chamber. To use the Area-Length method, navigate the preset to [Create Measurement Tools > Application Measurement > Measured Method & Display Items > B.Mode], then select Area-Length.

Prior confirmation

Assign [Area-Length] to the measurement menu using Preset ([Create Measurement Tools] > [Study Assignment] > [Cardiac Func.] > [Menu Assign]).

Procedure

1. Display end-diastolic and end-systolic images for the same cardiac cycle in B/B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [Area-Length] from the measurement menu.
4. Use the Area-Length method to trace left ventricular inner membrane on the end-diastolic image.
The LVLAd and LVLd line are displayed.
5. Set the LVLd position using the trackball.
6. Press the [Caliper]key.
7. Use the Area-Length method to trace the left ventricular inner membrane on the end-systolic image.
The LVLAs and LVLs are displayed.
8. Set the LVLs position using the trackball.
When the electrocardiogram is hidden
Press [Caliper] key, and enter the heart rate in the displayed dialog.

Example of Measurement Results Display

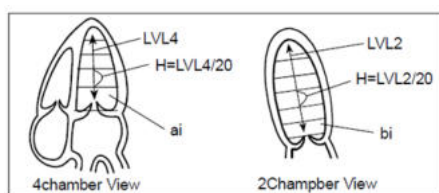
Area-Length	
LVLd : mm	: Left ventricular long axis length (end diastole)
LVLAd : cm ²	: Left ventricular long axis area (end-diastolic)
LVLs : mm	: Left ventricular long axis length (end systole)
LVLAs : cm ²	: Left ventricular long axis area (end-systolic)
HR : BPM	: Heart rate
EDV : ml	: Left ventricular volume at end diastole
ESV : ml	: Left ventricular volume at end systole
SV : ml	: Stroke volume
CO : l/m	: Cardiac output
EF : %	: Ejection fraction

Reference information

2.2.1(3) Volume Measurement: Volume1/Volume2 on page 41

Left Ventricular Function Measurements: Simpson (Disc)

Use the Area-Length method to measure the left ventricular chamber area (LVLA) and left ventricular long-axis length (LVL) on the apical four-chamber and two-chamber views. The left ventricular volume (EDV, ESV) is calculated as the sum of 20 elliptical disks orthogonal to the left ventricular long axis.



The Area-Length method for measuring the left ventricular chamber area includes two modes: [Auto], which requires you to assign 3 points of both annulus and left ventricular long-axis length; and [Manual], which traces the left ventricular chamber. To use the Area-Length method, choose the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > B.Mode]) and select Simpson (Disc).

Procedure

1. Display end-diastolic and end-systolic images on the apical four-chamber view for the same cardiac cycle in B/B mode.
2. Press the [Measurement] button on the touch panel and select [Simpson (Disc)] from the measurement menu.
3. Measure the left ventricular lumen area (LVLA4d) and left ventricular long axis length (LVL4d) using the end-diastolic period image.
 - a. Press [Enter] key.
 - b. Use the Area-Length method to trace the left ventricular inner membrane. The LVLA4d and LVL4d line are displayed.
 - c. Use the trackball to adjust the left ventricular long-axis length (LVL4d) and press the [Enter] key.
4. Measure the left ventricular lumen area (LVLA4s) and the left ventricular long axis length (LVL4s) using the end-systolic image.
 - a. Press the [Enter]key.
 - b. Use the Area-Length method to trace the left ventricular inner membrane. The LVLA4s and LVL4s line are displayed.
 - c. Use the trackball to adjust the left ventricular long-axis length (LVL4d) and press the [Enter] key.
5. Display end-diastolic and end-systolic images of the apical two-chamber view for the same cardiac cycle in B/B mode.
 - a. Press the [Freeze]key.
 - b. Display end-diastolic and end-systolic images of the apical two-chamber view for the same cardiac cycle in B/B mode.
 - c. Press the [Freeze]key.
 - d. Press the [Caliper]key.

6. Measure the left ventricular chamber area (LVLA2d) and left ventricular long-axis length (LVL2d) on the end-diastolic image in the same way as step 3.
7. Measure the left ventricular lumen area (LVLA2s) and the left ventricular long axis length (LVL2s) using the end-systolic image in the same way as step 4.

When the electrocardiogram is hidden

Press [Caliper] key, and enter the heart rate in the displayed dialog.

Example of Measurement Results Display

Simpson (Disc)	
LVL4d: . mm	: Left ventricular long-axis diameter of the apical four-chamber view (end diastole)
LVLA4d: . cm ²	: Left ventricular long-axis area of the apical four-chamber view (end diastole)
LVL2d: . mm	: Left ventricular long axis length in apical two-chamber view (end diastole)
LVLA2d: . cm ²	: Left ventricular long-axis area of the apical two-chamber view (end diastole)
LVL4s: . mm	: Left ventricular long axis length in apical four-chamber view (end systole)
LVLA4s: . cm ²	: Left ventricular long-axis area of the apical four-chamber view (end systole)
LVL2s: . mm	: Left ventricular long axis length in apical two-chamber view (end systole)
LVLA2s: . cm ²	: Left ventricular long-axis area of the apical two-chamber view (end systole)
HR: BPM	: Heart rate
EDV: ml	: Left ventricular volume at end diastole
ESV: ml	: Left ventricular volume at end systole
SV: ml	: Stroke volume
CO: l/m	: Cardiac output
EF: %	: Ejection fraction
%difD: %	: Displacement of the end-diastolic left ventricular long-axis length (LVL4d and LVL2d)
%difS: %	: Displacement of the end-systolic left ventricular long-axis length (LVL4s and LVL2s)

If %difD and %difS are higher than 20%, it is possible that the cardiac apical cross section is not rendered correctly. In this case, the system will display the left ventricular volume (EDV, ESV) as "****ml". Redraw a suitable apical image and then re-measure.

Reference information

2.2.1(3) Volume Measurement: Volume1/Volume2 on page 41

Left Ventricular Function Measurements: BP-Ellipse

Measure the left ventricular chamber area (LVLA) and left ventricular long-axis length (LVL) on the apical two-chamber or four-chamber cross sectional view. Also, measure the left ventricular short-axis area (LVSAMV) and left ventricular short-axis diameter (LVSLMV) on the left ventricular short-axis view (at the mitral valve).

Using these measurements, calculate indices such as LV volume, Stroke volume, Cardiac output, and Ejection fraction.

Measured position

LVLA



(Apical four-chamber view)

LVL



(Apical two-chamber view)

LVSAMV



(Left ventricular short axis
image (mitral valve level))

Procedure

1. Display end-diastolic and end-systolic images of the apical two-chamber or four-chamber view for the same cardiac cycle in B/B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [BP-Ellipse] from the measurement menu.
4. Measure the left ventricular lumen area (LVLA_d) and left ventricular long axis length (LVLD) using the end-diastolic period image.
 - a. Use the Area-Length method to trace the left ventricular inner membrane on the end-diastolic image.
The LVLD line is displayed after the trace is closed.
 - b. Use the trackball to adjust the LVLD position and press [Enter] key.
5. Measure the left ventricular lumen area (LVLA_s) and left ventricular direct axis length (LVLS) using the end-systolic period image .
 - a. Press the [Enter]key.
 - b. Use the Area-Length method to trace the left ventricular inner membrane on the end-systolic image.
The LVLS line is displayed after the trace is closed.
 - c. Use the trackball to adjust the LVLS position and press [Enter] key.
6. Display the end-diastolic and end-systolic image of the left ventricular short axis view (mitral valve level) in the same cardiac cycle in B/B mode.
 - a. Press the [Freeze]key.
 - b. Display the end-diastolic and end-systolic image of the left ventricular short axis view (mitral valve level) in the same cardiac cycle in B/B mode.
 - c. Press the [Freeze]key.
 - d. Press the [Measurement] button on the touch panel and select [BP-Ellipse] from the measurement menu.
7. Measure the left ventricular short axis area (LVSAMV_d) and left ventricular short axis diameter (LVSLMV_d) with the end-diastolic period image.
 - a. Use the Area-Length method to trace the left ventricular inner membrane starting from the vicinity of the posterior commissure.

The LVSLMVd line is displayed after the trace is closed.

b. Use the trackball to adjust the LVSLMVd position and press [Enter] key.

8. Measure the left ventricular short-axis area (LVSAMVs) and left ventricular short-axis diameter (LVSLMVd) on the end-systolic image.

a. Press the [Enter]key.

b. Use the Area-Length method to trace the left ventricular inner membrane starting from the vicinity of the posterior commissure.

The LVSLMVd line is displayed after the trace is closed.

c. Use the trackball to adjust the LVSLMVd position and press [Enter] key.

When the electrocardiogram is hidden

Press [Caliper] key, and enter the heart rate in the displayed dialog.

Example of Measurement Results Display

BP-Ellipse	
LVLd: . mm	: Left ventricular long-axis diameter of the apical four-chamber view (end diastole)
LVLAd: . cm ²	: Left ventricular long-axis area of the apical four-chamber view (end diastole)
LVSAMVd: . cm ²	: Left ventricular long axis length in apical two-chamber view (end diastole)
LVSLMVd: . mm	: Left ventricular long-axis area of the apical two-chamber view (end diastole)
LVLs: . mm	: Left ventricular long axis length in apical four-chamber view (end systole)
LVLAs: . cm ²	: Left ventricular long-axis area of the apical four-chamber view (end systole)
LVSAMVs: . cm ²	: Left ventricular long axis length in apical two-chamber view (end systole)
LVSLMVs: . mm	: Left ventricular long-axis area of the apical two-chamber view (end systole)
HR: BPM	: Heart rate
EDV: ml	: Left ventricular volume at end diastole
ESV: ml	: Left ventricular volume at end systole
SV: ml	: Stroke volume
CO: l/m	: Cardiac output
EF: %	: Ejection fraction

Reference information

2.2.1(3) Volume Measurement: Volume1/Volume2 on page 41

Left Ventricular Function Measurements: Modified Simpson

Measure the left ventricular long-axis length (LVL) on the apical two-chamber or four-chamber cross section, measure the left ventricular short-axis area (LVSAMV) on the left ventricular short-axis view (at the mitral valve level), and measure the left ventricular short-axis area (LVSAPM) on the left ventricular short-axis view (at the papillary muscle level).

Using these measurements, calculate indices such as LV volume, Stroke volume, Cardiac output, and Ejection fraction.

Measured position

LVL



(Apical two-chamber view)

LVSAMV



(Left ventricular short axis
image (mitral valve level))

LVSAPM



(Left ventricular short-axis
image (papillary muscle level))

Procedure

1. Display end-diastolic and end-systolic images of the apical two-chamber or four-chamber view for the same cardiac cycle in B/B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [M-Simpson] from the measurement menu.
4. Measure the left ventricular long axis length (LVL).
 - a. Measure the left ventricular long-axis length (LVLd) on the end-diastolic image.
 - b. Measure the left ventricular long-axis length (LVLs) on the end-systolic image.
5. Measure the left ventricular short axis area (LVSAMV) with the left ventricular short axis image (mitral valve level).
 - a. Press the [Freeze]key.
 - b. Display the end-diastolic and end-systolic image of the left ventricular short axis view (mitral valve level) in the same cardiac cycle in B/B mode.
 - c. Press the [Freeze]key.
 - d. Press the [Measurement] button on the touch panel and select [M.Simpson] from the measurement menu.
 - e. Measure the left ventricular short-axis area (LVSAMVd) along the left ventricular inner membrane on the end-diastolic image.
 - f. Measure the left ventricular short-axis area (LVSAMVs) along the left ventricular inner membrane on the end-systolic image.
6. Measure the left ventricular short axis area (LVSAPM) with the left ventricular short axis image (papillary muscle level).
 - a. Press the [Freeze]key.
 - b. Display the end-diastolic and end-systolic image of the left ventricular short axis view (papillary muscle level) in the same cardiac cycle in B/B mode.
 - c. Press the [Freeze]key.
 - d. Press the [Measurement] button on the touch panel and select [M.Simpson] from the measurement menu.

- e. Measure the left ventricular short-axis area (LVSAPMd) along the left ventricular inner membrane on the end-diastolic image.
- f. Measure the left ventricular short-axis area (LVSAPMs) along the left ventricular inner membrane on the end-systolic image.

When the electrocardiogram is hidden

Press [Caliper] key, and enter the heart rate in the displayed dialog.

Example of Measurement Results Display

M.Simpson		
LVLd : . mm	:	Left ventricular long axis diameter (end-diastolic)
LVSAMVd : . cm ²	:	Left ventricular short axis area at the mitral valve level (end-diastolic)
LVSAPMd : . cm ²	:	Left ventricular short axis area at the papillary muscle level (end diastolic)
LVLs : . mm	:	Left ventricular long axis diameter (end systolic)
LVSAMVs : . cm ²	:	Left ventricular short axis area at the mitral valve level (end-systolic)
LVSAPMs : . cm ²	:	Left ventricular short axis area at the papillary muscle level (end systolic)
HR : BPM	:	Heart rate
EDV : ml	:	Left ventricular volume at end diastole
ESV : ml	:	Left ventricular volume at end systole
SV : ml	:	Stroke volume
CO : l/m	:	Cardiac output
EF : %	:	Ejection fraction

Reference information

2.2.1(3) *Volume Measurement: Volume1/Volume2* on page 41

1.2.1 *Caliper Method* on page 27

1.2.4 *B Trace Method* on page 30

Left Ventricular Function Measurements: Bullet

Measure the left ventricular long-axis length (LVL) on the apical two-chamber or four-chamber view, and measure the left ventricular short-axis area (LVSAPM) on the left ventricular short-axis view (at the papillary muscle level).

Using these measurements, calculate indices such as LV volume, Stroke volume, Cardiac output, and Ejection fraction.

Measured position

LVL



(Apical two-chamber view)

LVSAPM



(Left ventricular short-axis image (papillary muscle level))

Procedure

1. Display end-diastolic and end-systolic images of the apical two-chamber or four-chamber view for the same cardiac cycle in B/B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [Bullet] from the measurement menu.
4. Measure the left ventricular long axis length (LVL).
 - a. Measure the left ventricular long-axis length (LVLd) on the end-diastolic image.
 - b. Measure the left ventricular long-axis length (LVLs) on the end-systolic image.
5. Measure the left ventricular short axis area (LVSAPM) with the left ventricular short axis image (papillary muscle level).
 - a. Press the [Freeze]key.
 - b. Display the end-diastolic and end-systolic image of the left ventricular short axis view (papillary muscle level) in the same cardiac cycle in B/B mode.
 - c. Press the [Freeze]key.
 - d. Press the [Measurement] button on the touch panel and select [Bullet] from the measurement menu.
 - e. Measure the left ventricular short-axis area (LVSAPMd) along the left ventricular inner membrane on the end-diastolic image.
 - f. Measure the left ventricular short-axis area (LVSAPMs) along the left ventricular inner membrane on the end-systolic image.

When the electrocardiogram is hidden

Press [Caliper] key, and enter the heart rate in the displayed dialog.

Example of Measurement Results Display

Bullet	
LVLd: . mm	: Left ventricular long axis diameter (end-diastolic)
LVSAPMd: . cm ²	: Left ventricular short axis area at the mitral valve level (end-diastolic)
LVLs: . mm	: Left ventricular long axis diameter (end systolic)
LVSAPMs: . cm ²	: Left ventricular short axis area at the papillary muscle level (end systolic)
HR: BPM	: Heart rate
EDV: ml	: Left ventricular volume at end diastole
ESV: ml	: Left ventricular volume at end systole
SV: ml	: Stroke volume
CO: l/m	: Cardiac output
EF: %	: Ejection fraction

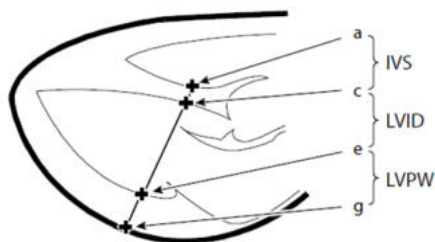
Reference information

1.2.1 Caliper Method on page 27

1.2.4 B Trace Method on page 30

Left Ventricular Function Measurements: Pombo, Teichholz, Gibson

Measuring the interventricular septal thickness (IVS), left ventricular short axis diameter (LVID) and left ventricular posterior wall thickness (LVPW) with left ventricular long axis image of the left sternal border.



Estimate the left ventricular long axis from the short axis diameter and calculate the indices for left ventricular volume, stroke volume, cardiac output, ejection fraction, etc. assuming the left ventricle as a spheroid.

Measuring using any of the following Pombo, Teichholz, or Gibson procedures.

Procedure

1. Display the end-diastolic image of the left ventricular long axis image (left sternal border).
2. Press the [Measurement] button on the touch panel.
3. Select [Pombo], [Teichholz], or [Gibson] from the measurement menu.
4. Measure the interventricular septal thickness (IVSd), left ventricle internal diameter (LVIDd), and left ventricle posterior wall thickness (LVPWd) on the end-diastolic image.
 - a. Move the caliper mark to the start point of IVSd.
 - b. Press the [Enter]key.
 - c. Move the caliper mark to the end point of IVSd.
 - d. Press the [Enter]key.
 - e. Move the caliper mark to the end point of LVIDd.
 - f. Press the [Enter]key.
 - g. Move the caliper mark to the end point of LVPWd.
 - h. Press [Enter] key.
5. Display the end-systolic image of the left ventricular long axis image (left sternal border).
6. Measure the interventricular septal thickness (IVSs), left ventricle internal diameter (LVIDs), and left ventricle posterior wall thickness (LVPWs) on the end-systolic image.
 - a. Press the [Measurement] button on the touch panel and select [Pombo], [Teichholz] or [Gibson] from the measurement menu.
 - b. Move the caliper mark to the start point of IVSs.
 - c. Press the [Enter]key.
 - d. Move the caliper mark to the end point of IVSs.
 - e. Press the [Enter]key.

- f. Move the caliper mark to the end point of LVIDs.
- g. Press the [Enter]key.
- h. Move the caliper mark to the end point of LVPWs.
- i. Press [Enter] key.

When the electrocardiogram is hidden

Press [Caliper] key, and enter the heart rate in the displayed dialog.

Teichholz		: Selected measurement menu
IVSd: . mm		: Interventricular Septal Thickness (end diastole)
LVIDd: . mm		: Left ventricular short-axis diameter (end diastole)
LVPWd: . mm		: LV posterior wall thickness (end diastole)
IVSs: . mm		: Interventricular Septal Thickness (end systole)
LVIDs: . mm		: Left ventricular short axis area at the papillary muscle level (end systolic)
LVPWs: . mm		: LV Posterior Wall Thickness (end systole)
HR:	BPM	: Heart rate
EDV:	ml	: Left ventricular volume at end diastole
ESV:	ml	: Left ventricular volume at end systole
SV:	ml	: Stroke volume
CO:	l/m	: Cardiac output
EF:	%	: Ejection fraction
FS:	%	: Left ventricular percent fractional shortening
mFS:	%	: midwall FS

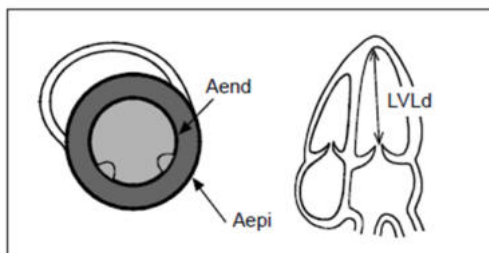
midwall FS is used to evaluate shrinkage ability in cases of cardiac hypertrophies. To display this index, navigate the preset to [Create Measurement Tools > Application Measurement > Measured Method and Display Items > B.Mode].

Reference information

1.2.1 Caliper Method on page 27

(2) Cardiac Mass Measurement: LV Mass

Measures the epicardial area (Aepi) and the endocardial area (Aend) from the left ventricular short axis image (papillary muscle level), and the left ventricular long-axis (LVLd) from the apical two-chamber or four-chamber view, to obtain the left ventricular myocardial mass (LVM).



Measured position

Procedure

1. Display the end-diastolic image of the left ventricular short axis image (at the papillary muscle level).
2. Press the [Measurement] button on the touch panel.
3. Select [LV Mass(AL)] from the measurement menu.
4. Measure the epicardial area (Aepi) using the Trace method.
While paying attention to the structural region of the right ventricle side, trace the inside border of the very bright region.
5. Measure the endocardial area (Aend) using the Trace method.
Exclude papillary muscle and trabeculae carneae from tracing.
6. Display the end-diastolic image of the apical two-chamber or four-chamber view.
 - a. Press the [Freeze]key.
 - b. Display the end-diastolic image of the apical two-chamber or four-chamber view.
 - c. Press the [Freeze]key.
 - d. Press the [Caliper]key.
7. Measure the left ventricular long axis length (LVLd) using the Caliper method.

LV Mass (AL)	
LVM: . g	: Left ventricular mass
Aepi . cm ²	: Epicardial area
Aend . cm ²	: Endocardial area
LVLd: . mm	: Left ventricular long axis length (end diastole)

Reference information

1.2.4 B Trace Method on page 30

1.2.1 Caliper Method on page 27

2.2.1(3) Volume Measurement: Volume1/Volume2 on page 41

(3) Right Ventricular Diameter Measurement: RVD

Measure the size of the right ventricle (RVD) from the left ventricle long-axis cross-section at the left edge of the sternum.

Procedure

1. Display the end-diastolic period of the left ventricle long-axis cross-section at the left edge of the sternum.
2. Press the [Measurement] button on the touch panel.
3. Select [RVD] from the measurement menu.
4. Using the Caliper method, measure the right ventricular diameter (RVD).

Example of Measurement Results Display

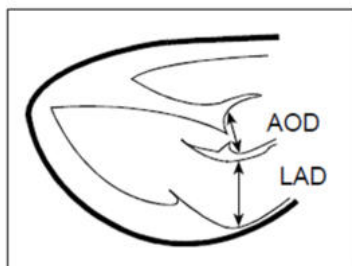
RVD	
RVDd: . mm	: Right Ventricular Diameter (diastole)

Reference information

1.2.1 Caliper Method on page 27

(4) Left Atrial - Aortic Valve Measurement: LA/AO

Measure the aortic diameter (AODd) and the left atrial diameter (LADs) on the left ventricular long-axis cross section (left sternal border), and obtain the ratio (LA/AO).



Measured position

Procedure

1. Display the end-diastolic and end-systolic images of the left ventricular long axis image at the left edge of the sternum for the same cardiac cycle in B/B mode.
2. Press the [Measurement] button on the touch panel.
3. Select [LA/AO] from the measurement menu.
4. Measure the aortic diameter (AODd) with the end-diastolic image.
5. Measure the left atrial diameter (LADs) with the end-systolic image.

Example of Measurement Results Display

LA/AO	
LADs: . mm	: Left atrial diameter at end systole
AODd: . mm	: Aortic root Diameter at end diastole
LA/AO:	: Left atrial dimension and aortic diameter ratio

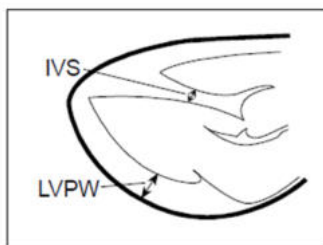
Reference information

1.2.1 Caliper Method on page 27

(5) Measurement of Myocardium Thickness Ratio and Measurement of Percent Systolic Wall Thickening: Ratio

Measure the interventricular septum (IVS) and also the left ventricular posterior wall thickness (LVPW) from the left ventricle long-axis cross section at the left edge of the sternum to calculate the ratio of the interventricular septum versus left ventricular posterior wall thickness (IVS/LVPW).

Measured position



Procedure

1. Display the end-diastolic image of the left ventricular long axis image (left sternal border).
2. Press the [Measurement] button on the touch panel.
3. Select [Ratio] from the measurement menu.
4. Measure the interventricular septal thickness (IVSd) on the end-diastolic image.
5. Measure the left ventricular posterior wall thickness (LVPWd) on the end-diastolic image.
The ratio of the interventricular septum versus left ventricular posterior wall thickness (IVS/LVPW) is displayed.

Example of Measurement Results Display

Ratio	
IVSd: . mm	: Interventricular septal thickness at end diastole
LVPWd: . mm	: Left ventricular posterior wall thickness at end diastole
IVS/LVPW:	: The ratio of the interventricular septum versus left ventricular posterior wall thickness

To calculate the percent systolic wall thickening (%IVSTF and %PWTF), use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > B.Mode]) to set the measurement parameter to Ratio. Once you measure the end-diastolic and end-systolic LVPW and IVS of the left ventricular long-axis (left sternal border) image for the same cardiac cycle, the ratio of the systolic wall thickness change is displayed.

Reference information

1.2.1 Caliper Method on page 27

(6) Stenosis valve area measurement: MVA, AVA

Obtain the area of the aortic valve orifice from the sax cross-section at the aortic valve level (the aortic base at the left edge of the sternum) to measure AVA.
Obtain the area of the mitral valve orifice from the sax cross-section at the mitral valve level to measure MVA.

Procedure

1. Display by zooming in on the target cross-section.
2. Press the [Measurement] button on the touch panel.

- From the measurement menu, select [AVA] for the area of the aortic valve orifice, and select [MVA] for the area of the mitral valve orifice.
- Using the Trace method, trace the inner circumference of the valve.

Example of Measurement Results Display

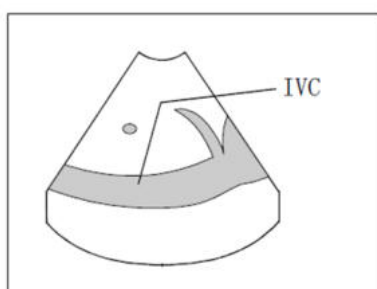
AVA	: Measurement name (Aortic valve area measurement)
AVA: . cm ²	: Aortic Valve Area

Reference information

1.2.4 B Trace Method on page 30

(7) Inferior Vena Cava Diameter Measurement: IVC measurement

The Collapse Index is obtained with the measurement of vena cava inferior diameters at the time of inspiration and exhalation.



Measured position

Procedure

- Record an image of the inferior vena cava during inspiration and expiration.
- Display the image at inspiration.
- Press the [Measurement] button on the touch panel.
- Select [IVC] from the measurement menu.
- Using the Caliper method, measure the inferior vena cava diameter at inspiration time.
- Display the image at expiration.
- Press the [Measurement] button on the touch panel.
- Using the Caliper method, measure the inferior vena cava diameter at exhalation time. Once you measure the inferior vena cava diameters at the time of inspiration and exhalation, Collapse Index is displayed.

Example of Measurement Results Display

IVC	
Insp: . mm	: Inferior vena cava diameter during inspiration
Exp: . mm	: Inferior vena cava diameter during expiration
%Collapse: %	: Collapse Index

Reference information

1.2.1 Caliper Method on page 27

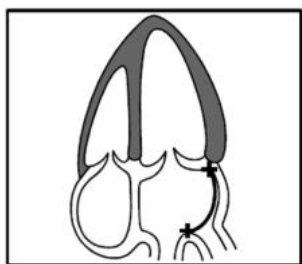
(8) Left Atrial Volume Measurement: LA Volume, Right Atrial Volume Measurement: RA Volume

Measure the left or right atrial areas (LALAs or RALAs) and left or right atrial diameter (cLALs or RALs) from the end-systolic apical two-chamber and four-chamber view to calculate the left or right atrial volume (LAvol. or RA vol.). There are two measurement methods: Area-Length and Simpson.

Using the Area-length Method for Measuring

Procedure

1. Display the apical four-chamber view at end systole.
2. Press the [Measurement] button on the touch panel.
3. Select the measurement menu.
 - To measure the LA volume, select [LA Vol.(AL)].
 - To measure the RA volume, select [RA Vol.(AL)].
4. Trace the inner membrane of the right or left atrium.
 - a. Move the + mark to the annulus and press [Enter] key.
 - b. Trace in the direction of the pulmonary vein.



- c. Trace to the other annulus, then press [Enter] key.



The long axis line (LAL4s or RAL4s) is displayed.

- d. Set LAL4s or RAL4s.
5. Display the end-systolic apical two-chamber view.
 - a. Press the [Freeze]key.
 - b. Display the end-systolic apical two-chamber view.
 - c. Press the [Freeze]key.

- d. Press the [Caliper]key.
6. Measure the left or right atrial areas on the end-systolic apical two-chamber view while referring to step 4.

Example of Measurement Results Display

LAVol. (AL)	
LAL4s: . mm ³	: Left atrial diameter (four-chamber view)
LALA4s: . cm ²	: Left atrial area (four-chamber view)
LAL2s: . mm	: Left atrial diameter (two-chamber view)
LALA2s: . cm ²	: Left atrial area (two-chamber view)
LAVol.: . ml	: Left atrial volume
%difs: . %	: Difference in long axis length obtained in four-chamber and two-chamber view

Reference information

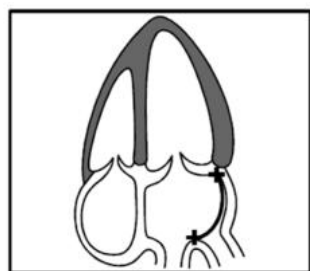
2.2.1(3) Volume Measurement: Volume1/Volume2 on page 41

Left Ventricular Function Measurements: Area-Length on page 351

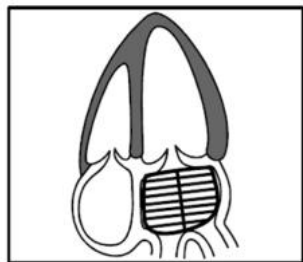
Using the Simpson Method for Measuring

Procedure

1. Display the apical four-chamber view at end systole.
2. Press the [Measurement] button on the touch panel.
3. Select the [LA Vol.(Simpson)] or [RA Vol.(Simpson)] from the measurement menu.
 - To measure the LA volume, select [LA Vol.(Simpson)].
 - To measure the RA volume, select [RA Vol.(Simpson)].
4. Trace the left or right atrial cavity.
 - a. Move the + mark to the annulus and press [Enter] key.
 - b. Trace in the direction of the pulmonary vein.



- c. Trace to the other annulus, then press [Enter] key.



The long axis line (LAL4s or RAL4s) is displayed.

- d. Set LAL4s or RAL4s.
5. Display the end-systolic apical two-chamber view.
 - a. Press the [Freeze]key.
 - b. Display the end-systolic apical two-chamber view.
 - c. Press the [Freeze]key.
 - d. Press the [Caliper]key.
6. Measure the left or right atrial areas on the end-systolic apical two-chamber view while referring to step 4.

Example of Measurement Results Display

LAvol.Simpson	
LAL4s: . mm ³	: Left atrial diameter (four-chamber view)
LALA4s: . cm ²	: Left atrial area (four-chamber view)
LAL2s: . mm	: Left atrial diameter (two-chamber view)
LALA2s: . cm ²	: Left atrial area (two-chamber view)
LAvol.: . ml	: Left atrial volume
%difS: . %	: Difference in long axis length obtained in four-chamber and two-chamber view

Reference information

2.2.1(3) Volume Measurement: Volume1/Volume2 on page 41

Left Ventricular Function Measurements: Area-Length on page 351

8.2.2 M Mode

(1) Left Ventricular Function Measurements: Pombo, Teichholz, Gibson

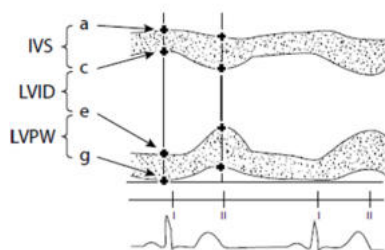
Measure the interventricular septal thickness (IVS), ventricular short-axis diameter (LVID), and left ventricle posterior wall thickness (LVPW) on the left ventricle M mode cardiac echo diagram recorded from the left ventricular long-axis view (at the left sternal border). Calculate indices such as LV volume, Stroke volume, Cardiac output, and Ejection fraction. Follow the steps below to use the Pombo, Teichholz, or Gibson procedures.

Procedure

1. Record a left ventricle M mode cardiac echo diagram from the left ventricle long-axis view at the left sternal border.
Position the cursor on A (as shown in the figure) on the left ventricular long-axis view (left sternal border).



2. Press the [Measurement] button on the touch panel.
3. Select [Pombo], [Teichholz], or [Gibson] from the measurement menu.
4. Measure the interventricular septal thickness (IVSd), left ventricle short-axis diameter (LVIDd), and left ventricle posterior wall thickness (LVPWd) at end diastole.



- a. Move the caliper mark to the start point of end-diastolic IVSd.
 - b. Press the [Enter]key.
 - c. Move the caliper mark to the end point of IVSd.
 - d. Press the [Enter]key.
 - e. Move the caliper mark to the end point of LVIDd.
 - f. Press the [Enter]key.
 - g. Move the caliper mark to the end point of LVPWd.
 - h. Press the [Enter]key.
5. Measure the interventricular septal thickness at end systole (IVSs), left ventricle short axis diameter (LVIDs), and left ventricle posterior wall thickness (LVPWs).
 - a. Move the caliper mark to the start point of end-systolic IVSs.
 - b. Press the [Enter]key.
 - c. Move the caliper mark to the end point of IVSs.
 - d. Press the [Enter]key.
 - e. Move the caliper mark to the end point of LVIDs.
 - f. Press the [Enter]key.
 - g. Move the caliper mark to the end point of LVPWs.

6. Use the Caliper method to measure one heartbeat (if the ECG is not displayed).
 - a. Press the [Enter]key.
 - b. Measure one heartbeat.

Example of Measurement Results Display

Teichholz	: Selected measurement menu
IVSd: . mm	: Interventricular Septal Thickness (end diastole)
LVIDd: . mm	: Left ventricular short-axis diameter (end diastole)
LVPWd: . mm	: LV posterior wall thickness (end diastole)
IVSs: . mm	: Interventricular Septal Thickness (end systole)
LVIDs: . mm	: Left ventricular short-axis diameter (end-systole)
LVPWs: . mm	: LV Posterior Wall Thickness (systole)
HR: . BPM	: Heart rate
EDV: . ml	: Left ventricular volume at end diastole
ESV: . ml	: Left ventricular volume at end systole
SV: . ml	: Stroke volume
CO: . l/m	: Cardiac output
EF: . %	: Ejection fraction
FS: . %	: Left ventricular percent fractional shortening
mFS: . %	: midwall FS

midwall FS is used to evaluate shrinkage ability in cases of cardiac hypertrophies. To display this index, navigate the preset to [Create Measurement Tools > Application Measurement > Measured Method and Display Items > M.Mode].

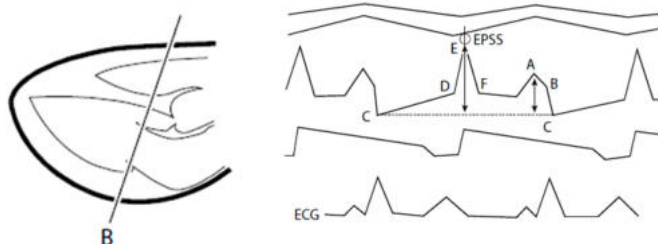
Reference information

2.2.2(3) Heart Rate Measurement: Heart Rate on page 52

(2) Mitral Valve Measurement: Mitral Valve

This measures the mobility of the mitral valve cusp.

Cursor position: M mode cardiac echo diagram
 B on the left ventricle
 long-axis view (left
 sternal border)



Procedure

1. Record the M mode echo diagram of the mitral valve from the left ventricular long axis image at the left sternal border.
2. Press the [Measurement] button on the touch panel.
3. Select [Mitral V] from the measurement menu.
4. Move the caliper mark to C point, then press the [Enter] key.
5. Move the Caliper mark to the E point and press [Enter] key.
6. Move the Caliper mark to the F point and press [Enter] key.
7. Move the caliper mark to A point, then press the [Enter] key.
8. Measure EPSS using the Caliper method.

Example of Measurement Results Display

Mitral V	
C-Eamp: mm	: C-E amplitude
C-Aamp: mm	: C-A amplitude
E-Fslop: mm/s	: Mitral valve E-F slope
EPSS: mm	: Distance from E point to interventricular septum
E/A:	: E wave / A wave

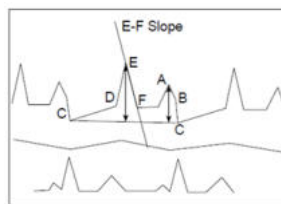
(3) Tricuspid Valve Measurement: Tricuspid Valve

This measures the mobility of the tricuspid valve cusp.

Cursor position:

Schematic M mode cardiac echo diagram

Left ventricular short-axis image (aortic valve level)



Procedure

1. Record an M mode cardiac echo diagram of the tricuspid valve from the left ventricular short-axis view (aortic valve level).
2. Press the [Measurement] button on the touch panel.
3. Select [Tricuspid V] from the measurement menu.
4. Move the caliper mark to C point, then press the [Enter] key.
5. Move the caliper mark to D point, then press the [Enter] key.
6. Move the caliper mark to E point, then press the [Enter] key.

7. Move the caliper mark to F point, then press the [Enter] key.
8. Move the caliper mark to A point, then press the [Enter] key.

Example of Measurement Results Display

Tricuspid V	
C-Eamp: mm	: C-E amplitude
C-Aamp: mm	: C-A amplitude
E-Fslop: mm/s	: Tricuspid valve E-F slope
D-Eslop: mm/s	: Tricuspid valve D-E slope
D-Eamp: mm	: D-E amplitude
E/A:	: E wave / A wave

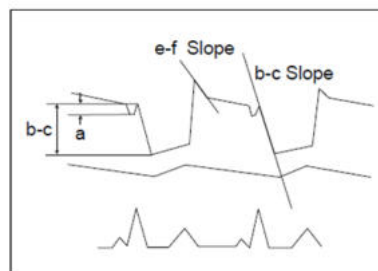
(4) Pulmonary Valve Measurement: Pulmonary Valve

This measures the mobility of the pulmonary valve cusp.

Cursor position:

Schematic M mode cardiac echo diagram

Left ventricular short-axis image (aortic valve level)



Procedure

1. Record an M mode cardiac echo diagram of the tricuspid valve from the end-diastolic left ventricle long-axis view (the left sternal border).
2. Press the [Measurement] button on the touch panel.
3. Select [Pulmonary V] from the measurement menu.
4. Move the Caliper mark to the a point and press [Enter].
5. Move the Caliper mark to the b point and press [Enter].
6. Move the Caliper mark to the c point and press [Enter].
7. Move the Caliper mark to the e point and press [Enter].
8. Move the Caliper mark to the f point and press [Enter].

Example of Measurement Results Display

Pulmonary V	
A wave amp: mm	: "A" wave amplitude

E-Fslop: mm/s	: E-F Slope
B-Cslop: mm/s	: B-C Slope
B-Camp: mm	: B-C amplitude

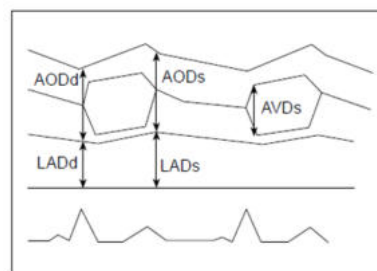
(5) Left Atrial - Aortic Valve Measurement: LA/AO

Measures the aortic root diameter (AODd) and the left atrial diameter (LADs), and obtain the ratio between them (LA/AO).

Cursor position: Left ventricular long axis view
(left sternal border) C in the figure below



Schematic M mode cardiac echo diagram



Procedure

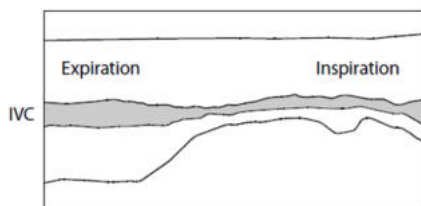
- Record the aortic valve M mode ECG diagram from the left ventricular long axis image at the left sternal border.
- Press the [Measurement] button on the touch panel.
- Select [LA/AO] from the measurement menu.
- Measure the aortic diameter (AODd) at end diastole.
 - Move the caliper mark to the start point of end-diastolic AODd.
 - Press the [Enter]key.
 - Move the caliper mark to the end point of AODd.
 - Press the [Enter]key.
- Measure the left atrial dimension (LADs) at end systole.
 - Move the caliper mark to the start point of end-systolic LADs.
 - Press the [Enter]key.
 - Move the caliper mark to the end point of LADs.
 - Press the [Enter]key.
- Measure AVDs.
 - Move the caliper mark to the start point of AVDs.
 - Press the [Enter]key.
 - Move the caliper mark to the end point of AVDs.
 - Press the [Enter]key.

Example of Measurement Results Display

LA/AO		
LADs :	mm	: Left atrial diameter at end systole
AODd :	mm	: Aortic diameter at end diastole
AVDs :	mm	: Aortic valve diameter (systole)
LA/AO :		: LADs/AODd

(6) Inferior Vena Cava Diameter Measurement: IVC

The Collapse Index is obtained with the measurement of vena cava inferior diameters at the time of inspiration and exhalation.



Measured position

Procedure

1. Record an M mode image of the inferior vena cava during inspiration and expiration.
2. Press the [Measurement] button on the touch panel.
3. Select [IVC] from the measurement menu.
4. Using the Caliper method, measure the inferior vena cava diameter at inspiration time.
5. Using the Caliper method, measure the inferior vena cava diameter at expiration time.
Once you measure the inferior vena cava diameters at the time of inspiration and exhalation, Collapse Index is displayed.

Example of Measurement Results Display

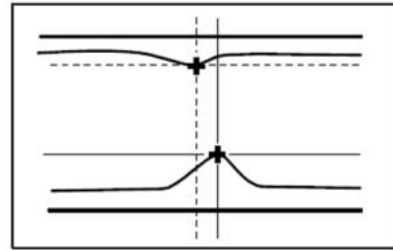
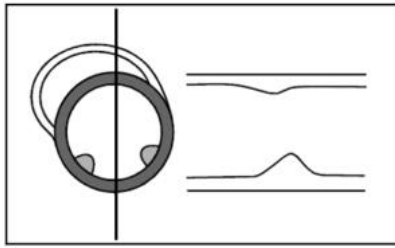
IVC		
Insp: .	mm	: Inferior vena cava diameter during inspiration
Exp: .	mm	: Inferior vena cava diameter during expiration
%Collapse:	%	: Collapse Index

(7) Asynchrony Measurements

Measure the septal-to posterior wall motion delay (SPWMD) from the left ventricular short-axis tomographic image (at papillary muscle level) in M mode.

B/M mode

Schematic M mode cardiac echo diagram



You can select this measurement from Asynchrony Study.

Procedure

1. Record an M mode image from the left ventricular short-axis tomographic image (at papillary muscle level).
Set the Sweep Speed value for capturing images to at least 100 mm/sec.
2. Press the [Measurement] button on the touch panel.
3. Select [IntraV. Async.] from the measurement menu.
4. Measure SPWMD.
 - a. Move the caliper mark to the phase in which the interventricular septal is most contracted, then press [Enter] key.
 - b. Move the caliper mark to the phase of the maximal inward movement of the LV posterior wall, then press [Enter] key.

Measuring the time difference in other locations

Use Intraventricular Asynchrony in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > M.Mode]) to add T1, T2, and T3 to the measurement parameters. Names can be set to T1, T2, T3.

Example of Measurement Results Display

IntraV.Async.	
SPWMD: ms	: Septal to posterior wall motion delay

8.2.3 D Mode

The following precautions are necessary when taking measurements in D mode.

- When you record an arterial flow Doppler waveform (pulse method) other than the cardiac, set the smallest possible Doppler angle of incidence. If the Doppler angle of incidence 60° , the blood velocity measurement error increases.
- When measuring the blood velocity using multiple blood flow waveform images, use identical recording conditions (forward and reverse flow directions) for all blood flow waveforms. The blood flow measurement values of the system are recorded as real numbers but the $\pm$ sign is not displayed on the screen.
Completely different values may be displayed, especially when the system is set to display measured values as average values in reports (and Display Data is set to "Average" in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > Report Data])).

(1) Aortic Valve D Mode Measurements

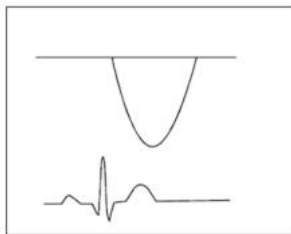
Left Ventricular Ejection Flow Measurement: LVOT Flow

Measure the velocity time integral (VTI) and left ventricular outflow tract diameter (LVOT) from the left ventricular outflow tract flow velocity waveform at systole, then calculate the ejection volume.

Apical long-axis view



Schematic diagram of left ventricle out tract flow waveform



Select a measurement method by setting LVOT Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods& Display Items > D.Mode]).

Procedure

1. Record the left ventricular ejection flow velocity waveform.
2. Press the [Measurement] button on the touch panel.
3. Select [LVOT Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the left ventricle out tract flow waveform.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.
6. If the ECG is not displayed, measure the heart rate (HR) for a single heartbeat.
7. Display the mesosystolic long-axis cross section at the left sternal border.
 - a. Press the [Freeze]key.
 - b. Display the mesosystolic long-axis cross section at the left sternal border.
Enlarge the flow path to increase measurement accuracy.
 - c. Press the [Freeze]key.
 - d. Press the [Measurement] button on the touch panel and select [LVOT Flow] from the measurement menu.
8. Measure the flow path diameter (CSA(LVOT)) using the Caliper method.
The cross-sectional area (CSA) is calculated assuming a circular outflow tract diameter.

Example of Measurement Results Display

LVOT Flow		
pV:	cm/s	: Peak blood flow velocity
PG:	mmHg	: Peak pressure gradient
MnV:	cm/s	: Mean velocity*
VTI:	cm	: Velocity-time integral value*

LVOT:	mm	: Left ventricular outflow tract
CSA:	cm ²	: Left ventricular outflow tract cross-sectional area
SV:	ml	: Stroke volume*
HR:	BPM	: Heart rate
CO:	l/m	: Cardiac output*
Qp/Qs:		: Ratio of pulmonic flow to systemic flow* (Displayed if LVOT Flow and RVOT Flow are measured)

*

Each value is displayed after tracing Doppler wave form by Doppler Trace method.

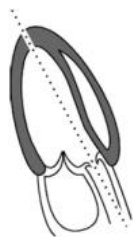
Reference information

1.2.5 Doppler Trace Method on page 31

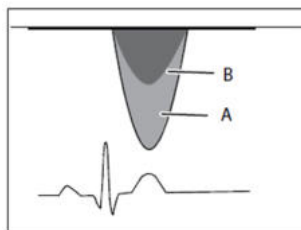
Aortic stenosis flow measurement: AS Flow

Obtain peak velocity (pV), peak pressure gradient (PG), mean pressure gradient (MPG) and valve area (AVA) from the aortic stenosis flow velocity waveform.

Apical long-axis view



Schematic diagram of left ventricle out tract flow waveform



A: Aortic stenosis flow velocity waveform

B: Left ventricle out tract flow waveform

Select a measurement method by setting AS Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

Procedure

1. Record the aortic stenosis flow velocity waveform in CW mode.
2. Press the [Measurement] button on the touch panel.
3. Select [AS Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the aortic stenosis flow velocity waveform.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.
6. If valve area (AVA) is calculated, measure LVOT Flow.

Example of Measurement Results Display

AS Flow		
pV:	cm/s	: Maximum velocity at valve stenosis
PG:	mmHg	: Peak pressure gradient at valve stenosis
MnV:	cm/s	: Mean velocity at valve stenosis*1

MPG:	mmHg	: Mean pressure gradient at valve stenosis*1
VTI:	cm	: Velocity-time integral value of valve stenosis flow*1
LVOT:	mm	: Left ventricular outflow tract (Displayed when LVOT Flow is measured.)
CSA:	cm ²	: Cross-Sectional Area (Displayed when CSA(LVOT) is measured.)
VTI (LVOT) :	cm	: Velocity-time integral (Displayed when LVOT Flow and CSA(LVOT) are measured.)
AVA:	cm ²	: Aortic valve area*1 (Displayed if LVOT Flow and CSA(LVOT) are measured)

*1

Each value is displayed after tracing Doppler wave form by Doppler Trace method.

Reference information

1.2.5 Doppler Trace Method on page 31

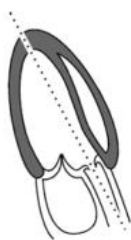
1.2.1 Caliper Method on page 27

Left Ventricular Ejection Flow Measurement: LVOT Flow on page 376

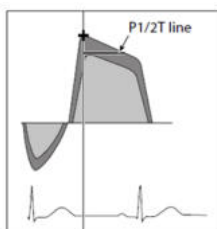
Aortic valve regurgitation flow measurement: AR Flow

Obtain the peak velocity (pV), peak pressure gradient (PG), etc, from the aortic regurgitation velocity waveform.

Apical long-axis view



Schematic diagram of blood velocity waveform during aortic regurgitation



Select a measurement method by setting AR flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

Procedure

1. Record the aortic valve regurgitation velocity waveform in CW mode.
2. Press the [Measurement] button on the touch panel.
3. Select [AR Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the aortic regurgitation velocity waveform.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.
6. Measure the pressure half-time (P1/2T).

Pressure half-time measurements

Use the Caliper method if the detection method for pressure half time (P1/2T) is Caliper or Max.F.Trace is set for the Point method.

If Max.F.Trace has been set for the Doppler Trace method (Auto or Manual), the measurement will be displayed in step 4 (Max.F.Trace detection).

Example of Measurement Results Display

AR Flow		
pV:	cm/s	: Maximum valve regurgitation velocity
PG:	mmHg	: Peak pressure gradient for valve regurgitation
MnV:	cm/s	: Mean velocity of valve regurgitation*1
MPG:	mmHg	: Mean pressure gradient for valve regurgitation*1
P1/2T:	ms	: Pressure half-time of valve regurgitant flow

*1

Each value is displayed after tracing Doppler wave form by Doppler Trace method.

Reference information

1.2.5 Doppler Trace Method on page 31

1.2.1 Caliper Method on page 27

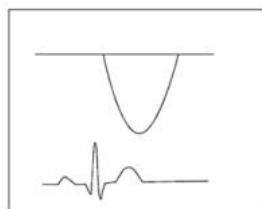
2.2.3(7) Pressure Half-Time Measurements: P1/2T on page 59

(2) D Mode Measurements for Pulmonary Valve

Right ventricular ejection flow measurement: RVOT Flow

Measures the velocity-time integral value (VTI) and right ventricular outflow tract diameter (LVOT) from the systolic right ventricular outflow tract flow waveform to calculate the ejection volume.

Left ventricular short-axis image Schematic diagram of right ventricular outflow tract flow waveform (aortic valve level)

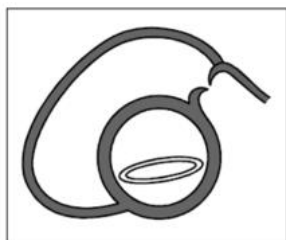


Select a measurement method by setting RVOT Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

Procedure

1. Record the blood flow waveform in the right ventricular outflow tract.
2. Press the [Measurement] button on the touch panel.
3. Select [RVOT Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the right ventricular out tract flow waveform.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.
6. Measure one heartbeat of the heart rate (HR) if the electrocardiogram is not displayed.
7. Display a cross section of the systolic right ventricular outflow path.
 - a. Press the [Freeze]key.

- b. Display a cross section of the systolic right ventricular outflow path.
Enlarge the flow path to increase measurement accuracy.
- c. Press the [Freeze]key.
- d. Press the [Caliper]key.



8. Measure the flow path diameter (CSA(RVOT)) using the Caliper method.
The flow path cross-sectional area (CSA) is calculated on the assumption that the outflow path diameter is the diameter of a complete circle.

Example of Measurement Results Display

RVOT Flow	
pV: . cm/s	: Peak blood flow velocity
PG: . mmHg	: Peak pressure gradient
MnV: . cm/s	: Mean velocity*1
VTI: . cm	: Velocity-time integral value*1
RVOT: . mm	: Right ventricular outflow diameter
CSA: . cm ²	: Right ventricular outflow tract cross-sectional area
SV: . ml	: Stroke volume*1
HR: . BPM	: Heart rate
CO: . l/m	: Cardiac output*1
Qp/Qs: .	: Pulmonary flow/systemic flow (displayed when pulmonary flow/systemic flow are measured)

*1

Each value is displayed after tracing Doppler wave form by Doppler Trace method.

Reference information

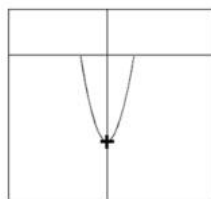
1.2.5 Doppler Trace Method on page 31

1.2.1 Caliper Method on page 27

Pulmonary stenosis flow measurement: PS Flow

Obtain the peak blood velocity (pV), peak pressure gradient (PG) and mean pressure gradient(MPG) from the pulmonary stenosis flow velocity waveform.

Left ventricular short-axis image (aortic valve level) Schematic diagram of the pulmonary stenosis flow velocity waveform



Select a measurement method by setting PS Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

Procedure

1. Record the pulmonary stenosis flow velocity waveform in CW mode.
2. Press the [Measurement] button on the touch panel.
3. Select [PS Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the pulmonary stenosis flow velocity waveform.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.

Example of Measurement Results Display

PS Flow		
pV:	cm/s	: Maximum velocity at valve stenosis
PG:	mmHg	: Peak pressure gradient at valve stenosis
MnV:	cm/s	: Mean velocity at valve stenosis*1
MPG:	mmHg	: Mean pressure gradient at valve stenosis*1

*1

Each value is displayed after tracing Doppler wave form by Doppler Trace method.

Reference information

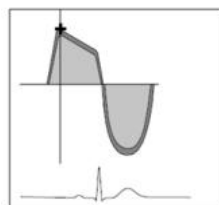
1.2.5 Doppler Trace Method on page 31

Pulmonary valve regurgitant flow measurement: PR Flow

Obtain the peak blood velocity (pV), peak pressure gradient (PG), etc, from the pulmonary regurgitation blood velocity waveform.

Left ventricular short-axis image
(aortic valve level)

Schematic diagram of pulmonary regurgitation blood velocity
waveform



Select a measurement method by setting PR Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

Procedure

1. Record the pulmonary regurgitation velocity waveform in CW mode.
2. Press the [Measurement] button on the touch panel.
3. Select [PR Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the pulmonary regurgitation velocity waveform.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.

Example of Measurement Results Display

PR Flow		
pV:	cm/s	: Maximum valve regurgitation velocity
PG:	mmHg	: Peak pressure gradient for valve regurgitation
MnV:	cm/s	: Mean velocity of valve regurgitation*1
MPG:	mmHg	: Mean pressure gradient for valve regurgitation*1

*1

Each value is displayed after tracing Doppler wave form by Doppler Trace method.

Reference information

1.2.5 Doppler Trace Method on page 31

(3) D mode measurements for mitral valve

Left ventricular inflow measurement: Trans M Flow

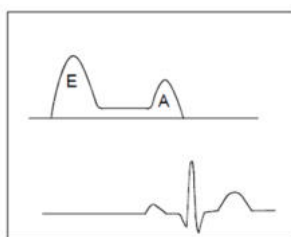
Obtain each left ventricle inflow velocity (eV, aV), the maximum velocity ratio (E/A), E wave deceleration time (DecT), and so on, from the left ventricle inflow velocity waveform.

Place the sample volume at the tip of the mitral valve in the apical left ventricular long axis image or four-chamber view and measure, positioning the ultrasound beam parallel to the left ventricular inflow.

Apical long-axis view



Schematic diagram of transmitral flow waveform



Select a measurement method by setting Trans M Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

Using the Doppler Trace Method for Measurement

Procedure

1. Record the left ventricle inflow velocity waveform.
2. Press the [Measurement] button on the touch panel.

3. Select [Trans M Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the left ventricle inflow waveforms.
The traced waveform is displayed. "E" on the traced waveform indicates the detected early diastolic left ventricular inflow velocity (eV). "A" indicates the detected mitral valve A-wave peak velocity (aV).
5. Adjust the each detection position if necessary.
 - a. Adjust the detection position of point E using the Trackball.
 - b. Press the [Enter]key.
 - c. Adjust the detection position of point A.
 - d. Measure the deceleration time (DecT) of E wave using the Caliper method.
 - e. Use the Caliper method to measure the pressure half time (P1/2T).
6. Using the Caliper method, measure the A wave duration (Adur).
The PV Adur and Adur time difference is displayed if there are PVA duration (PV Adur) measurement results with the PV Flow measurement.

Example of Measurement Results Display

Trans M Flow	
eV: cm/s	: Early diastolic left ventricular inflow velocity
aV: cm/s	: Mitral valve A-wave peak velocity
VTI: cm	: Velocity-time integral value
E/A:	: E/A ratio
DecT: ms	: Deceleration time
P1/2T: ms	: Pressure half-time
MVA: cm ²	: Mitral valve stenosis area
Adur: ms	: Atrial systolic period left ventricular inflow duration
PV Adur-Adur: ms	: PV Adur and Adur time difference

Reference information

1.2.5 Doppler Trace Method on page 31

1.2.1 Caliper Method on page 27

2.2.3(5) Acceleration (deceleration) Measurement: ACCEL on page 57

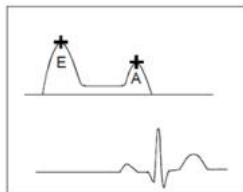
2.2.3(7) Pressure Half-Time Measurements: P1/2T on page 59

8.2.3(6) Pulmonary Vein Flow Measurement: PV Flow on page 391

Using the Point Method for Measurement

Procedure

1. Record the left ventricle inflow velocity waveform.
2. Press the [Measurement] button on the touch panel.
3. Select [Trans M Flow] from the measurement menu.
4. Move the Caliper mark to the "E" point (early diastolic left ventricular inflow velocity (eV)) and press [Enter] key.



5. Measure the E wave deceleration time (DecT).
6. Move the Caliper mark to the "A" point (mitral valve A-wave peak velocity (aV)) and press [Enter] key.
7. Use the Caliper method to measure the pressure half time.
The PV Adur and Adur time difference is displayed if there are PVA duration (PV Adur) measurement results with the PV Flow measurement.

Example of Measurement Results Display

Trans M Flow		
eV:	cm/s	: Early diastolic left ventricular inflow velocity
aV:	cm/s	: Mitral valve A-wave peak velocity
E/A:		: E/A ratio
DecT:	ms	: Deceleration time
P1/2T:	ms	: Pressure half-time
MVA:	cm ²	: Mitral valve stenosis area
Adur:	ms	: Atrial systolic period left ventricular inflow duration
PV Adur-Adur:	ms	: PV Adur and Adur time difference

Reference information

1.2.1 Caliper Method on page 27

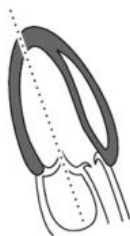
2.2.3(7) Pressure Half-Time Measurements: P1/2T on page 59

8.2.3(6) Pulmonary Vein Flow Measurement: PV Flow on page 391

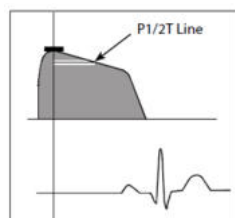
Mitral stenosis flow measurement: MS Flow

Obtain peak flow velocity (pV), peak pressure gradient (PG), mean pressure gradient (MPG) and valve area (AVA) from the flow velocity waveform in mitral stenosis.

Apical long-axis view



Schematic diagram of peak flow velocity across mitral valve stenosis



Select a measurement method by setting MS Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

Procedure

1. Record the flow velocity waveform in mitral stenosis in CW mode.
2. Press the [Measurement] button on the touch panel.
3. Select [MS Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the flow velocity waveform in mitral stenosis.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.
6. Measure the pressure half-time (P1/2T).

Pressure half-time measurements

Use the Caliper method to measure if the detection method is set to Point.
Displayed at the step 4 if Max.F.Trace uses the Doppler Trace method (Auto or Manual).

Example of Measurement Results Display

MS Flow		
pV:	cm/s	: Maximum velocity at valve stenosis
PG:	mmHg	: Peak pressure gradient at valve stenosis
MnV:	cm/s	: Mean velocity at valve stenosis*1
MPG:	mmHg	: Mean pressure gradient at valve stenosis*1
P1/2T:	ms	: Pressure half-time
MVA:	cm ²	: Mitral valve stenosis area

*1

Each value is displayed after tracing Doppler wave form by Doppler Trace method.

Reference information

1.2.5 Doppler Trace Method on page 31

2.2.3(7) Pressure Half-Time Measurements: P1/2T on page 59

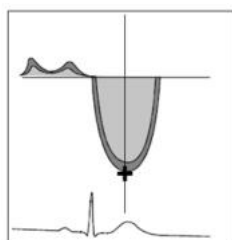
Mitral regurgitant flow measurement: MR Flow

Obtain peak flow velocity (pV), peak pressure gradient (PG) and other values from the mitral valve regurgitation flow waveform.

Apical long-axis view



Schematic diagram of mitral valve regurgitation waveform



Select a measurement method by setting MR Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

To measure dP/dt, set dP/dt to ON in the preset above.

Procedure

1. Record the mitral regurgitant flow waveform in CW mode.
When measuring dP/dt, setting the highest Sweep Speed improves accuracy.
2. Press the [Measurement] button on the touch panel.
3. Select [MR Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the mitral valve regurgitation flow waveform.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.
6. Measure dP/dt as required.
 - a. Move the caliper mark to the position of 1m/s on the waveform, then press [Enter] key.
 - b. Move the caliper mark to the position of 3m/s on the waveform, then press [Enter] key.

dP/dt can be measured between any two points.

Example of Measurement Results Display

MR Flow		
pV:	cm/s	: Maximum valve regurgitation velocity
PG:	mmHg	: Peak pressure gradient for valve regurgitation
MnV:	cm/s	: Mean velocity of valve regurgitation ^{*1}
MPG:	mmHg	: Mean pressure gradient for valve regurgitation ^{*1}
dP/dt:	mmHg/s	: dP/dt (if dP/dt is measured.)
PG1:	mmHg	: Pressure gradient at V1 (if dP/dt is measured.)
V1:	cm/s	: dP/dt measurement point 1 (if dP/dt is measured.)
PG2:	mmHg	: Pressure gradient at V2 (if dP/dt is measured.)
V2:	cm/s	: dP/dt measurement point 2 (if dP/dt is measured.)
dt:	ms	: Time difference between V1 and V2 (when dP/dt is measured.)

^{*1}

Each value is displayed after tracing Doppler wave form by Doppler Trace method.

Reference information

1.2.5 Doppler Trace Method on page 31

2.2.3(8) Dop Caliper Measurement: D.Caliper1, D.Caliper2 on page 60

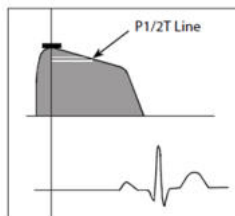
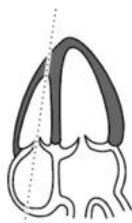
(4) D Mode Measurements for Tricuspid Valve

Tricuspid stenosis flow measurement: TS Flow

Obtain the peak blood velocity (pV), peak pressure gradient (PG) and mean pressure gradient (MPG) from the tricuspid stenosis blood velocity waveform.

Apical four-chamber view

Schematic diagram of tricuspid stenosis blood velocity waveform



Select a measurement method by setting TS Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

Procedure

1. Record the tricuspid stenosis flow velocity waveform in CW mode.
2. Press the [Measurement] button on the touch panel.
3. Select [TS Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the tricuspid stenosis blood velocity waveform.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.
6. Measure the pressure half-time (P1/2T).

Pressure half-time measurements

Use the Caliper method to measure if the detection method is set to Point.

Displayed at the step 4 if Max.F.Trace uses the Doppler Trace method (Auto or Manual).

Example of Measurement Results Display

TS Flow		
pV:	cm/s	: Maximum velocity at valve stenosis
PG:	mmHg	: Peak pressure gradient at valve stenosis
MnV:	cm/s	: Mean velocity across the valve stenosis (when measured using the Doppler Trace method)
MPG:	mmHg	: Mean pressure gradient across the valve stenosis (when measured using the Doppler Trace method)
P1/2T:	ms	: Pressure half-time

Reference information

1.2.5 Doppler Trace Method on page 31

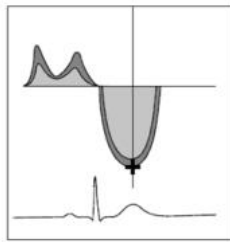
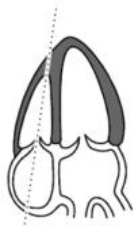
2.2.3(7) Pressure Half-Time Measurements: P1/2T on page 59

Tricuspid valve regurgitant flow measurement: TR Flow

Obtain peak flow velocity (pV), peak pressure gradient (PG) and other values from the tricuspid regurgitation velocity waveform.

Apical four-chamber view

Schematic diagram of tricuspid stenosis blood velocity waveform



Select a measurement method by setting TR Flow using the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

To measure dP/dt, set [dP/dt] to ON in the preset above.

Procedure

1. Record the tricuspid regurgitation velocity waveform in CW mode.
When measuring dP/dt, setting the highest Sweep Speed improves accuracy.
2. Press the [Measurement] button on the touch panel.
3. Select [TR Flow] from the measurement menu.
4. Use the Doppler Trace method to trace the tricuspid regurgitation velocity waveform.
5. Move the caliper mark to the peak flow velocity point, then press [Enter] key.
6. Measure dP/dt as required.
 - a. Press the [Caliper]key.
 - b. Move the caliper mark to the position of 1m/s on the waveform, then press [Enter] key.
 - c. Move the caliper mark to the position of 3m/s on the waveform, then press [Enter] key.

dP/dt can be measured between any two points.

7. Set the right atrial pressure if necessary.
The default setting for right atrial pressure is 10 mmHg.

- a. Press the [Caliper]key.
The dialog box is displayed.

RVSP = PG + RAP

RAP = mmHg

- b. Enter the right atrial pressure value from the keyboard, then press [Enter] key.
The right atrial pressure (RAP) and ventricular pressure (RVSP) is updated.

Example of Measurement Results Display

TR Flow		
pV:	cm/s	: Maximum valve regurgitation velocity
PG:	mmHg	: Peak pressure gradient for valve regurgitation

MnV:	cm/s	: Mean velocity of valve regurgitation*1
MPG:	mmHg	: Mean pressure gradient for valve regurgitation*1
dP/dt:	mmHg/s	: dP/dt (Displayed when dP/dt is measured.)
PG1:	mmHg	: Pressure gradient at V1 (Displayed if dP/dt is measured.)
V1:	cm/s	: dP/dt measurement point 1 (Displayed if dP/dt is measured.)
PG2:	mmHg	: Pressure gradient at V2 (Displayed if dP/dt is measured.)
V2:	cm/s	: dP/dt measurement point 2 (Displayed if dP/dt is measured.)
dt:	ms	: Time difference between V1 and V2 (when dP/dt is measured.)
RVSP:	mmHg	: Right ventricular systolic pressure
RAP:	mmHg	: Right atrial pressure

*1

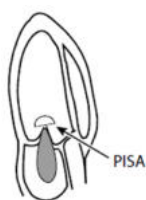
Each value is displayed after tracing Doppler wave form by Doppler Trace method.

Reference information

2.2.3(8) Dop Caliper Measurement: D.Caliper1, D.Caliper2 on page 60

(5) Proximal Isovelocity Surface Area Measurement: PISA

When there is valve regurgitation, hemispherical suction bloodstreams (acceleration flow) are formed at the upstream of the regurgitation. This semi-spherical surface area is known as the PISA (proximal isovelocity surface area).



PISA measurement procedure

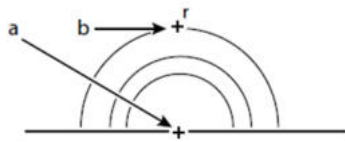
- Measure the radius r of semi-spherical-shaped aliasing area to obtain the effective regurgitant orifice area (EROA).
- Obtain the quantity of regurgitant volume (RV) by tracing the regurgitant blood flow waveform.

You can measure these for each valve. These measurements are mainly used for mitral regurgitation.

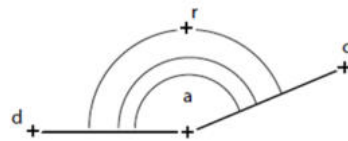
Procedure

1. Display an image of the target valve in B/Flow mode.
 - a. Record the target area in B/Flow mode.
 - b. Display the time phase frame in which the aliasing area (PISA) becomes maximum.
 - c. Zoom in on the aliasing region.
2. Press the [Measurement] button on the touch panel.
3. Select the measurement menu.
 - To measure at the mitral level, select [MR Vol.PISA].
 - To take measurements at the aortic level, select [AR Vol.PISA].
 - To take measurements at the tricuspid level, select [TR Vol.PISA].
 - To take measurements at the pulmonary level, select [PR Vol.PISA].

4. Measure the PISA Radius.



- Move the caliper mark to the center of the regurgitation valve and press [Enter] key.
- Move the caliper mark to the aliasing point, then press [Enter] key.
FR (flow rate), and Vr (the PISA radius acceleration flow velocity at maximum regurgitant flow time) are displayed.
- Use the trackball to move the line cursor to one side of the PISA, then press [Enter] key.



- Use the trackball to move the line cursor to the other side of the PISA, then press [Enter] key.

5. Trace the regurgitant blood flow waveform.

- Record the regurgitant blood flow waveform in CW mode.
- Press the [Caliper]key.
- Trace the regurgitant blood flow waveform.

The VTI, RV, EROA and FR are displayed.

6. Measure the regurgitation fraction (RF).

- Record the transmitral flow waveform for "MR Vol.PISA".
- Press the [Caliper]key.
- Trace the left ventricular inflow velocity.
VTI (MV annu) and MV diam are displayed.
- Press the [Caliper]key.
- Use the tomographic image to measure the cross sectional diameter, then press [Enter] key.

[Example: MR Vol.PISA]

Example of Measurement Results Display

MR Vol. PISA	
RV: . ml	: Regurgitant flow volume for one heartbeat
EROA: . cm ²	: Effective regurgitant orifice area
RF: . %	: Regurgitant fraction
FR: . ml/s	: Flow Rate
PISA r: mm	: PISA radius at maximum regurgitant flow time
Vr: . cm/s	: PISA r acceleration flow velocity

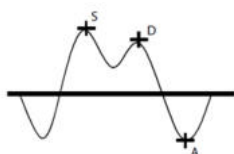
Angle: . °	: Angle correction value
VTI (MR) : . cm	: Time velocity integral of valve regurgitation
pV: . cm/s	: Maximum regurgitation velocity
VTI (MVannu) : . cm	: Velocity time integral of the left ventricular inflow waveform
MVdiam: . mm	: Mitral valve diameter
SV: . ml	: Mitral valve inflow value

Reference information

1.2.5 Doppler Trace Method on page 31

(6) Pulmonary Vein Flow Measurement: PV Flow

Measure the S-wave (forward flow velocity pattern), D-wave (diastolic forward flow velocity pattern) and A-wave (reversed flow velocity pattern of atrial systolic period) from pulmonary vein blood flow waveforms. These measurements will obtain S/D ratio, deceleration time, etc., that are useful indicators for determining defects in dilation of left ventricular. With these indexes, evaluation can be made to determine whether left ventricle inflow waveforms show normal diastolic filling or false normalization.



Procedure

1. Record pulmonary vein blood flow waveforms.
2. Press the [Measurement] button on the touch panel.
3. Select [PV Flow] from the measurement menu.
4. Move the+S mark to the S wave peak, then press [Enter] key.
5. Move the+D mark to the D wave peak, then press [Enter] key.
6. Move the+A mark to the A wave peak, then press [Enter] key.
7. Use the Caliper method to measure the atrial contracting wave during PVA duration (PV Adur).
8. Measure the deceleration time (DecT) of D wave using the Caliper method.

Example of Measurement Results Display

PV Flow	
PVS: . cm/s	: Maximum S wave flow velocity
PVD: . cm/s	: Maximum D wave flow velocity
S/D:	: S/D ratio
PVA: . cm/s	: Maximum A wave flow velocity
PVAdur: ms	: PVA duration

DecT:	ms	: D wave deceleration time
PVAdur-Adur:	ms	: Time difference between PVAdur and Adur (displayed when Adur has been calculated using Trans M Flow.)

Reference information

1.2.1 Caliper Method on page 27

(7) TDI PW Measurements

The TDI PW uses pulsed Doppler tissue imaging to obtain the myocardial movement velocities (Sm1 wave, Sm2 wave, Em wave and Am wave) and the velocity ratio (Em/Am) by setting a sample volume at myocardial tissues such as the mitral annulus region and the left ventricular wall.

The ratio of E/Em with the early diastole wave of the mitral annulus region (Em) can be calculated when early diastole waveform of the mitral annulus region (E-wave) is measured. The following 3 are on the measurement menu. Each measuring procedure is the same.

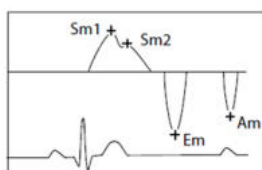
- TDI PW MA: Calculate the early diastolic mitral annular velocity (Em), atrial systolic mitral annular velocity (Am), and velocity ratio from the mitral valve annular velocity waveform.
- TDI PW 1: Measure the desired valve annulus or left ventricular posterior wall. The name can be changed.
- TDI PW 2: Measure the desired valve annulus or left ventricular posterior wall. The name can be changed.

There are two measurement methods, the Doppler Trace method (Auto, Manual) and Point method. Select TDI PW in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]).

Using the point method for measurement

Procedure

1. Switch the measurement Study to [TDI].
2. Record the mitral annulus velocity waveform.
 - a. Display the mitral valve annulus in TDI mode.
 - b. Set Sample Volume to the mitral annulus region.
 - c. Record the mitral annulus velocity waveform.
3. Press the [Measurement] button on the touch panel.
4. Select [TDI PW MA], [TDI PW 1], or [TDI PW 2] from the measurement menu.
5. Measure each point



- a. Move the caliper mark to Sm1, then press the [Enter] key.
- b. Move the caliper mark to Sm2, then press the [Enter] key.

- c. Move the caliper mark to Em, then press the [Enter] key.
 - d. Move the caliper mark to Am, then press the [Enter] key.
6. Measure regional isovolumetric relaxation time (RIVRT).
 - a. Move the line cursor to the regional isovolumetric relaxation time phase, then press [Enter] key.
7. Measure regional isovolumetric contraction time RIVCT.
 - a. Move the line cursor to the isovolumic contraction time, then press [Enter] key.

Example of Measurement Results Display

TDI PW MA		
Sm1 :	cm/s	: Systolic myocardial motion velocity (1st wave)
Sm2 :	cm/s	: Systolic myocardial motion velocity (2nd wave)
Em :	cm/s	: early diastolic myocardium motion velocity
Am :	cm/s	: late systolic myocardium motion velocity
Em/Am :		: Em/Am ratio
RIVRT :	ms	: Regional Isovolumetric Relaxation Time
RIVCT :	ms	: Regional Isovolumetric Contraction Time

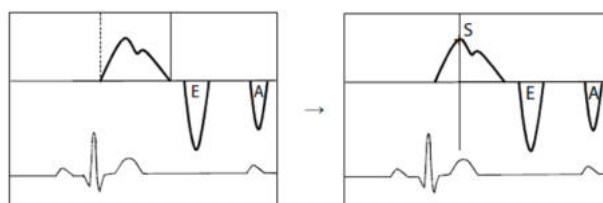
Reference information

1.2.5 Doppler Trace Method on page 31

Doppler Trace method

Procedure

1. Switch the measurement Study to [TDI].
2. Record the mitral annulus velocity waveform.
 - a. Display the mitral valve annulus in TDI mode.
 - b. Set Sample Volume to the mitral annulus region.
 - c. Record the mitral annulus velocity waveform.
3. Press the [Measurement] button on the touch panel.
4. Select [TDI PW MA], [TDI PW 1], or [TDI PW 2] from the measurement menu.
5. Trace the systolic myocardial motion velocity waveform (Sm).
The line cursor accompanied by "S" is displayed at the peak blood velocity point.



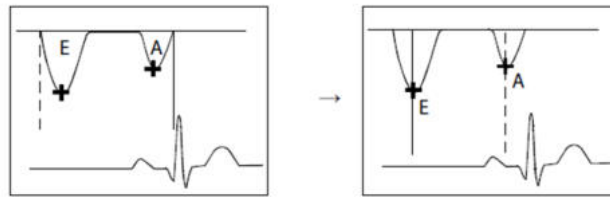
6. Adjust the Sm1 point (first systolic wave), then press [Enter] key.
7. Move the caliper mark to Sm2 point (second wave), then press [Enter] key.

8. Measure the Em and Am.

- a. Trace both the early diastolic myocardial motion velocity waveform and the atrial systolic myocardial motion velocity waveform.

A line cursor is displayed at each Em and Am point.

(For the Auto Trace method)



- b. If required, use the Trackball to adjust Em and Am point location, then press [Enter] key.

9. Move the line cursor to the regional isovolumetric relaxation time (RIVRT) phase, then press [Enter] key.

10. Move the line cursor to the regional contraction time (RIVCT) phase, then press [Enter] key.

Example of Measurement Results Display

TDI PW MA		
Sm1 :	cm/s	: Systolic myocardial motion velocity (1st wave)
Sm2 :	cm/s	: Systolic myocardial motion velocity (2nd wave)
Em :	cm/s	: early diastolic myocardium motion velocity
Am :	cm/s	: Systolic myocardium motion velocity
Em/Am :		: Em/Am ratio
RIVRT :	ms	: Regional Isovolumetric Relaxation Time
RIVCT :	ms	: Regional Isovolumetric Contraction Time

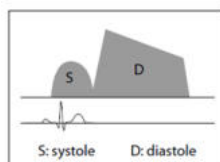
Reference information

1.2.5 Doppler Trace Method on page 31

(8) Coronary Measurements

There are two menus for measuring coronary arteries.

1) Coronary flow velocity reserve measurement



The peak systolic velocity (S wave) and peak diastolic velocity (D wave) are measured from the coronary artery blood velocity waveform. These values are used to calculate the diastolic-to-systolic velocity ratio (DSVR) and diastolic deceleration time (DDecT).

Measuring the peak coronary diastolic velocity (Peak) and rest flow velocity (Rest) at the same coronary artery region makes it possible to calculate indices such as coronary flow velocity reserve (CFVR), etc.

The following measurement menus are available.

Menu	Coronary artery region name	Target time phase	Remarks
pLAD(Rest)	Proximal portion of the left anterior descending coronary artery	Rest	
pLAD(Peak)	Proximal portion of the left anterior descending coronary artery	Peak	
dLAD(Rest)	Distal portion of the left anterior descending coronary artery	Rest	
dLAD(Peak)	Distal portion of the left anterior descending coronary artery	Peak	
RCA(Rest)	Posterior descending branch of right coronary artery	Rest	
RCA(Peak)	Posterior descending branch of right coronary artery	Peak	
LCX(Rest)	Left circumflex branch	Rest	
LCX(Peak)	Left circumflex branch	Peak	
C.A.1(Rest)	For blood vessels other than those above	Rest	Names can be entered in the report.
C.A.1(Peak)	For blood vessels other than those above	Peak	
C.A.2(Rest)	For blood vessels other than those above	Rest	
C.A.2(Peak)	For blood vessels other than those above	Peak	
C.A.3(Rest)	For blood vessels other than those above	Rest	
C.A.3(Peak)	For blood vessels other than those above	Peak	
Graft(Rest)	Implanted artificial blood vessels	Rest	
Graft(Peak)	Implanted artificial blood vessels	Peak	

II) Measuring flow velocity comparisons at coronary artery stenosis: [C.A. Stenosis]

This calculates the Pre Stenosis/ Stenosis ratio for the end diastolic velocity.

There are two measurement methods, the Doppler Trace method (Auto, Manual) and Point method. Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods & Display Items > D.Mode]) to set the measurement method.

Measuring Coronary Flow Velocity Reserve

Measuring the peak coronary diastolic velocity (Peak) and the flow velocity at rest (Rest) for the same coronary artery region makes it possible to calculate indices such as coronary flow velocity reserve (CFVR), etc.

Procedure

1. Switch the measurement Study to [Coronary].
2. Measure the blood flow at rest.

- a. Record the rest period blood flow waveform for the target measurement region.
 - b. Press the [Measurement] button on the touch panel.
 - c. Select the rest period from the Measurement Menu (Rest) for the target region.
 - d. Detect the peak blood velocity of the S and D waves.
When the detection method is Auto or Manual (Doppler Trace method)
 Trace the blood velocity waveform.
Point detection measurement
 Move the caliper mark to the peak flow velocity point of the S wave, then press [Enter] key. Move the caliper mark to the peak flow velocity point of the D wave, then press [Enter] key.
 - e. Measure the D wave diastolic flow velocity deceleration time (DDecT).
3. Measure the maximum coronary blood flow.
- a. Record the blood velocity waveform at maximum coronary flow for the target measurement region.
 - b. Press the [Measurement] button on the touch panel.
 - c. Select Peak from the measurement menu.
 - d. Detect the peak blood velocity of the S and P waves.
When the detection method is Auto or Manual (Doppler Trace method)
 Trace the blood velocity waveform.
Point detection measurement
 Move the caliper mark to the peak flow velocity point of the S wave, then press [Enter] key. Next, move the caliper mark to the peak blood velocity point of the P wave, then press [Enter] key.
 - e. Measure the D wave diastolic flow velocity deceleration time (DDecT).

Example of Measurement Results Display

proxLAD (Peak)	: Selected measurement menu
S: . cm/s	: Maximum S wave flow velocity
D: . cm/s	: Maximum D wave flow velocity
pDSVR:	: D wave and S wave maximum blood flow velocity ratio
DDecT: ms	: Diastolic deceleration time of D wave flow
pCFVR:	: Coronary flow velocity reserve (displayed when Rest has been measured)

Reference information

1.2.5 Doppler Trace Method on page 31

Measuring Blood Flow Velocity Ratio Before and After Stenosis

Procedure

1. Switch the measurement Study to [Coronary].
2. Record the coronary artery flow waveform at the coronary artery pre-stenosis region.
3. Press the [Measurement] button on the touch panel.

4. Select [C.A.Stenosis] from the measurement menu.
5. Detect the D wave peak flow velocity.
When the detection method is Auto or Manual (Doppler Trace method)
 Trace the blood velocity waveform.
Point detection measurement
 Move the caliper mark to the peak blood flow velocity point of the D wave.
6. Release the freeze frame, and record the coronary artery flow waveform at the region of coronary artery stenosis.
7. Freeze the image.
8. Measure the peak flow velocity for the D wave as in step 4 and 5.

Example of Measurement Results Display

C.A.Stenosis	
Pre D: cm/s	: D wave peak flow velocity at the pre-stenosis region
Steno D: cm/s	: D wave peak flow velocity at the region of stenosis
Pre/Stenosis	
Peak D:	: Peak flow velocity ratio at the region of stenosis

Reference information

1.2.5 Doppler Trace Method on page 31

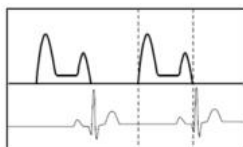
(9) Asynchrony Measurements

AV AsynchronyMeasurements

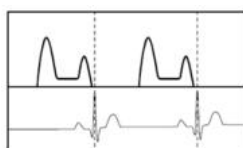
Calculates the LVDF/RR from the left ventricle diastolic filling time (LVDF/RR) on the waveform of the mitral annulus region and the RR interval on the electrocardiogram.

Procedure

1. Switch the measurement Study to [Asynchrony].
2. Record the left ventricle inflow waveform.
3. Press the [Measurement] button on the touch panel.
4. Select [AV Async.] from the measurement menu.
5. Use the Caliper method to measure the LV diastolic filling time.



6. Measure the RR interval with the electrocardiogram.



When the LVDF and RR time interval measurement result has been obtained using the Trans M Flow measurement

This result is used to measure LVDFT/RR.

Example of Measurement Results Display

AV Async.	
LVDFT: ms	: Left ventricle diastolic filling time
RR: ms	: RR interval of the electrocardiogram
LVDFT/RR: %	: LVDFT/RR ratio

Reference information

2.2.3(1) Time Measurement: Time on page 54

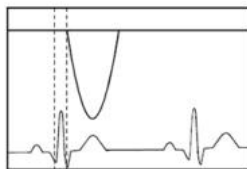
InterV. Async.Measurements

Measure the pre-ejection period (PEP) for the left ventricle out tract flow waveform and the right ventricle out tract flow waveform to obtain the difference between the right and left ventricular ejection flow (IMD).

NOTE: The IMD is calculated from the measurement results of LVPEP with LVOT Flow and RVPEP with RVOT Flow, if present.

Procedure

1. Switch the measurement Study to [Asynchrony].
2. Record the left ventricular ejection flow velocity waveform.
3. Press the [Measurement] button on the touch panel.
4. Select [InterV. Async.] from the measurement menu.
5. Measure the time (LVPEP) on the ECG from the QRS onset to the ejection waveform origin.



6. Record the right ventricular outflow tract flow waveform.
7. Press the [Caliper]key.
8. Measure the time (RVPEP) on the ECG from the QRS onset to the ejection waveform origin.

Example of Measurement Results Display

InterV.Async.	
LVPEP: ms	: Left ventricular pre-ejection period
RVPEP: ms	: Right ventricular pre-ejection period
IMD: ms	: Interventricular mechanical delay

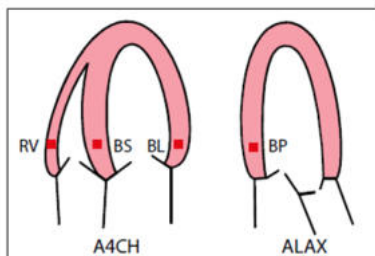
Reference information

2.2.3(1) *Time Measurement: Time* on page 54

Time to OnsetMeasurements

Use pulsed Doppler tissue imaging to record the myocardial movement velocity waveforms at the 4 locations of the basal septal wall (BS), lateral wall (BL), posterior wall (BP) of left ventricle and basal lateral wall of right ventricle (RV). Then measure the time interval between QRS onset and the start of the systolic waveform.

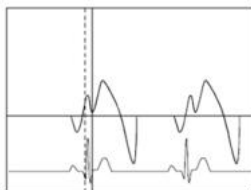
Sample Volume points



Find the difference between the maximum and minimum of the values (Intra) measured at three points in the left ventricle, as well as the difference between the largest of the values measured at three points in the left ventricle and the right ventricular basal lateral wall (Inter), and find the sum of the two (Intra+Inter).

Procedure

1. Switch the measurement Study to [Asynchrony].
2. Measure the time from the QRS onset of the left ventricular basal septal wall (BS) to the systolic period waveform start point on the myocardial movement velocity waveform.
 - a. TDI mode is engaged.
 - b. Set the Sample Volume at the left ventricular basal septal wall (BS) in apical four-chamber view.
 - c. Displaying the D mode.
 - d. Set Sweep Speed to 100 mm/sec or higher.
 - e. Record the myocardial movement velocity waveform of the left ventricular basal septal wall (BS).
 - f. Press the [Measurement] button on the touch panel.
 - g. Select [Time to Onset] from the measurement menu.
 - h. Measure the interval between QRS onset and the beginning of systolic waveform.



3. Measure the time from the QRS onset of the left ventricular basal lateral wall (BL) to the systolic period waveform start point on the myocardial movement velocity waveform.

- a. Set the Sample Volume at the left ventricular basal wall (BL) in apical four-chamber view.
- b. Displaying the D mode.
- c. Set the sweep speed at as high a value as possible.
- d. Record the myocardial movement velocity waveform of the left ventricular basal wall (BL).
- e. Press the [Caliper]key.
- f. Measure the interval between QRS onset and the beginning of systolic myocardial velocity waveform.

NOTE: Measurement accuracy improves at sweep speeds of 100 mm/sec or higher.

4. Measure the time from the QRS onset of the right ventricular basal lateral wall (RV) to the systolic period waveform start point on the myocardial movement velocity waveform, referring to step 3 above.
5. Measure the time from the QRS onset of the left ventricular basal posterior wall (BP) to the systolic period waveform start point on the myocardial movement velocity waveform.
 - a. Set the Sample Volume at the basal posterior wall (BP) in apical long axis view.
 - b. Displaying the D mode.
 - c. Set the sweep speed at as high a value as possible.
 - d. Measure in the same way as in step 3.

NOTE: Measurement accuracy improves at sweep speeds of 100 mm/sec or higher.

Inter is calculated when each item is measured.

Example of Measurement Results Display

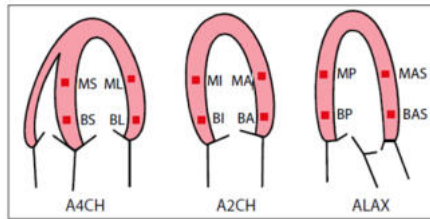
Time to Onset		
BS:	ms	: Measured value of the left ventricular basal septal wall
BL:	ms	: Measured value of the left ventricular basal lateral wall
RV:	ms	: Measured value of the right ventricular basal lateral wall
BP:	ms	: Measured value of the left ventricular basal posterior wall
Intra:	ms	: The difference between the minimum and maximum values of 3 regions measured in the left ventricle
Inter:	ms	: The difference between the maximum value of the 3 regions measured in the left ventricle and the right ventricular basal lateral wall
Intra+Inter:	ms	: Total of Intra and Inter

Reference information

2.2.3(1) *Time Measurement: Time* on page 54

Time to PeakMeasurements

Use pulsed Doppler tissue imaging to record the myocardial velocity waveforms measured at twelve regions of the left ventricle in TDI mode, and measure the time from QRS onset to the peak of the systolic wave.

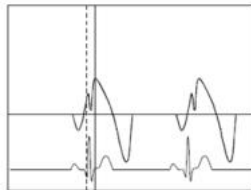


Find the difference between the maximum and minimum of the values (Intra) measured at three points in the left ventricle, as well as the difference between the largest of the values measured at three points in the left ventricle and the right ventricular basal lateral wall (Inter), and find the sum of the two (Intra+Inter).

Procedure

1. Switch the measurement Study to [Asynchrony].
2. Measure the time from the QRS onset of the left ventricular basal septal wall (BS) to the peak of the systolic period waveform on the myocardial movement velocity waveform.
 - a. TDI mode is engaged.
 - b. Set the Sample Volume at the left ventricular basal septal wall (BS) in apical four-chamber view.
 - c. Displaying the D mode.
 - d. Set the sweep speed at as high a value as possible.
 - e. Record the myocardial movement velocity waveform of the left ventricular basal septal wall (BS).
 - f. Press the [Measurement] button on the touch panel.
 - g. Select [Time to Peak] from the measurement menu.
 - h. Measure the time from QRS onset to the peak of the systolic wave.

NOTE: Measurement accuracy improves at sweep speeds of 100 mm/sec or higher.



3. Measure the time from the QRS onset of the left ventricular basal lateral wall (BL) to the peak of the systolic wave on the myocardial movement velocity waveform.
 - a. Set the Sample Volume at the left ventricular basal wall (BL) in apical four-chamber view.
 - b. Displaying the D mode.
 - c. Set Sweep Speed to 100 mm/sec or higher.
 - d. Record the myocardial movement velocity waveform of the left ventricular basal wall (BL).

- e. Press the [Caliper]key.
 - f. Measure the time from QRS onset to the peak of the systolic wave.
4. Use the procedure in step 3 to measure the time from QRS onset at a specified site on the myocardial motion velocity waveform to the peak of the systolic wave.

The mean and standard deviation are displayed when more than two items are measured.

Reference: Time

Example of Measurement Results Display

Time to Peak		
BS:	ms	: Measured value of the left ventricular basal septal wall
BL:	ms	: Measured value of the left ventricular basal lateral wall
MS:	ms	: Measured value of the left ventricle mid septal wall
ML:	ms	: Measured value of the left ventricle mid lateral wall
BI:	ms	: Measured values of the left ventricular basal inferior wall
BA:	ms	: Measured value of the left ventricular basal anterior wall
MI:	ms	: Measured values for the mid inferior wall of the left ventricle
MA:	ms	: Measured values for mid anterior wall of the left ventricle
BP:	ms	: Measured value of the left ventricular basal posterior wall
BAS:	ms	: Measured values for basal antero-septal wall of the left ventricle
MP:	ms	: Measured values for mid posterior wall of the left ventricle
MAS:	ms	: Measured values for mid antero-septal wall of the left ventricle
avg:	ms	: Average value
SD:	ms	: Standard deviation

Reference information

2.2.3(1) Time Measurement: Time on page 54

8.3 Reports

Measurement results and obtained index values are sorted and displayed in the report.

Return	Header	Prev.	Next	Cardiac Func.	US Image	Output
Patient Information						2011/04/22
ID	: 123-456-7890					
Name	: ALOKA					
Sex	: Male	Date of birth	: 1960/06/11	Age	: 50Y	
Height	: 168.0cm	Weight	: 70.00kg	Occupation	:	
BSA	: 1.79m²	BMI	: 24.8			
<Comments>						
<M mode LV Function>						
EDV	Pombo	133ml	Teichholz	124ml		
ESV		35ml		44ml		
SV		97ml		80ml		
CO		6.90l/m		5.69l/m		
EF		73.4%		64.8%		
FS		35.7%				
HR		71BPM				
LVID	Diastole	49mm	Systole	33mm		
IVS		11mm		15mm		
LVPW		10mm		19mm		
<LA/AO>	Diastole	29mm	Systole	31mm		
LA Diam						
AO Diam						
AV Diam						
LADs/AODd	1.06	AVA				

The following operations are available using the report.

I) Displaying measurement results and images

- Measurement results
- Normal value
- Recorded ultrasonic images
- Recorded ultrasonic images
- Past exam results

II) Editing results, comments and findings

III) Printing reports (print, save)

8.3.1 Displaying a Report

NOTE: Report display requires patient data input. Enter patient data on the ID screen.

(1) Displaying a Report

Procedure

1. Display the report.

- Press the [Measurement] button on the touch panel and select [Report] from the measurement menu.
- Select the [Report] icon from the [Accessories] tab in the function menu.

The screenshot shows a software interface for displaying a report. At the top, there are navigation buttons: 'Return', 'Header', 'Prev.', 'Next', 'Cardiac Func.', 'US Image', and 'Output'. Below these, the 'Patient Information' section displays: ID: 123-456-7890, Name: ALOKA, Sex: Male, Date of birth: 1960/06/11, Age: 50Y, Height: 168.0cm, Weight: 70.00kg, Occupation: , BSA: 1.79m², BMI: 24.8. A date '2011/04/22' is shown in the top right. Below this is a section for '<M mode LV Function>' with two columns of data: Pombo and Teichholz. The Pombo column lists EDV (133ml), ESV (35ml), SV (97ml), CO (6.90l/min), EF (73.4%), FS (35.7%), and HR (718BPM). The Teichholz column lists EDV (124ml), ESV (44ml), SV (80ml), CO (5.69l/min), and EF (64.8%). Below this is a section for 'LVID', 'IVS', and 'LVPW' with 'Diastole' and 'Systole' measurements. LVID Diastole is 49mm, Systole is 33mm. IVS Diastole is 11mm, Systole is 15mm. LVPW Diastole is 10mm, Systole is 19mm. Below this is a section for '<LA/AO>' with 'Diastole' and 'Systole' measurements. LA Diam Diastole is 29mm, Systole is 31mm. Below this is a section for 'LADs/AODd' with a value of 1.06 and 'AVA'.

Patient Information	
ID	: 123-456-7890
Name	: ALOKA
Sex	: Male
Date of birth	: 1960/06/11
Age	: 50Y
Height	: 168.0cm
Weight	: 70.00kg
Occupation	:
BSA	: 1.79m²
BMI	: 24.8

<M mode LV Function>	
	Pombo
EDV	133ml
ESV	35ml
SV	97ml
CO	6.90l/min
EF	73.4%
FS	35.7%
HR	718BPM

	Diastole	Systole
LVID	49mm	33mm
IVS	11mm	15mm
LVPW	10mm	19mm

	Diastole	Systole
<LA/AO>		
LA Diam		
AO Diam		
AV Diam		

LADs/AODd	1.06	AVA
-----------	------	-----

The following buttons will appear at the top of the report:

- | | |
|----------------|--|
| [Return] | Closes the report. |
| [Header] | Switches the Header block display (patient data display) between Long Form and Short Form. |
| [Prev.] | Displays the previous page. |
| [Next] | Displays the next page. |
| [(Study list)] | Switches the Study in the report. |
| [US Image] | Displays an ultrasonic image in the report. |

[Output]

Outputs report data to a personal computer, storage media, printer or other destination.

Switching from Report Screen to the Scanning Screen

- Select [Return] button on the upper corner of the report screen.

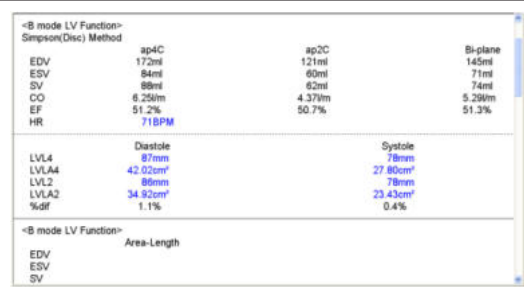
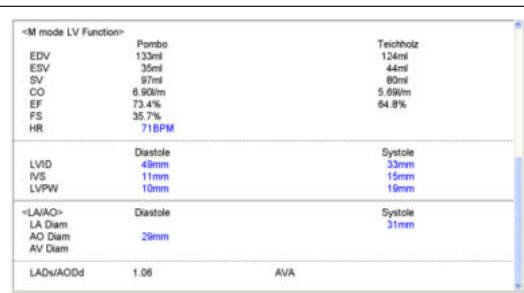
(2) Information Blocks Displayed in a Report

Reports are displayed in Study units.

There are 4 types of cardiac function measurement study: Cardiac Func, Coronary, TDI, and Asynchrony. Each Study displays the following information classified into blocks. The Header Block and Site Information Block are displayed in reports for all Studies. Other blocks are set in the measurement preset ([Study Assignment > (Study Name) > Combined Report Display]), while blocks that include measurement results registered in a report are displayed.

	Header Block Patient information that was entered in the ID screen. [<Comment>] Show/hide the comment input field.
	Site Information Block Facility information, doctor in charge, and other information

The block below is one example. There are 39 types of block for cardiac function measurement reports.

	B mode LV Function Block Displays B mode left ventricular function measurement results.
	M mode LV Function Block Displays M mode left ventricular function measurement results.
	LVOT Flow Doppler Block Displays LVOT Flow measurement results.

	LAD Flow Block RCA Flow Block LCX Flow Block Displays coronary (LAD, RCA, or LCX) measurement results. A schema diagram corresponding to the measurement item appears.
	C.A. User Block Displays C.A.1 to C.A.3 measurement results.
	C.A. Stenosis Block Displays C.A.Stenosis measurement results.
	Graft Flow Block Displays the Graft measurement value for Coronary measurements.

(3) Attaching Ultrasonic Images

You can attach ultrasonic images to reports. The attached ultrasonic images will be displayed in the US Image Block. You can add stored images of the patient whose report is being displayed from the system hard disk or a USB flash drive.

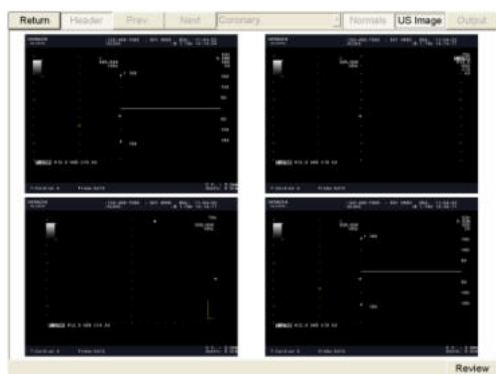
Use the following options in [Report Data] under preset to select images to display in the US Image Block.

- Use Display Pasted US Image Form on the Screen to set the display format.
- Set the number of images to display immediately after selecting US Image Block in [Automatically be Displayed US Images Number].

Procedure

1. Select [US Image] on the upper corner of the report screen.
The US Image Block is displayed. The number of images configured with the preset are displayed in the order of top-left, top-right, etc., from the latest image saved to the system's hard disk or connected media, such as USB flash drive.

Images will be displayed as shown below when [Display Pasted US Image Form on the Screen] is set to [2×2] and [4] is selected in [Automatically be Displayed US Images Number].



When 4 images are stored

2. If necessary, change the displayed images.
 - a. Select [Review] at the bottom of the screen.
Images on the system hard disk or connected media are displayed as thumbnails. Only today's images of the current patient are displayed. The "Current Exam.View" is displayed at the top right of the screen.



- b. Select an image to display.
Selected images will be displayed with a blue frame.
 - c. After selecting all the images to display, select [Paste Desired US].
Only the selected images are displayed in the US Image Block.

Displaying images from past examination dates

Select [Change View] under the thumbnails. "Current Exam.View" is displayed in the upper right corner of the screen and past exam images of the current patient are displayed. You can also select images from past examinations to display in the US Image Block.

When you re-select [Change View], the screen switches to display the images of the day only (Current Exam.View). The "Current Exam.View" is displayed at the top right of the screen.

3. To return to the report page, select [Return].

(4) Displaying Past Reports

Displays past reports.

NOTE: You cannot modify the data in the past reports.

Procedure

1. Select the date [▼] on the top right of the report screen.
When past reports are available, a list of the report dates is displayed.

The screenshot shows a software interface with tabs: Return, Header, Prev., Next, Cardiac Func., Normals, US Image, and Output. The 'Cardiac Func.' tab is active. Below the tabs, patient information is displayed: ID: 123-456-7890, Name: ALOKA, Sex: Male, Date of birth: 1960/06/11, Age: 50Y, Height: 168.0cm, Weight: 70.00kg, Occupation: , BSA: 1.79m², BMI: 24.8. On the right, a date selection dropdown is open, showing a list of dates: 2011/04/22, 2011/04/22, 2011/02/25 (highlighted), 2010/11/02, 2010/09/01, and 2010/06/27. A '<Comments>' link is visible at the bottom left of the patient information section.

2. Select the dates you want to display.
The report of the selected date opens.

8.3.2 Editing Reports

You can edit the following contents in the report.

- Comments
- Findings
- Measurement results

(1) Entering Comments

Enter comments like results of ultrasonic findings, etc. in the Comments field such as Header Block.

Procedure

1. Select [<Comments>].
When the [<Comments>] are hidden
Select [Header] on the upper corner of the report screen and select [<Comments>].
A text box is displayed.

This screenshot shows the same software interface as before, but with the 'Header' tab selected. The patient information is still visible. The '<Comments>' link has been clicked, and a text box has appeared with the placeholder text: 'You can type in the information of Ultrasound Examination comments.' Below the text box are 'OK' and 'Cancel' buttons. The date dropdown on the right is now closed and shows '2011/04/22'.

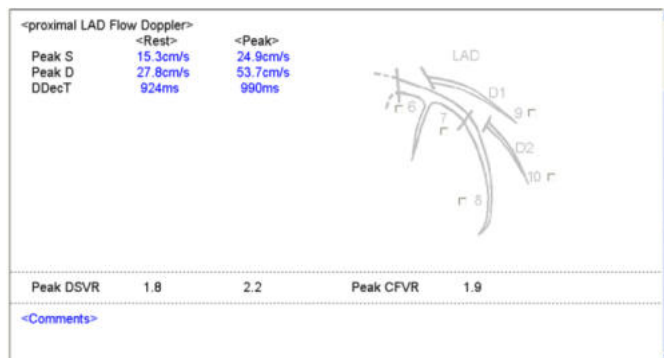
2. Enter a comment using the keyboard.
3. Select [OK] when you finish entering the comments.
The entry is confirmed.
To cancel the entry, select [Cancel].

(2) Entering the Coronary Artery Measurement Regions

Measurement regions can be entered in the schema diagram in the block that displays coronary artery measurement result and other Coronary Flow Blocks.

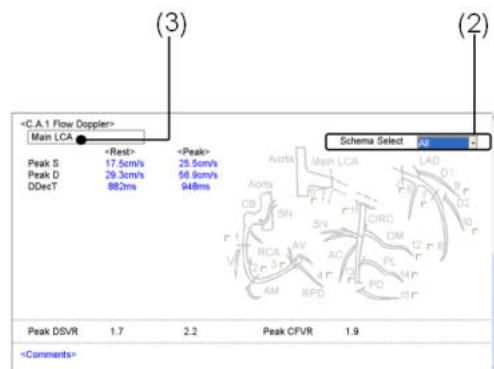
Procedure

1. Display the report.
2. Display the Block including Coronary measurement results.



3. Check the locations corresponding to the measurement regions on the schema diagram.

Entering the Regions Measured in Coronary 1 to Coronary 3



Procedure

1. Display the blocks that contain measurements for Coronary 1 to Coronary 3.
2. Select the schema diagram (ALL, Main LCA, LAD, LCX, RCA) from Schema Select.
3. Enter region names from the keyboard.
4. Check the locations corresponding to the measurement regions on the schema diagram.

Entering the Regions Measured in Coronary Stenosis

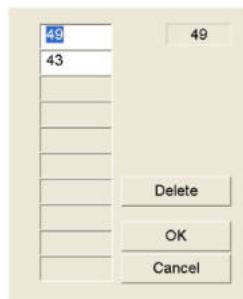
Procedure

1. Display the Block including Coronary Stenosis measurement results.
2. Select the schema diagram (ALL, Main LCA, LAD, LCX, RCA) from Schema Select.
3. Check the locations corresponding to the measurement regions on the schema diagram.

(3) Editing Measurement Results

Procedure

1. Select the measurement value to be modified.
The dialog box with the measurement value opens.



When Display Data in [Report Data] under preset is set to "Current", the data at the top appears in the report screen. If it is set to "Average", an average value is displayed.

2. Revise the data.

Deleting data

- I) Select the measurement value from the dialog box.
- II) Select [Delete] from the dialog box.
- III) Select [OK] from the dialog box.

Revising data

Some measurement results, such as PI and RI, correlate to the 2 blood flow velocities (EDV, PSV) within the same heartbeat cycle. Modify as necessary to maintain the mutual time-phase relationship.

- I) Select the measurement value from the dialog box.
- II) Enter values from the keyboard.
- III) Select [OK] from the dialog box.

A # mark will be added to the name of the modified item.

<M mode LV Function>		
EDV	Pombo	Teichholz
ESV	133ml	124ml
SV	35ml	44ml
CO	97ml	80ml
EF	6.909m	5.699m
FS	73.4%	64.8%
HR	35.7%	
	71BPM	
LVID	# Diastole	Systole
RVS	50mm	33mm
LVPW	11mm	15mm
	10mm	19mm
<LA/AO>	Diastole	Systole
LA Diam	29mm	31mm
AO Diam		
AV Diam		
LADs/AODd	1.06	AVA

Display example: Revising LVID (Diastole)

Selecting the data to be displayed

If Display Data of [Report Data] in the preset is set to "Current", you can change the measurement value to be displayed on the report screen.

- I) Select the measurement value from the dialog box.
- II) Select [OK] from the dialog box.

8.3.3 Outputting Reports

There are 3 ways to output reports.

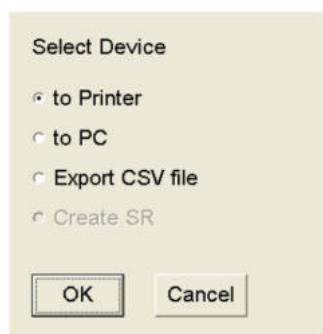
- Outputting to a local printer: Select the Block to output.
- Outputting as a CSV file: Output the values registered to the report to a connected media or device.
- Creating a DICOM SR file: Create a DICOM SR file.

(1) Printing

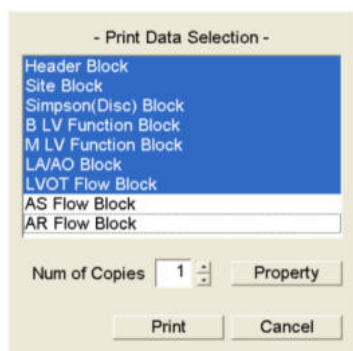
Print a report to the local printer (printer connected to the system).

Procedure

1. Select [Output] on the upper corner of the report screen.
A dialog box is displayed.



2. Select [to Printer], and press [OK].
The following dialog box is displayed.



3. Select the blocks to be printed.
 - a. Select one of the blocks to print.
 - b. Repeat this step and highlight all the blocks to print.

To cancel a selected block, select that block again.
4. Use Num of Copies to set the number of copies to print.
5. If necessary, configure the printer properties.
 - a. Select [Property].
 - b. See the next section to configure the printer property.
6. Select [Print].

Printer Properties



You can set the advanced printer properties.

Item	Options	Description
Printer Name		Select the printer model.
Paper Sizes	US Letter	Prints on US letter size paper.
	A4	Prints on A4 size paper.
Orientation	Portrait	Sets the direction of the paper to the vertical orientation (there is no other option).
US Image Form	1x2	Prints a US Image Block with 1 rows of 2 images per sheet.
	1x3	Prints a US Image Block with 1 rows of 3 images per sheet.
	2 x 2	Prints a US Image Block with 2 rows of 2 images per sheet.
	2x4	Prints a US Image Block with 2 rows of 4 images per sheet.
Signature	Physician	Sets the Physician signature field.
	Physician. & Sonographer	Sets the Physician and Sonographer signature fields.
	None	Hides the signature field.
Title Inform	80 characters	Enables you to enter a report title.
Site Inform		You can enter facility information (hospital department, address, telephone number, FAX number, etc.).

(2) Outputting as a CSV File

You can output data registered in the report as a CSV file.

Procedure

1. Select [Output] on the upper corner of the report screen.
A dialog box is displayed.

2. Select [Export CSV file], and press [OK].

A dialog box is displayed.

A dialog box titled "Target Medium". It contains a radio button labeled "USB" which is selected. Below it is a "File Name" label followed by a text box containing "123-456-7890_20110422_CA". Underneath is a "File List" label followed by an empty rectangular box. At the bottom are "OK" and "Cancel" buttons.

The file name is displayed in the format ID_Date_Application.
Select [Cancel] to return to the report screen.

3. Select the storage destination from the Target Medium list.
4. Change the file name if necessary.
5. Select [OK].
The selected CSV file is saved in the specified media.
A CSV file contains patient information, numerical values and comments.

(3) Creating a DICOM SR File

You can create a DICOM SR file from the data displayed in the reports.

NOTE The optional DICOM SR compatible software (SOP-AR50-21) is necessary for creating DICOM SR files.

Procedure

1. Select [Output] on the upper corner of the report screen.
A dialog box is displayed.

A dialog box titled "Select Device". It contains four radio buttons: "to Printer", "to PC", "Export CSV file", and "Create SR". The "Create SR" option is selected. At the bottom are "OK" and "Cancel" buttons.

2. Select [Create SR], and press [OK].
A DICOM SR file is created for the examination date shown on the report. Any existing file will be overwritten.
The DICOM SR file is not sent at this time.

Sending a DICOM SR File

NOTE: The optional DICOM networking software (SOP-AR50-10) is necessary for connecting to a DICOM SR server.

The DICOM SR file you have created is sent to the DICOM SR server when you select [New Patient] or [End Study] to complete an examination.

If [SR Auto Creation] is "On" in preset ([Common Preset > DICOM SR]) and today's DICOM SR file has not yet been created, an SR file containing the current examination will be created and sent together with other created DICOM SR files to the DICOM SR server.

8.4 Presets

Cardio measurement presets (Cardio preset) can be broadly divided into 3 types.

- **Create Measurement Tools**
Settings for measurement methods, caliper mark display, and report display.
Settings for basic measurements, and for applied measurements.
- **Study Assignment**
Enables you to configure the menu, transferred items and report view in the study.
These are set for each study.
- **SW Assignment**
Assigns measurement functions to menu items.

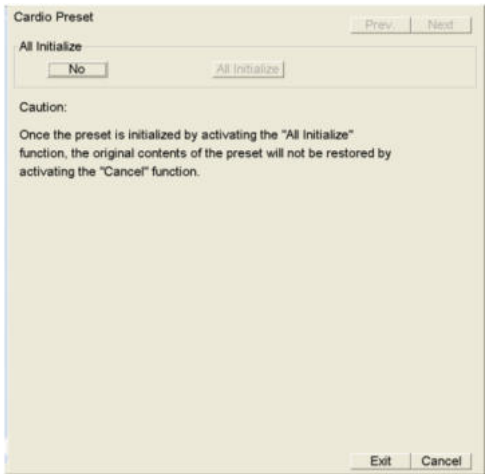
Table5: Abdom preset configuration

Create Measurement Tools	Basic Measurement	Measured Method & Display Items	B.Mode
			M.Mode
			D.Mode
			F.Mode
		Caliper Mark Control	
		Unit Selection	
		Caliper Auto Off	
		Display Form	Mark Display
	Application Measurement	Measured Method & Display Items	B.Mode
			D.Mode
		Caliper Mark Control	
		Unit Selection	
		Caliper Auto Off	
		Report Data	
		Display Form	Mark Display
		User's Calculation	Reserved Word
Study Assignment	Cardiac Func Coronary TDI Asynchrony	Menu Assign	
		Combined Report Display	
		Transfer List Assign	
		Other	

SW Assignment	Touch Panel SW Assignment
	+Mark Key Assignment

8.4.1 Cardio Presets

The pages of the preset are displayed as shown below.



[Cardio Preset]
Cardio Preset top page

(1) Create Measurement Tools

Settings for measurement methods, caliper marks, and report display.

Basic Measurement

Refer to the presets for basic measurements.

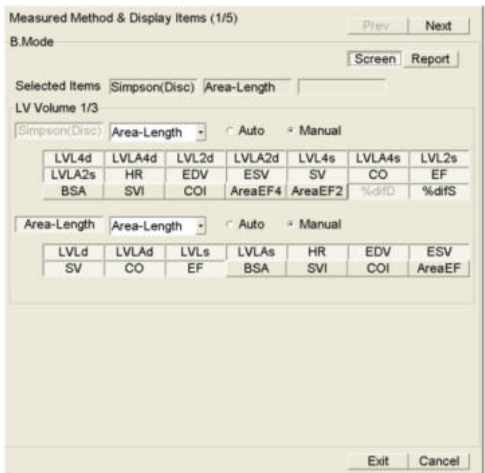
Reference information

2.2.7(3) *Measurement-related Settings: Create Measurement Tools* on page 82

Application Measurement

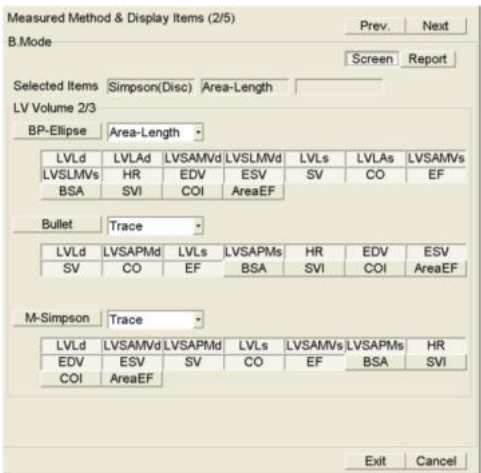
Settings for applied measurements (cardio measurement).

[Measured Method & Display Items > B.Mode]
(1/5): B mode measurement settings



[Measured Method & Display Items > B.Mode]
(3/5): B mode measurement settings

[Measured Method & Display Items > B.Mode]
(2/5): B mode measurement settings



[Measured Method & Display Items > B.Mode]
(4/5): B mode measurement settings



Measured Method & Display Items (3/5) Prev. Next

B.Mode Screen Report

Selected Items Simpson(Disc) Area-Length

LV Volume 3/3

Pombo Caliper

LVIDd	LVIDs	HR	EDV	ESV	SV	CO
EF	RVDd	RVDs	IVSd	IVSs	LVPWd	LVPWs
%IVSTF	%PWTF	IVS/LVPW	BSA	SVI	COI	FS
LVM	LVM/BSA	mFS				

Teichholz Caliper

LVIDd	LVIDs	HR	EDV	ESV	SV	CO
EF	RVDd	RVDs	IVSd	IVSs	LVPWd	LVPWs
%IVSTF	%PWTF	IVS/LVPW	BSA	SVI	COI	FS
LVM	LVM/BSA	mFS				

Gibson Caliper

LVIDd	LVIDs	HR	EDV	ESV	SV	CO
EF	RVDd	RVDs	IVSd	IVSs	LVPWd	LVPWs
%IVSTF	%PWTF	IVS/LVPW	BSA	SVI	COI	FS
LVM	LVM/BSA	mFS				

Exit Cancel

[Measured Method & Display Items > B.Mode]
(5/5): B mode measurement settings

Measured Method & Display Items (4/5) Prev. Next

B.Mode Screen Report

LV Mass(AL)

Aapi Trace Aapi Aend LVLd thick

Aend Trace LVM LVM/BSA

LVLd Distance

RVD Caliper RVAWd RVAWs RVDd RVDs

LA/AO Caliper LADs AODd LA/AO LADd AODs

Ratio Caliper IVSd LVPWd IVS/LVPW IVSs LVPWs LVIDd %IVSTF %PWTF LVM BSA LVM/BSA

Valve Area

MVA Trace MVA a-axis b-axis

AVA Trace AVA a-axis b-axis

Exit Cancel

Measured Method & Display Items (5/5) Prev. Next

B.Mode Screen Report

IVC Caliper Insp Exp %Collapse

LA Volume Simpson,Area-Length

LAL4s	LALA4s	LAL2s	LALA2s	LA Vol.	%dIFS	LAvol/BSA
-------	--------	-------	--------	---------	-------	-----------

RA Volume Simpson,Area-Length

RAL4s	RALA4s	RAL2s	RALA2s	RA Vol.	%dIFS	RAvol/BSA
-------	--------	-------	--------	---------	-------	-----------

Exit Cancel

[Measured Method & Display Items > M.Mode]
(1/3): M mode measurement settings

[Measured Method & Display Items > M.Mode]
(2/3): M mode measurement settings

Measured Method & Display Items (1/3) Prev. Next

M.Mode Screen Report

LV Function mFS Equation Shimizu Circulation 1991

Pombo Cross Line LVM Equation Penn

LVIDd	LVIDs	HR	EDV	ESV	SV	CO
EF	RVDd	RVDs	IVSd	IVSs	LVPWd	LVPWs
%IVSTF	%PWTF	IVS/LVPW	BSA	SVI	COI	FS
MVCF	ET	LVM	LVM/BSA	mFS		

Teichholz Cross Line

LVIDd	LVIDs	HR	EDV	ESV	SV	CO
EF	RVDd	RVDs	IVSd	IVSs	LVPWd	LVPWs
%IVSTF	%PWTF	IVS/LVPW	BSA	SVI	COI	FS
MVCF	ET	LVM	LVM/BSA	mFS		

Gibson Cross Line

LVIDd	LVIDs	HR	EDV	ESV	SV	CO
EF	RVDd	RVDs	IVSd	IVSs	LVPWd	LVPWs
%IVSTF	%PWTF	IVS/LVPW	BSA	SVI	COI	FS
MVCF	ET	LVM	LVM/BSA	mFS		

HR Cardiac Cycles # 1 Caliper Mark Auto Shift Yes

Exit Cancel

[Measured Method & Display Items > M.Mode]
(3/3): M mode measurement settings

Measured Method & Display Items (2/3) Prev. Next

M.Mode Screen Report

LA/AO Line LADs AODd LA/AO LADd AODs AVDs Caliper Mark Auto Shift Yes

Mitral V Point C-E amp C-A amp E-F slope EPSS A/E E/A

Tricuspid V Point C-E amp C-A amp D-E amp E-F slope D-E slope A/E E/A

Pulmonary V Point A wave E-F slope B-C slope B-C amp

IVC Line Insp Exp %Collapse

Exit Cancel



Measured Method & Display Items (3/3) Prev. Next

M.Mode Screen Report

Asynchrony
Intraventricular Asynchrony

Cross Line SPWMD T1 T2 T3

Name Assignment

T1	T1
T2	T2
T3	T3

Exit Cancel

[Measured Method & Display Items > D.Mode]
(1/16): D mode measurement settings

[Measured Method & Display Items > D.Mode]
(2/16): D mode measurement settings

Measured Method & Display Items (1/16) Prev. Next

D.Mode Screen Report

AV Doppler 1/2

LVOT Flow

Auto Vertical L VTI CSA(LVOT) SV HR
Manual Cross Point CO pV PG MnV MPG
Point Horizontal L PEP ET PEP/ET AccT AccT/ET
Op/Os BSA SVI COI

Trace Condition
Position Peak Level -18 dB Smooth No

AS Flow

Auto Vertical L pV PG MnV MPG VTI
Manual Cross Point CSA LVOT VTI(LVOT) AVA
Point Horizontal L

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(3/16): D mode measurement settings

Measured Method & Display Items (2/16) Prev. Next

D.Mode Screen Report

AV Doppler 2/2

AR Flow

Auto Vertical L pV PG MnV MPG P1/2T
Manual Cross Point
Point Horizontal L P1/2T Trace

Trace Condition
Position Peak Level -18 dB Smooth No

AR Vol. PISA

Auto Vertical L PISA Radius FR EROA RV
Manual Cross Point RF Angle

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(4/16): D mode measurement settings

Measured Method & Display Items (3/16) Prev. Next

D.Mode Screen Report

MV Doppler 1/2

Trans M Flow

Auto Vertical L eV aV A/E EPG APG
Manual Cross Point MnV MPG IRT AccT DecT
Point Cross Point E/A P1/2T MVA VTI Edur
Adur LVDF/T RR LVDF/T/RR

DecT,P1/2T Yes

Trace Condition
Position Peak Level -18 dB Smooth No

MS Flow

Auto Vertical L pV MnV MPG PG P1/2T
Manual Cross Point MVA FlowT
Point Horizontal L P1/2T Trace

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(5/16): D mode measurement settings

Measured Method & Display Items (4/16) Prev. Next

D.Mode Screen Report

MV Doppler 2/2

MR Flow

Auto Vertical L pV PG MnV MPG dP/dt
Manual Cross Point FlowT
Point Horizontal L

Trace Condition
Position Peak Level -18 dB Smooth No

MR Vol. PISA

Auto Vertical L PISA Radius FR EROA RV
Manual Cross Point RF Angle

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(6/16): D mode measurement settings

Measured Method & Display Items (5/16) Prev. Next

D.Mode Screen Report

PA Doppler 1/2

RVOT Flow

Auto Vertical L VTi CSA(RVOT) SV HR
Manual Cross Point CO pV PG MnV MPG
Point Horizontal L PEP ET PEP/ET AccT AccT/ET
Qp/Qs BSA SVI COI

Trace Condition
Position Peak Level -18 dB Smooth No

PS Flow

Auto Vertical L pV PG MnV MPG
Manual Cross Point
Point Horizontal L

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(7/16): D mode measurement settings

Measured Method & Display Items (6/16) Prev. Next

D.Mode Screen Report

PA Doppler 2/2

PR Flow

Auto Vertical L pV PG MnV MPG
Manual Cross Point
Point Horizontal L

Trace Condition
Position Peak Level -18 dB Smooth No

PR Vol. PISA

Auto Vertical L PISA Radius FR EROA RV
Manual Cross Point RF Angle

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(8/16): D mode measurement settings

Measured Method & Display Items (7/16) Prev. Next

D.Mode Screen Report

TV Doppler 1/2

TS Flow

Auto Vertical L pV MnV MPG PG P1/2T
Manual Cross Point FlowT
Point Horizontal L P1/2T Trace

Trace Condition
Position Peak Level -18 dB Smooth No

TR Flow

Auto Vertical L pV PG MnV MPG dP/dt
Manual Cross Point FlowT RVSP RAP 10
Point Horizontal L dP/dt 1st:1.0m/s, 2nd:3.0m/s

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(9/16): D mode measurement settings

Measured Method & Display Items (8/16) Prev. Next

D.Mode Screen Report

TV Doppler 2/2

TR Vol. PISA

Auto Vertical L PISA Radius FR EROA RV
Manual Cross Point RF Angle

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(10/16): D mode measurement settings

Measured Method & Display Items (9/16) Prev. Next

D.Mode Screen Report

PV Flow

Auto Vertical L PVS PVD PVA S/D PVAdur
Manual Cross Point DecT SF S-VTI D-VTI
Point Cross Point

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(11/16): D mode measurement settings

Measured Method & Display Items (10/16) Prev. Next

D.Mode Screen Report

Heart failure

TEI Index

Vertical L a b c d T
ICT IRT ICT/ET IRT/ET

TDI PW 1/2

TDI PW MA

Auto Vertical L Sm1 stMnV Sm2 Em Am
Manual Cross Point dtMnV EmAm E/Em RIVRT RIVCT
Point Cross Point time Vel1 Vel2 AccT ACC

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(12/16): D mode measurement settings

Measured Method & Display Items (11/16) Prev. Next

D.Mode Screen Report

TDI PW 2/2

TDI PW1

Auto Vertical L. Sm1 sMnV Sm2 Em Am
dMnV Em/Am E/Em RIVRT RIVCT
time Vel1 Vel2 AccT ACC

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

TDI PW2

Auto Vertical L. Sm1 sMnV Sm2 Em Am
dMnV Em/Am E/Em RIVRT RIVCT
time Vel1 Vel2 AccT ACC

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

Name Assignment

TDI PW 1 TDI PW1 TDI PW 2 TDI PW2

Exit Cancel

[Measured Method & Display Items > D.Mode]
(13/16): D mode measurement settings

Measured Method & Display Items (12/16) Prev. Next

D.Mode Screen Report

Coronary 1/4

LAD Flow

Auto Vertical L. S D pDSVR S-MnV D-MnV
mDSVR S-VTI D-VTI D-AccT DDecT
VHT pCFVR mCFVR

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

RCA Flow

Auto Vertical L. S D pDSVR S-MnV D-MnV
mDSVR S-VTI D-VTI D-AccT DDecT
VHT pCFVR mCFVR

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(14/16): D mode measurement settings

Measured Method & Display Items (13/16) Prev. Next

D.Mode Screen Report

Coronary 2/4

LCX Flow

Auto Vertical L. S D pDSVR S-MnV D-MnV
mDSVR S-VTI D-VTI D-AccT DDecT
VHT pCFVR mCFVR

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

Coronary 1

Auto Vertical L. S D pDSVR S-MnV D-MnV
mDSVR S-VTI D-VTI D-AccT DDecT
VHT pCFVR mCFVR

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(15/16): D mode measurement settings

Measured Method & Display Items (14/16) Prev. Next

D.Mode Screen Report

Coronary 3/4

Coronary 2

Auto Vertical L. S D pDSVR S-MnV D-MnV
mDSVR S-VTI D-VTI D-AccT DDecT
VHT pCFVR mCFVR

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

Coronary 3

Auto Vertical L. S D pDSVR S-MnV D-MnV
mDSVR S-VTI D-VTI D-AccT DDecT
VHT pCFVR mCFVR

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(16/16): D mode measurement settings

Measured Method & Display Items (15/16) Prev. Next

D.Mode Screen Report

Coronary 4/4

Coronary Stenosis

Auto Vertical L. Pre D-pV Pre D-MnV
Steno D-pV Steno D-MnV
Pre/Steno-pV Pre/Steno-MnV

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

Graft Flow

Auto Vertical L. S D pDSVR S-MnV D-MnV
mDSVR S-VTI D-VTI D-AccT DDecT
VHT pCFVR mCFVR

Manual Cross Point

Point Cross Point

Trace Condition

Position Peak Level -18 dB Smooth No

Exit Cancel

Measured Method & Display Items (16/16) Prev. Next

D.Mode Screen Report

Asynchrony

AV Asynchrony

Vertical L. LVDFTR RR LVDFTR/RR

Interventricular Asynchrony

Vertical L. LVPEP RVPEP IMD

TDI PW Time to Onset

Vertical L. BS BL RV BP
Intra Inter Intra+Inter

TDI PW Time to Peak

Vertical L. A4CH BS BL MS ML
A2CH BI BA MI MA
ALAX BP BAS MP MAS
avg SD

Exit Cancel

[Unit Selection]: Cardiac function measurement
unit list

[Caliper Auto Off]: Caliper mark and measurement result display setting for when freeze Is canceled

[Report Data]: Report display data settings

[Display Form]: Vertical and horizontal display of measurement results, display of multiple results, settings for simultaneous display with basic measurement

[Display Form > Mark Display]: Caliper mark display settings

[User's Calculation]: User index calculation formula settings

[User's Calculation > Reserved Word]: Reserved word settings for user index calculation formulas

User's Calculation

Equation Program

Create User's Calculation

Delete User's Calculation

U-Calc. 1	U-Calc. 16
U-Calc. 2	U-Calc. 17
U-Calc. 3	U-Calc. 18
U-Calc. 4	U-Calc. 19
U-Calc. 5	U-Calc. 20
U-Calc. 6	U-Calc. 21
U-Calc. 7	U-Calc. 22
U-Calc. 8	U-Calc. 23
U-Calc. 9	U-Calc. 24
U-Calc. 10	U-Calc. 25
U-Calc. 11	U-Calc. 26
U-Calc. 12	U-Calc. 27
U-Calc. 13	U-Calc. 28
U-Calc. 14	U-Calc. 29
U-Calc. 15	U-Calc. 30

Exit Cancel

User's Calculation:Reserved Word (1/2)

Reserved Word Registration

Create Reserved Word

Delete Reserved Word

Reserved Word 1	Reserved Word 16
Reserved Word 2	Reserved Word 17
Reserved Word 3	Reserved Word 18
Reserved Word 4	Reserved Word 19
Reserved Word 5	Reserved Word 20
Reserved Word 6	Reserved Word 21
Reserved Word 7	Reserved Word 22
Reserved Word 8	Reserved Word 23
Reserved Word 9	Reserved Word 24
Reserved Word 10	Reserved Word 25
Reserved Word 11	Reserved Word 26
Reserved Word 12	Reserved Word 27
Reserved Word 13	Reserved Word 28
Reserved Word 14	Reserved Word 29
Reserved Word 15	Reserved Word 30

Exit Cancel

(2) Study Assignment

You can configure the menu, transferred items and report view in each study.

[Study Assignment]: Tree view display settings of Study and user-defined Study

Study Assignment

Select Study

Copy from Other Study

Select Display Study on the Left Tree View

Study Name	Study Name	Study Name
Cardiac Func	User7	User17
Coronary	User8	User18
TDI	User9	User19
Asynchrony	User10	User20
User1	User11	User21
User2	User12	
User3	User13	
User4	User14	
User5	User15	
User6	User16	

Exit Cancel

[Menu Assign]: Measurement menu parameter display settings

[Combined Report Display]: Report display block settings

Menu Assign

[Cardiac Func.] Select the Study at the Top Screen of Study Assignment and then Setup Measurement Menu Format.

Select Target View Mode

Select B(F).Mode Items

Distance	Dist-trace	Area-Trace	Area-Ellipse
Area-Circle	Volume 1	Volume 2	Histogram
B. Index	Rt.Hip J Angle	Lt.Hip J Angle	Angle
Flow Profile			

Area-Length	RVD	LA/AO	Ratio
MVA	AVA	LV Mass(AL)	Simpson(Disc)
IVC	LA Vol. (Simp)	LA Vol. (AL)	RA Vol. (Simp)
RA Vol. (AL)			

Exit Cancel

Combined Report Display

Study Name [Cardiac Func.]

1. Header Block	
2. Site Block	
3. Simpson(Disc) Block	15. TDI PW Block
4. B LV Function Block	16. PV Flow Block
5. LA/RA Volume Block	17. MS Flow Block
6. M LV Function Block	18. MR Flow Block
7. LA/AO Block	19. RVOT Flow Block
8. Mitral Valve Block	20. PS Flow Block
9. Tricuspid Valve Block	21. PR Flow Block
10. Pulmonary Valve Block	22. TS Flow Block
11. LVOT Flow Block	23. TR Flow Block
12. AS Flow Block	24. IVC Flow Block
13. AR Flow Block	25.
14. Trans Mitral Block	26.

Exit Cancel

[Transfer List Assign]: Setting measurement parameters whose basic measurement results can be transferred

Transfer List Assign

Study Name [Cardiac Func.]

Assign the Transfer List by Each Method.

Select Target View Mode

B.Mode M.Mode D.Mode

Select B/(F) Mode Items

Distance	A-L Dist	Area	A-L Area	SP-Simps
LVIDd	LVLd	LVLAd	LVLAd	Simp-D(4d)
LVIDs	LVLs	LVLAs	LVLAs	Simp-D(4s)
LVLd		MVA		Simp-D(2d)
LVLs		AVA		Simp-D(2s)
RVDd				LA Vol. Simp(4s)
IVSd				LA Vol. Simp(2s)
LVPWd				RA Vol. Simp(4s)
LADs				RA Vol. Simp(2s)
AODd				
LVOT				
RVOT				
Insp				
Exp				

Exit Cancel

[Other]: Measurement guide message display settings

Other

Study Name [Cardiac Func.]

Operational guide message display

ON

Exit Cancel

(3) SW Assignment

Assigns measurement menus to the [Meas] tab in the function menu or select the basic measurement menu that will appear when you press the [Caliper] key.

[Touch Panel SW Assignment]

Configures the items that can be assigned to the [Meas] tab in the function menu.

Touch Panel SW Assignment

Setup Touch Panel SW Assignment

Assign a Measurement Item to Touch Panel.

Name: Meas1

Clear

Exit Cancel

[+Mark Key Assignment]

Sets the measurement item to launch when the [Caliper] key is pressed.

+Mark Key Assignment

Setup + (Direct) Key Assignment under Cardio

Assign a Measurement Item to + Mark Key.

+ Mark SW 1 2 3 4

B/(F) Mode Distance Area-Trace Area-Ellipse Volume 1

M/(F) Mode Velocity Time HR M.Length

Dop Mode Velocity1 P1/2T ACC Time

Exit Cancel

8.5 References

8.5.1 Formulas

(1) B mode

(a) LV Function: LV Volumes

Left ventricular end diastolic volume	
Measurement parameters	Formulas
Pombo	$EDV = (LVIDd)^3$
Teichholz	$EDV = \{7.0 \times (LVIDd)^3\} \div (2.4 + LVIDd)$
Gibson	$EDV = (\pi/6) \times (LVIDd)^2 \times (0.98 \times LVIDd + 5.90)$
Area-Length	$EDV = \{8.0 \times (LVLA d)^2\} \div (3\pi \times LVLd)$
BP-Ellipse	$EDV = (8.0 \times LVLA d \times LVSAMVd) \div (3\pi \times LVSLMVd)$
Bullet	$EDV = (5 \times LVSAPMd \times LVLd) \div 6$
Modified Simpson	$EDV = (LVLd/9) \times \{4 \times LVSAMVd + 2 \times LVSAPMd + (LVSAMVd \times LVSAPMd)^{1/2}\}$
Simpson (Disk)	$EDV = (\pi/4) \sum (a_i \times b_i) \times L/n$ $n = 20$ $a_i, b_i = 20$ disks obtained from Apical four chamber and two chamber view
Simpson (Disk)	$EDV = (\pi/4) \sum (a_i)^2 \times L/n$ $n = 20$ $a_i = 20$ disks obtained from Apical four chamber or two chamber view

Left ventricular end systolic volume	
Measurement parameters	Formulas
Pombo	$ESV = (LVIDs)^3$
Teichholz	$ESV = \{7.0 \times (LVIDs)^3\} \div (2.4 + LVIDs)$
Gibson	$ESV = (\pi/6) \times (LVIDs)^2 \times (1.14 \times LVIDs + 4.18)$
Area-Length	$ESV = \{8.0 \times (LVLA s)^2\} \div (3\pi \times LVLs)$
BP-Ellipse	$ESV = (8.0 \times LVLA s \times LVSAMVs) \div (3\pi \times LVSLMV s)$
Bullet	$ESV = (5 \times LVSAPMs \times LVLs) \div 6$
Modified Simpson	$ESV = (LVLs/9) \times \{4 \times LVSAMVs + 2 \times LVSAPMs + (LVSAMVs \times LVSAPMs)^{1/2}\}$
Simpson (Disk)	$ESV = (\pi/4) \sum (a_i \times b_i) \times L/n$ $n = 20$ $a_i, b_i = 20$ disks obtained from Apical four chamber and two chamber view
Simpson (Disk)	$EDV = (\pi/4) \sum (a_i)^2 \times L/n$ $n = 20$ $a_i = 20$ disks obtained from Apical four chamber or two chamber view

Left ventricular end systolic volume	
Measurement parameters	Formulas
Stroke volume	SV = EDV - ESV SVI = SV ÷ BSA
Left ventricular ejection fraction	EF (%) = (SV ÷ EDV) × 100
Cardiac output	CO = (SV × HR) ÷ 1000 COI = CO ÷ BSA
Left ventricular percent fractional shortening	FS (%) = {(LVIDd - LVIDs) ÷ LVIDd} × 100
mid wall FS (Shimizu Circulation 1991)	mFS = 1 - (LVIDs + 2 × (-LVIDs/2 + ((2 × LVIDd + (IVSd + LVPWd)/2) × (LVIDs + (IVSs + LVPWs)/2) × ((IVSs + LVPWs)/2)/(4 × (LVIDd + (IVSd + LVPWd)/2)) + (LVIDs/2) ²) ^{1/2})/(LVIDd + (IVSd + LVPWd)/2)
mid wall FS (Schussheim Am J Cardiol 2001)	mFS = {(Dd + Hd/2) - (Ds + Hs/2)} / (Dd + Hd/2) Hd = (IVSd + LVPWd)/2, Hs = (IVSs + LVPWs)/2, Dd = LVIDd, Ds = LVIDs
Interventricular septal fractional shortening (%)	%IVSTF = {(IVSs - IVSd) ÷ IVSd} × 100
Left ventricular posterior wall fractional shortening (%)	%PWTF = {(LVPWs - LVPWd) ÷ LVPWd} × 100
Septum/posterior wall ratio	IVS/LVPW = IVSd ÷ LVPWd
Myocardial mass	LVM = 1.05 × {[5Aepi (LVLd + thick)/6] - [5Aend (LVLd)/6] } thick = $\sqrt{(Aepi / \pi)}$ - $\sqrt{(Aend / \pi)}$
Left ventricular mass coefficient	LVM/BSA = LVM ÷ BSA BSA = 0.007184 × W ^{0.425} × H ^{0.725} H: Height (cm), W: Weight (kg)
Left atrium/aorta ratio	LA/AO = LADs ÷ AODd
IVC Measurements	% Collapse = 100 × (Expiration IVC Diameter - Inspiration IVC Diameter) / Expiration IVC Diameter

(b) Cardiac Function: LA/RA Volumes

Left atrial volume (end-systolic)	
Measurement parameters	Formulas
Area-Length	LA Vol. = (8.0 × LALA4s × LALA2s) ÷ (3π × L) L: Shortest left atrial diameter of either measured with the apical four-chamber or two-chamber cross section.
Simpson	LA Vol. = (π/4)Σ(ai × bi) × L/n n = 20 ai, bi = 20 disks obtained from Apical four chamber and two chamber view

Right atrial volume (end-systolic)	
Measurement parameters	Formulas
Area-Length	$RA\ Vol. = (8.0 \times RALA4s \times RALA2s) \div (3\pi \times L)$ L: Shortest right atrial diameter of either measured with the apical four-chamber or two-chamber cross section.
Simpson	$RA\ Vol. = (\pi/4) \sum (a_i \times b_i) \times L/n$ $n = 20$ $a_i, b_i = 20$ disks obtained from Apical four chamber and two chamber view

(2) M mode

LV Function	
Measurement parameters	Formulas
Left ventricular end diastolic volume	
Pombo	$EDV = (LVIDd)^3$
Teichholz	$EDV = \{7.0 \times (LVIDd)^3\} \div (2.4 + LVIDd)$
Gibson	$EDV = (\pi/6) \times (LVIDd)^2 \times (0.98 \times LVIDd + 5.90)$
Left ventricular end systolic volume	
Pombo	$ESV = (LVIDs)^3$
Teichholz	$ESV = \{7.0 \times (LVIDs)^3\} \div (2.4 + LVIDs)$
Gibson	$ESV = (\pi/6) \times (LVIDs)^2 \times (1.14 \times LVIDs + 4.18)$
Stroke volume	$SV = EDV - ESV$ $SVI = SV \div BSA$
Left ventricular ejection fraction	$EF (\%) = (SV \div EDV) \times 100$
Cardiac output	$CO = (SV \times HR) \div 1000$ $COI = CO \div BSA$
Interventricular septal fractional shortening	
Interventricular septal fractional shortening (%)	$\%IVSTF = \{(IVSs - IVSd) \div IVSd\} \times 100$
Left ventricular posterior wall fractional shortening (%)	$\%PWTF = \{(LVPWs - LVPWd) \div LVPWd\} \times 100$
Septum/posterior wall ratio	$IVS/LVPW = IVSd \div LVPWd$
Left ventricular percent fractional shortening	$FS (\%) = \{(LVIDd - LVIDs) \div LVIDd\} \times 100$
mid wall FS (Shimizu Circulation 1991)	$mFS = 1 - (LVIDs + 2 \times (-LVIDs/2 + ((2 \times LVIDd + (IVSd + LVPWd)/2) \times (LVIDs + (IVSs + LVPWs)/2) \times ((IVSs + LVPWs)/2)/(4 \times (LVIDd + (IVSd + LVPWd)/2)) + (LVIDs/2)^2)^{1/2})/(LVIDd + (IVSd + LVPWd)/2)$

LV Function	
Measurement parameters	Formulas
mid wall FS (Schussheim Am J Cardiol 2001)	$mFS = \{(Dd + Hd/2) - (Ds + Hs/2)\} / (Dd + Hd/2)$ $Hd = (IVSd + LVPWd)/2$, $Hs = (IVSs + LVPWs)/2$, $Dd = LVIDd$, $Ds = LVIDs$
Mean velocity of inner circumferential fiber shortening	$MVCF = (LVIDd - LVIDs) \div (LVIDd \times ET)$
Heart rate	$HR = \# \times 60 \div (\text{Time for } \# \text{ cardiac cycle})$
Myocardial mass Penn (Devereux)	$LVM = 1.04 \times \{(IVSd + LVIDd + LVPWd)^3 - LVIDd^3\} - 13.6$
Myocardial mass ASE	$LVM = 0.80 \times 1.04 \times \{(IVSd + LVIDd + LVPWd)^3 - LVIDd^3\} + 0.6$
Left ventricular mass coefficient	$LVM/BSA = LVM \div BSA$ $BSA = 0.007184 \times W^{0.425} \times H^{0.725}$ H: Height (cm), W: Weight (kg)

LA/LO Measurements	
Measurement parameters	Formulas
Left atrium/aorta ratio	$LA/AO = LADs \div AODd$

Mitral V Measurements	
Measurement parameters	Formulas
E wave amplitude	C-E amp = Distance from C point to E point
A wave amplitude	C-A amp = Distance from C point to A point
E-F slope	E-F slope = Velocity from E point to F point
Distance from E to the septum	EPSS = Distance from E point to IVS
A wave / E wave ratio	$A/E = (C-A \text{ amp}) \div (C-E \text{ amp})$
E wave / A wave ratio	$E/A = (C-E \text{ amp}) \div (C-A \text{ amp})$

IVC Measurements	
Measurement parameters	Formulas
IVC Measurement	$\%Collapse = 100 \times (\text{Expire} - \text{Inspire}) / \text{Expire}$

Tricuspid V Measurements	
Measurement parameters	Formulas
E wave amplitude	C-E amp = Distance from C point to E point
A wave amplitude	C-A amp = Distance from C point to A point
E-F slope	E-F slope = Velocity from E point to F point

Tricuspid V Measurements	
Measurement parameters	Formulas
D-E slope	D-E slope = Velocity from D point to E point
D-E wave amplitude	D-E amp = Distance from D point to E point
A wave / E wave ratio	A/E = (C-A amp) ÷ (C-E amp)
E wave / A wave ratio	E/A = (C-E amp) ÷ (C-A amp)

Pulmonary V Measurements	
Measurement parameters	Formulas
A wave amplitude	A wave amp = Distance from F point to A point amp
E-F slope	E-F slope = Velocity from E point to F point
B-C slope	B-C slope = Velocity from B point to C point
C wave amplitude	B-C amp = Distance from B point to C point

(3) D mode

LVOT Flow Measurements	
Measurement parameters	Formulas
Instantaneous pressure gradient	$PG = 4 \times (\text{Peak } V)^2$
Mean pressure gradient	$MPG = (4/T) \int V(t)^2 dt$ average of all the instantaneous $4 \times (\text{Peak } V)^2$ over the flow period (T)
Stroke volume	$SV = CSA_{LVOT} \times VTI$
Cardiac output	$CO = (SV \times HR) \div 1000$
Heart rate	$HR = \# \times 60 \div (\text{Time for 1 cardiac cycle})$
Valve area	$VA = (CSA_{LVOT} \times VTI_{LVOT}) \div VTI$
Qp / Qs ratio	$Qp/Qs = SV_{RVOT} \div SV_{LVOT}$

RVOT Flow Measurements	
Measurement parameters	Formulas
Instantaneous pressure gradient	$PG = 4 \times (\text{Peak } V)^2$
Mean pressure gradient	$MPG = (4/T) \int V(t)^2 dt$ average of all the instantaneous $4 \times (\text{Peak } V)^2$ over the flow period (T)
Stroke volume	$SV = CSA_{RVOT} \times VTI$
Cardiac output	$CO = (SV \times HR) \div 1000$
Heart rate	$HR = \# \times 60 \div (\text{Time for 1 cardiac cycle})$
Qp / Qs ratio	$Qp/Qs = SV_{RVOT} \div SV_{LVOT}$

Trans M Flow measurement	
Measurement parameters	Formulas
A wave instantaneous pressure gradient	$APG = 4 \times (\text{Peak V of A wave})^2$
E wave instantaneous pressure gradient	$EPG = 4 \times (\text{Peak V of E wave})^2$
E wave / A wave ratio	$E/A = (E\text{-VEL}) \div (A\text{-VEL})$
A wave / E wave ratio	$A/E = (A\text{-VEL}) \div (E\text{-VEL})$

Regurgitant Flow Measurements	
Measurement parameters	Formulas
Instantaneous pressure gradient	$PG = 4 \times (\text{Peak V})^2$
Mean pressure gradient	$MPG = (4/T) \int V(t)^2 dt$ average of all the instantaneous $4 \times (\text{Peak V})^2$ over the flow period (T)

Stenosis Flow Measurements	
Measurement parameters	Formulas
Instantaneous pressure gradient	$PG = 4 \times (\text{Peak V})^2$
Mean pressure gradient	$MPG = (4/T) \int V(t)^2 dt$ average of all the instantaneous $4 \times (\text{Peak V})^2$ over the flow period (T)
Estimated valve area	$VA = 220 \div (P1/2T)$ Set up for the mitral valve. The continuity equations shown below are for targets like the aortic or pulmonary valve. $= \{VTI_{LVOT} \times 0.785 \times (LVOT)^2\} \div VTI$

Pulmonary vein flow Measurements	
Measurement parameters	Formulas
S/D	$S/D = S / D $
Systolic segment	$SF = \{S\text{-VTI} / (S\text{-VTI} + D\text{-VTI})\} \times 100$
Velocity time integral	$VTI = \int V(t) dt$

PISA Measurements	
Measurement parameters	Formulas
FlowRate	$\text{FlowRate} = (2\pi r^2) \times V_r \times \alpha / 180$ default $\alpha = 180^\circ$ r: Distance from the valve center to the location where Aliasing occurs (radius) Vr: Acceleration flow velocity at distance r
EROA	$\text{EROA} = \text{FlowRate} / pV$
RV	$\text{RV} = \text{EROA} \times \text{VTI (R)}$ R: Regurgitant flow
SV	$\text{SV} = \pi/4 \times (\text{Diam})^2 \times \text{VTI}$
RF	$\text{RF} = \text{RV} / \text{SV} \times 100$

TDI PW Measurements	
Measurement parameters	Formulas
Em/Am	$\text{Em/Am} = (\text{Em-Vel}) \div (\text{Am-Vel})$
E/Em	$\text{E/Em} = (\text{E-Vel}) \div (\text{Em-Vel})$

Coronary Flow Measurements	
Measurement parameters	Formulas
peakDSVR	$\text{peakDSVR} = \text{D peak} / \text{S peak} $
meanDSVR	$\text{meanDSVR} = \text{D-MnV} / \text{S-MnV} $
pCFVR	$\text{pCFVR} = \text{D Peak(Peak)} / \text{D Peak(Rest)} $
Pre/Stenosis	$\text{PeakD} = \text{Peak D(Pre)} / \text{Peak D(Stenosis)} $
Pre/Stenosis	$\text{D-MnV} = \text{MnV D(Pre)} / \text{MnV D(Stenosis)} $ $\text{VHT} = 1/2 \times (\text{Vmax} - \text{Vb}) / \text{Dec Slope}$ $\text{Vmax} = \text{Va}$, $\text{Dec Slope} = (\text{Vb} - \text{Va}) / (\text{Tb} - \text{Ta})$

8.5.2 References

(1) LV Volumes

I) Area-Length

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mid wall FS = $1 - \frac{(LVIDs + 2 \times (-LVIDs/2 + ((2 \times LVIDd + (IVSd + LVPWd)/2) \times (LVIDs + (IVSs + LVPWs)/2) \times ((IVSs + LVPWs)/2)/(4 \times (LVIDd + (IVSd + LVPWd)/2)) + (LVIDs/2)^2)^{1/2})}{(LVIDd + (IVSd + LVPWd)/2)}$

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12TS-SD

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CFVR

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8.5.3 Terms and Abbreviations

Abbreviation	Meaning	Meaning
%Collapse	IVC Collapse Index	Inferior vena cava rates of change caused by respiration
%dif	Long axis (at end diastole or end systole) length percentage difference	Left ventricular long axis diameter difference at ap 4C, 2C
%IVSTF	Interventricular Septal thickness Fraction	Rate of increase in the thickness of the systolic interventricular septal wall
%PWTF	Posterior Wall thickness Fraction	Rate of increase in the thickness of the systolic left ventricular posterior wall
dEn	Subendocardial half thickness change at systole on the line cursor(ES)	Endocardium half percent systolic wall thickening
dEp	Subepicardial half thickness change at systole on the line cursor(ES)	Epicardium half percent systolic wall thickening
dTotal	Entire wall thickness change at systole on the line cursor(ES)	Percent systolic wall thickening of all ventricle walls
dMT	Systolic myocardial thickness change	Percent systolic wall thickening
A wave amp	Pulmonary Valve A wave amplitude	Pulmonary Valve A wave amplitude
A/E	Mitral Valve A-wave velocity to /E-wave velocity ratio	A:E ratio of left ventricular inflow velocities across the mitral valve
AccT	Acceleration Time	Acceleration time
Adur	A-wave duration	A-wave duration
Aend	Endocardial Area	Endocardial area
AODd	Aortic root Diameter at end diastole	Aortic root diameter at end diastole
AODs	Aortic root Diameter at systole	Aortic root diameter at systole
Aepi	Epicardial Area	Epicardial Area
APG	Mitral Valve A-wave Peak Pressure Gradient	Mitral valve A-wave peak pressure gradient
AreaEF	Area Ejection Fraction	Area ejection fraction
aV	Mitral Valve A-wave peak Velocity	Mitral valve A-wave peak velocity
AVA	Aortic Valve Area	Aortic valve area
AVDs	Aortic Valve Diameter at systole	Aortic valve diameter at systole
Am	late diastole myocardium velocity	Atrial systolic myocardium motion velocity
B-C slope	Pulmonary Valve B-C slope	Pulmonary valve B-C slope
B-Camp	Pulmonary Valve B-C amplitude	Pulmonary valve amplitude
BSA	Body Surface Area	Body surface area
C-A amp	Mitral Valve C-A amplitude	Mitral valve C-A amplitude
	Tricuspid Valve C-A amplitude	Tricuspid valve C-A amplitude

Abbreviation	Meaning	Meaning
C-E amp	Mitral Valve C-E amplitude	Mitral valve C-E amplitude
	Tricuspid Valve C-E amplitude	Tricuspid valve C-E amplitude
CO	Cardiac Output	Cardiac output
COI	Cardiac Output index	Cardiac Output index
CSA	cross-sectional Area	Cross-sectional area
D	D wave flow velocity (Coronary Flow)	D wave peak flow velocity (Coronary Flow)
D-E amp	Tricuspid Valve D-E amplitude	Tricuspid valve D-E amplitude
D-E slope	Tricuspid Valve D-E slope	Tricuspid valve D-E slope
DecT	Deceleration Time	Deceleration time
DDecT	deceleration time of D wave flow	Deceleration time of D wave flow
D-MnV	D wave Mean Velocity	D wave mean Velocity
D-VTI	D wave VTI (PV Flow, Coronary Flow)	D wave VTI (PV Flow or Coronary Flow)
dp/dt	dp/dt	dp/dt
E-F slope	Mitral Valve E-F Slope	Mitral valve B-C slope
	Pulmonary Valve E-F Slope	Pulmonary valve D-E slope
	Tricuspid Valve E-F Slope	Tricuspid valve B-C slope
E/A	Mitral Vale E-wave velocity to /A-wave velocity ratio	E:A ratio of left ventricular inflow velocities across the mitral valve
E/Em	E/Em	E/Em
Edur	E-wave duration	E-wave duration
EDV	End Diastolic Volume	Left ventricular end diastolic volume
EF	Ejection Fraction	Ejection Fraction
EnV	Endocardial velocity	Endocardial velocity
EPG	Mitral Valve E-wave Peak Pressure Gradient	Mitral Valve E-wave Peak Pressure Gradient
EpV	Epicardial velocity	Epicardial side motion velocity
EPSS	Mitral Valve E-point Septal Separation	EPSS
EROA	Effective regurgitant orifice area	Effective regurgitant orifice area
ESV	End Systolic Volume	Left ventricular end systolic volume
ET	Ejection Time	Ejection Time
eV	Mitral Valve E-wave peak Velocity	Early diastolic left ventricular inflow velocity
Em	Early diastolic myocardium velocity	Early diastolic myocardium motion velocity
Em/Am	Early diastolic myocardium velocity/ late diastole myocardium velocity	Early diastolic myocardium motion velocity/Atrial systolic myocardium motion velocity
Exp	Expiration IVC Diameter	Expiration IVC Diameter
Flow T	Flow Time	Flow duration

Abbreviation	Meaning	Meaning
FR	Flow Rate	Instantaneous regurgitation volume
FS	Fractional Shortening	Left ventricular percent fractional shortening
HR	Heart Rate	Heart rate
Insp	Inspiration IVC Diameter	Inspiration IVC Diameter
IRT	Isovolumic Relaxation Time	Isovolumic Relaxation Time
IVS	Interventricular Septum	Interventricular Septum
IVS/LVPW	IVS/LVPW ratio	IVS/LVPW ratio
IVSd	Interventricular Septal thickness at end diastole	Interventricular Septal thickness at end diastole
IVSs	Interventricular Septal thickness at end systole	Interventricular Septal thickness at end systole
L	Between En and Ep length	Between En and Ep length
LADd	Left Atrial Diameter at end diastole	Left Atrial Diameter at end diastole
LADs	Left Atrial Diameter at end systole	Left Atrial Diameter at end systole
LAL2s	Left Atrial Long-axis Length at end systole on ap 2ch view	Left Atrial Long-axis Length at end systole on ap 2ch view
LAL4s	Left Atrial Long-axis Length at end systole on ap 4ch view	Left Atrial Long-axis Length at end systole on ap 4ch view
LALA2s	Left Atrial Long-axis Area at end systole on ap 2ch view	Left Atrial Long-axis Area at end systole on ap 2ch view
LALA4s	Left Atrial Long-axis Area at end systole on ap 4ch view	Left Atrial Long-axis Area at end systole on ap 4ch view
LAVol/BSA	LA Volume index by body surface area	Left atrial volume/BSA
LA Volume	Left Atrial Volume	Left atrial volume
LVDFt	LV diastole filling time	Left ventricle diastolic filling time
LVDFt/RR	LVDFt/RR	LVDFt/RR ratio
LVIDd	Left Ventricular Internal Diameter at end diastole	Left Ventricular Short Axis Diameter (end-diastolic)
LVIDs	Left Ventricular Internal Diameter at end systole	Left Ventricular Short Axis Diameter (end-systolic)
LVL2d	Left Ventricular Long-axis Length at end diastole on ap 2ch view	Left Ventricular Long-Axis Diameter (end diastole on ap 2ch view)
LVL2s	Left Ventricular Long-axis Length at end systole on ap 2ch view	Left Ventricular Long-Axis Diameter (end systole on ap 2ch view)
LVL4d	Left Ventricular Long-axis Length at end diastole on ap 4ch view	Left Ventricular Long-Axis Diameter (end diastole on ap 4ch view)
LVL4s	Left Ventricular Long-axis Length at end systole on ap 4ch view	Left Ventricular Long-Axis Diameter (end systole on ap 4ch view)
LVLA2d	Left Ventricular Long-axis Area at end diastole on ap 2ch view	Left Ventricular Long-Axis Area (end diastole on ap 2ch view)

Abbreviation	Meaning	Meaning
LVLA2s	Left Ventricular Long-axis Area at end systole on ap 2ch view	Left Ventricular Long-Axis Area (end systole on ap 2ch view)
LVLA4d	Left Ventricular Long-axis Area at end diastole on ap 4ch view	Left Ventricular Long-Axis Area (end diastole on ap 4ch view)
LVLA4s	Left Ventricular Long-axis Area at end systole on ap 4ch view	Left Ventricular Long-Axis Area (end systole on ap 4ch view)
LVLAAd	Left Ventricular Long-axis Area at end diastole	Left ventricular long axis area (end-diastolic)
LVLAAs	Left Ventricular Long-axis Area at end systole	Left ventricular long axis area (end-systolic)
LVLd	Left Ventricular Long-axis Length at end diastole	Left Ventricular Long-axis Length at end diastole
LVLs	Left Ventricular Long-axis Length at end systole	Left Ventricular Long-axis Length at end systole
LVM	Left Ventricular Mass	Left Ventricular Mass
LVM/BSA	LVM index by body surface area	LVM index by body surface area
LVOT	Left Ventricular Out Tract diameter	Left Ventricular Out Tract diameter
LVPW	LV posterior wall	LV posterior wall
LVPWd	Left Ventricular Posterior Wall thickness at end diastole	Left Ventricular Posterior Wall thickness at end diastole
LVPWs	Left Ventricular Posterior Wall thickness at end systole	Left Ventricular Posterior Wall thickness at end systole
LVSAMVd	Left Ventricular Sax Area at Mitral Valve by at end diastole	Left Ventricular Short Axis Area at Mitral Valve Level (end-diastolic)
LVSAMVs	Left Ventricular Sax Area at Mitral Valve by at end systole	Left Ventricular Short Axis Area at Mitral Valve Level (end-systolic)
LVSAPMd	Left Ventricular Sax Area at Papillary Muscle by at end diastole	Left Ventricular Short Axis Area at Papillary Muscle Level (end-diastolic)
LVSAPMs	Left Ventricular Sax Area at Papillary Muscle by at end systole	Left Ventricular Short Axis Area at Papillary Muscle Level (end systolic)
LVSLMVd	Left Ventricular Sax Length at Mitral Valve by at end diastole	Left Ventricular Short Axis Length at Mitral Valve Level (end-diastolic)
LVSLMVVs	Left Ventricular Sax Length at Mitral Valve by at end systole	Left ventricular short axis diameter at the mitral valve level (end-systolic)
mCFVR	Coronary flow velocity reserve by mean velocity	Coronary flow velocity reserve by mean velocity
mDd	LVIDd at midwall level	Left ventricular short-axis diameter at the midwall level (end-diastolic)
mDs	LVIDs at midwall level	Left ventricular short-axis diameter at the midwall level (end-systolic)
mDSVR	Diastolic to systolic blood flow mean velocity ratio	D-MnV/S-MnV
mFS	Midwall fractional shortening	Left ventricular fractional shortening at the mid-wall level

Abbreviation	Meaning	Meaning
MnV	Mean Velocity	Mean velocity
MPG	Mean Pressure Gradient	Mean pressure gradient
MVA	Mitral Valve Area	Mitral Valve Area
MVCF	Mean Velocity of Circumferential Fiber Shortening	Mean Velocity of Circumferential Fiber Shortening
MVG	Myocardial velocity gradient	Myocardial velocity gradient
P1/2T	Pressure half Time	Pressure half-time
pCFVR	Coronary flow velocity reserve by peak velocity	Coronary flow velocity reserve by peak velocity
pDSVR	Diastolic to systolic blood flow peak velocity ratio	Peak D/Peak S
PEP	Pre-Ejection period	Pre-Ejection period
PEP/ET	PEP/ET	PEP/ET(Weissler index, Systolic Time Interval)\
PG	Peak Pressure Gradient	Peak pressure gradient
PG1,2	Peak Pressure Gradient 1,2	Peak pressure gradient 1,2
PISA r	Radius of flow convergence	PISA radius at maximum regurgitant flow time
Pre D	Pre stenosis D wave flow velocity	D wave peak blood flow velocity (pre-stenosis region)
Pre D-MnV	Pre stenosis D wave Mean Velocity	D wave mean blood flow velocity (pre-stenosis region)
Pre/Stenosis	Pre Stenosis/ Stenosis ratio	Pre stenosis/stenosis ratio
pV	Peak Velocity	Peak velocity
PVA	PVA wave flow velocity	Peak velocity during atrial systole retrograde
PVAdur	PVA duration	PVA duration
PVAdur-Adur	PVAdur-Adur	Difference between PVA wave and A wave duration time
PVD	D wave flow velocity (PV Flow)	Maximum blood flow velocity of the D wave (PV Flow)
PVS	S wave flow velocity (PV Flow)	Maximum blood flow velocity of the S wave (PV Flow)
Qp/Qs	Ratio of pulmonic flow to systemic flow	Ratio of pulmonic flow to systemic flow
RAL2s	Right Atrial Long-axis Length at end systole on ap 2ch view	Right atrial diameter (at end systole on apical 2ch view)
RAL4s	Right Atrial Long-axis Length at end systole on ap 4ch view	Right atrial diameter (at end systole on apical 4 ch view)
RALA2s	Right Atrial Long-axis Area at end systole on ap 2ch view	Right atrial area (at end systole on apical 2 ch view)
RALA4s	Right Atrial Long-axis Area at end systole on ap 4ch view	Right atrial area (at end systole on apical 4 ch view)

Abbreviation	Meaning	Meaning
RAP	Right Atrial pressure	Right atrial pressure
RAvol/BSA	RA Volume index by body surface area	Right atrial volume/BSA
RA Volume	Right Atrial Volume	Right atrial volume
RF	Regurgitant fraction	Regurgitant fraction
RIVCT	Regional Isovolumetric Contraction Time	Regional Isovolumetric Contraction Time (when measuring TDI PW)
RIVRT	Regional Isovolumetric Relaxation Time	Regional Isovolumetric Relaxation Time (when measuring TDI PW)
RR	R-R interval	RR interval
RV	Regurgitant volume	Regurgitant flow volume per heartbeat
RVDd	Right Ventricular Diameter at end diastole	Right Ventricular Diameter at end diastole
RVDs	Right Ventricular Diameter at end systole	Right Ventricular Diameter at end systole
RVOT	Right Ventricular Out Tract diameter	Right Ventricular Out Tract diameter (mesosystolic)
RVSP	Right Ventricular systolic pressure	Right ventricle systolic pressure
S	S wave flow velocity (Coronary Flow)	Peak S wave flow velocity (Coronary Flow)
S/D	S/D ratio	S/D ratio
SF	Systolic fraction	Systolic fraction
S-MnV	S wave Mean Velocity	S wave mean blood flow velocity (stenosis region)
Steno D	Stenosis D S wave flow velocity	D wave peak blood flow velocity (stenosis region)
Steno D-MnV	Stenosis D wave Mean Velocity	D wave mean blood flow velocity (stenosis region)
SV	Stroke Volume	Stroke Volume
SVI	Stroke Volume Index	Stroke (Volume) Index
S-VTI	S wave VTI (PV Flow Coronary Flow)	Velocity time integral of S wave (PV Flow or Coronary Flow)
Sm1	Systolic myocardium velocity 1	Systolic myocardial motion velocity (1st wave)
Sm2	Systolic myocardium velocity 2	Systolic myocardial motion velocity (2nd wave)
thick	Mean wall thickness	Mean myocardial wall thickness
VHT	Velocity Half Time of D wave flow	D wave half velocity time
Vmax	Maximum Velocity (CW Doppler)	Maximum velocity across stenosis (CW Doppler method)
Vr	Aliasing velocity	Accelerated flow velocity at radius r
VTI	Velocity Time integral	Velocity Time Integral

Abbreviation	Meaning	Meaning
VTImax	Velocity Time integral (CW Doppler)	Velocity-time integral of flow velocity across stenosis (CW Doppler method)
WMV	Wall motion velocity curve	Wall motion velocity curve



Vascular Measurements

- 9.1 Vascular Measurement Overview
- 9.2 Measurement Methods
- 9.3 Reports
- 9.4 Presets
- 9.5 References

9.1 Vascular Measurement Overview

9.1.1 Vascular Measurement Menu

Vascular measurement provides the following measurements and measurement parameters.

Table1: B mode

Study	Menu	Measurement parameters		
R-Carotid A L-Carotid A	Car%StenoD	%STENO	Vessel	Residual
	Car%StenoA	%STENO	Vessel	Residual
	max-IMT	max-IMT		
	mean-IMT	mean-IMT		
	CCA_IMT, ICA_IMT, ECA_IMT, BIF_IMT	max	min	avg
		SD	points	width
		Hist		
		mean	points	width
	CmeanIMT			
R-Lwr Extr. A L-Lwr Extr. A	Lwr%StenoD Lwr%StenoA	%STENO	Vessel	Residual
R-Upr Extr. A L-Upr Extr. A	Upr%StenoD Upr%StenoA	%STENO	Vessel	Residual

Table2: D Mode

Study	Menu	Measurement parameters				
R-Carotid A L-Carotid A	pCCA, mCCA, dCCA	PI MnV AccT/FT	RI Vm	S/D FT	PSV AccT	EDV ACC F.Vol
	ICA, pICA, mICA, dICA, ECA, BIFUR	PI MnV AccT/FT	RI Vm	S/D FT	PSV AccT	EDV ACC F.Vol
	VERT	PI MnV AccT/FT	RI Vm	S/D FT	PSV AccT	EDV ACC F.Vol
R-Lwr Extr. A L-Lwr Extr. A	CIA, EIA, IIA, CFA, DFA, SFA, PopA, PTA, ATA, PerA, DPA	PI MnV AccT/FT	RI Vm	S/D FT	PSV AccT	EDV ACC F.Vol
	Lwr Art.1 through Lwr Art.8	PI MnV AccT/FT	RI Vm	S/D FT	PSV AccT	EDV ACC F.Vol

Study	Menu	Measurement parameters				
R-Lwr Extr. V L-Lwr Extr. V	CIV, EIV, IIV, CFV, DFV, SFV, GSV, PopV, LSV, PTV, ATV, PerV	pV				
	Lwr Vein 1 through Lwr Vein 8	pV				
R-Upr Extr. A L-Upr Extr. A	ScA, AA, BA, DBA, BasA, RA, UA, SPA	PI MnV AccT/FT	RI Vm	S/D FT	PSV AccT	EDV ACC F.Vol
	Upr Art.1 through Upr Art.8	PI MnV AccT/FT	RI Vm	S/D FT	PSV AccT	EDV ACC F.Vol
R-Upr Extr. V L-Upr Extr. V	IJV, ScV, CV, AV, BV, DBV, BasV, RV, UV	pV				
	Upr Vein 1 through Upr Vein 8	pV				
R-TCD L-TCD	ACA, MCA, PCA, BA, VA, TICA, ACoA, PCoA	PI MnV AccT/FT	RI Vm	S/D FT	PSV AccT	EDV ACC F.Vol

9.1.2 Vascular Measurement Study

Vascular measurement consists of the following studies.

- R-Carotid A: For right carotid artery
- L-Carotid A: For left carotid artery
- R-Lwr Extr. A: For right lower extremity arteries
- L-Lwr Extr. A: For left lower extremity arteries
- R-Lwr Extr. V: For right lower extremity veins
- L-Lwr Extr. V: For left lower extremity veins
- R-Upr Extr. A: For right upper extremity arteries
- L-Upr Extr. A: For left upper extremity arteries
- R-Upr Extr. V: For right upper extremity veins
- L-Upr Extr. V: For left upper extremity veins
- R-TCD: For the right trans-cranial Doppler
- L-TCD: For left trans-cranial Doppler

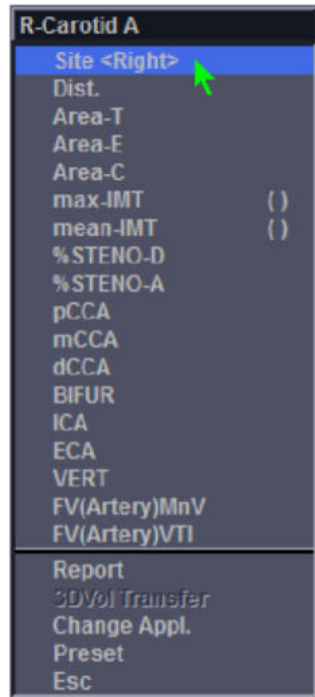
The measurement menu and report display differ with the selected study.

(1) Switching Between Right and Left Area Studies

Follow the steps below to switch between right and left studies in the same application and study.

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select the [Site<Right] or [Site<Left] from the measurement menu.



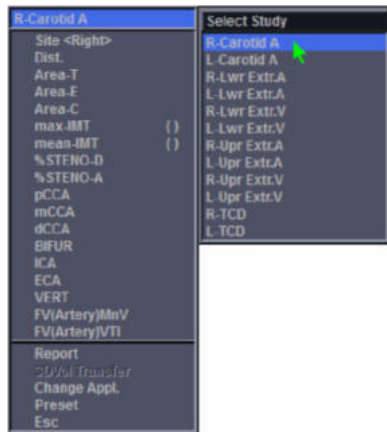
The right or left display of the study appears.

(2) Switching the Study

Switches the Study within the same application.

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select the item at the very top (current study name) from the Measurement menu.

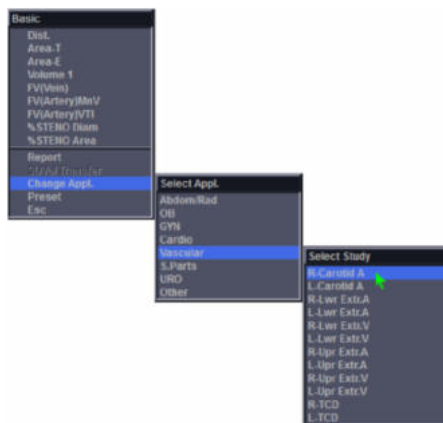


3. Select the Study to change.

(3) Switch the Study Using a Different Application

Procedure

1. Press the [Measurement] button on the touch panel.
The measurement menu corresponding to the screen mode is displayed.
2. Select [Change Appl].
3. Select the application.
4. Select Study.



Menu display example: Switching between Abdomen and Basic
Switches to the study of the selected application.

9.2 Measurement Methods

9.2.1 B mode Measurement

(1) Stenosis percentage measurements

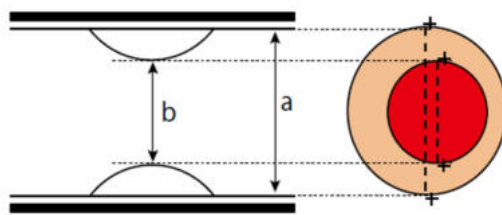
One of the following two methods can be used to evaluate stenosis percentage.

- Evaluation by calculation from the diameter (%STENO Diam)

- Calculation from the cross-sectional area of the blood vessel (%STENO Area)

% STENO-DiameterMeasurements

Measure the blood vessel lumen diameter and the residual lumen diameter of the stenosis using a tomographic image. Use those measurement values to obtain the stenosis percentage of the blood vessel.



$$\%STENO = (a - b) \div a \times 100$$

a: The blood vessel lumen diameter (Vessel lumen)

b: Residual lumen diameter of the stenosis of the blood vessel (Residual), (a > b)

Procedure

1. Record the transverse image of the short axis that intersects in the direction perpendicular to the stenosis.
2. Press the [Measurement] button on the touch panel.
3. Select [%STENO D] from the Measurement menu.
4. Measure the lumen diameter of the original blood vessel "a" using the Caliper method.
5. Measure the residual lumen diameter of blood vessel stenosis "b" using the Caliper method.

Obtain the vascular stenotic ratio of a blood vessel by calculating the blood vessel lumen diameter (Vessel) and the residual lumen diameter (Residual).

Example of Measurement Results Display

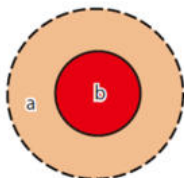
Rt.STENO-Diam		: Selected Study side (left or right) and measurement menu
Vessl:	mm	: Lumen diameter of the original blood vessel
Resid :	mm	: Residual lumen diameter of the stenosis of the blood vessel
%STENO:	%	: Stenosis percentage

Reference information

1.2.1 Caliper Method on page 27

%STENO-AreaMeasurements

Measure the lumen cross-sectional area (a) of a blood vessel and the residual lumen cross-sectional area (b) of stenosis in a tomographic image. Use those measurement values to calculate the stenosis percentage of the blood vessel.



$$\%STENO = (a - b) \div a \times 100$$

a: The blood vessel lumen diameter (Vessel lumen)

b: The area of the lumen of the stenosis part of the blood vessel (Residual) (a > b)

[Trace] (B Trace Method), [Ellipse], [Circle] are available as measurement methods.

Use %STENO-Area in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > B.Mode]) to select a method.

Procedure

1. Record the transverse image of the short axis that intersects in the direction perpendicular to the stenosis.
2. Press the [Measurement] button on the touch panel.
3. Select [%STENO A] from the measurement menu.
4. Measure the cross-sectional area of the blood vessel lumen "a".
5. Measure the residual cross-sectional area "b" of lumen of the stenosis.
Obtain the vascular stenotic ratio of a blood vessel by calculating the blood vessel lumen diameter (Vessel) and the residual lumen diameter (Residual).

Example of Measurement Results Display

Rt.STENO-Area		: Selected Study side (left or right) and measurement menu
Vessl:	cm ²	: The area of the lumen of the original blood vessel
Resid:	cm ²	: Residual lumen cross-sectional area of stenosis
%STENO:	%	: Stenosis percentage

Reference information

1.2.2 *Ellipse Method* on page 29

1.2.4 *B Trace Method* on page 30

1.2.3 *Circle Method* on page 29

(2) mean-IMT Measurements

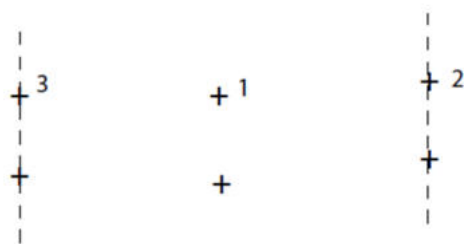
Identifies the greatest thickness of intima-media complex (IMC) in the common carotid artery. Mean-IMT was obtained by dividing a 2 cm length of the thickest area in two and taking measurements at three points.

The Caliper method and MT method are used for measurement. Use mean-IMT in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > B.Mode]) to set this method.

mean-IMT Caliper Measurement: Methods

Procedure

1. The ultrasound beam is perpendicular to the common carotid artery and a long axis view is recorded of the thickest area.
2. Press the [Measurement] button on the touch panel.
3. Select the [Site<Right>] or [Site<Left>] from the measurement menu.
4. Select [mean-IMT] from the measurement menu.
5. Use the Caliper method to measure the thickest area.
The line cursor is displayed at 1cm toward the right and left from the region measured.
6. Repeat step 5 to measure 3 locations.
7. Measure the thickness at right and left line cursor location.



The mean-IMT value is displayed.

Example of Measurement Results Display

Rt.mean-IMT		: Right and left and measurement menu of selected study
1 :	mm	: Maximum IMT value
2 :	mm	: IMT value at a location 1 cm to the right of the thickest area
3 :	mm	: IMT value at a location 1 cm to the left of the thickest area
mean-IMT :	mm	: Average value of measurements made at 3 points

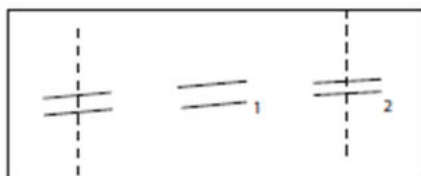
Reference information

1.2.1 Caliper Method on page 27

mean-IMT IMT Measurement: Methods

Procedure

1. The ultrasound beam is perpendicular to the common carotid artery and a long axis view is recorded of the thickest area.
2. Press the [Measurement] button on the touch panel.
3. Select the [Site<Right>] or [Site<Left>] from the measurement menu.
4. Select [mean-IMT] from the measurement menu.
5. Measure the thickest area.
 - a. Use the [Pointer] rotary encoder to place the line mark at the boundary of intima media and press [Enter].
 - b. Measure the thickness at the line mark.
Line cursors are displayed at 1cm to the right and left from the measured location.
6. Measure the thickness at right and left line cursor location in the same way as the thickest area was measured.



When thickness at 3 locations have been measured, the mean-IMT value is displayed.

Example of Measurement Results Display

Rt.mean-IMT		: Right and left and measurement menu of selected study
-------------	--	---

1 :	mm	: Maximum IMT value
2 :	mm	: IMT value at a location 1 cm to the right of the thickest area
3 :	mm	: IMT value at a location 1 cm to the left of the thickest area
mean-IMT :	mm	: Average value of measurements made at 3 points

(3) CmeanIMT (IMT automatic) Measurement

A mean-IMT measurement obtains measurements at 3 points and the average value by automatically tracing the inner and outer membranes.

NOTE: The optional SOP-AR50-38 is required for these measurements.

NOTE: Tracing may not work well with some images. Check the results after freezing.

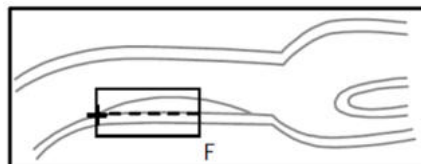
Procedure

1. Position the ultrasound beam perpendicular to the common carotid artery and record a long axis tomographic image of the thickest region.

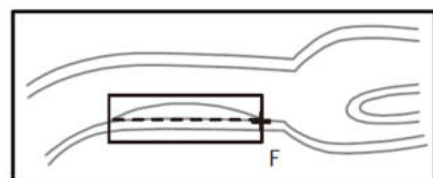
Taking measurements using images stored in the system

Only images saved in the Line and Palette formats can be used for measurements.

2. Press the [Measurement] button on the touch panel.
3. Select the [Site<Right>] or [Site<Left>] from the measurement menu.
4. Select [CmeanIMT] from the measurement menu.
5. Press [caliper] to switch between Diastole or Systole.
6. Set up the ROI.
 - a. Move the left line of the ROI to the start point.



- b. Align the + mark with the inner membrane and press [Enter] key.
- c. Use [Pointer] rotary encoder to adjust the height of the ROI to enclose the entire IMT.
- d. Move the right line of the ROI to the end point.
- e. Align the + mark with the inner membrane and press [Enter] key.



The inner membrane and outer membrane are automatically traced and the measurement results are displayed.

An error message may be displayed if the ROI is too narrow or the inner membrane is not detected. Select [Cancel] and reset the ROI.

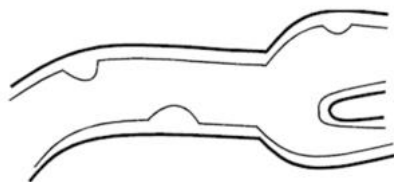
7. If necessary, use [Pointer] rotary encoder to adjust the trace level of the inner and outer membranes.
 - a. Correct the light blue (cyan) trace level using the [Pointer] rotary encoder.
Temporarily deleting the trace line
 Select [Mark Display] from the Meas tab in the function menu.
 - b. Press the [Enter] key.
 The other line is displayed in blue (cyan).
 - c. Correct the trace level using the [Pointer] rotary encoder.

Example of Measurement Results Display

Rt.CmeanIMT F		: Right and left and measurement menu of selected study
[Diastole]		
mean:	mm	: Average value of 3 points
1:	mm	: Maximum IMT value
2:	mm	: Peripheral IMT value
3:	mm	: Central IMT value
points:		: Amount of IMT measurement points
width:	mm	: ROI width

(4) max-IMT Measurements

Measures multiple points in the greatest intima-media thickness (IMT) in the common carotid artery. The maximum value of these measurements is indicated as max-IMT.



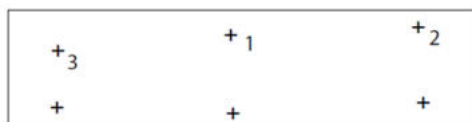
The Caliper method and IMT method are used for measurement. Select max-IMT in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > B.Mode]).

The factory default setting allow up to seven settings.

max-IMT Caliper Measurement: Methods

Procedure

1. The ultrasound beam is perpendicular to the carotid artery and a long axis view is recorded of the thickest area.
2. Press the [Measurement] button on the touch panel.
3. Select [Site<Right>] or [Site<Left>] from the measurement menu.
4. Select [max-IMT] from the measurement menu.
5. Use the Caliper method to measure a thick area.



6. Use the Caliper method to measure another thick area.

Example of Measurement Results Display

		: Right and left and measurement menu of selected study
1 :	mm	: IMT value
2 :	mm	: IMT value
3 :	mm	: IMT value
max-IMT :	mm	: Maximum IMT value

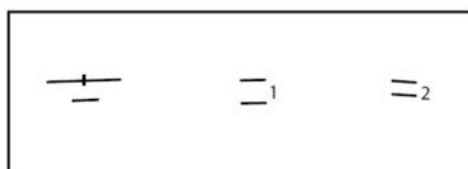
Reference information

1.2.1 Caliper Method on page 27

max-IMT IMT Measurement: Methods

Procedure

1. The ultrasound beam is perpendicular to the carotid artery and a long axis view is recorded of the thickest area.
2. Press the [Measurement] button on the touch panel.
3. Select [Site<Right>] or [Site<Left>] from the measurement menu.
4. Select [max-IMT] from the measurement menu.
5. Measure the thick region.
 - a. Move a line mark to the measurement position.
 - b. Use the [Pointer] rotary encoder to place the line mark at the boundary of intima media and press [Enter].
 - c. Use the line mark to measure the thickness and press [Enter].



6. Measure other thick regions.

Example of Measurement Results Display

Rt .max-IMT	: Right and left and measurement menu of selected study
-------------	---

1 :	mm	: IMT value
2 :	mm	: IMT value
3 :	mm	: IMT value
max-IMT :	mm	: Maximum IMT value

(5) max-IMT Measurement: IMT Automatic Measurement

This function allows you to automatically trace IMT and obtain the maximum IMT value

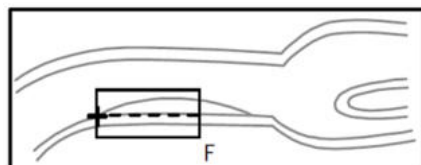
NOTE: The optional SOP-AR50-38 is required.

NOTE: Tracing may not work well with some images. Check the results after freezing.

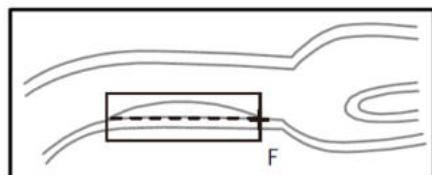
Procedure

1. The ultrasound beam is perpendicular to the carotid artery and a long axis view is recorded of the thickest area.
2. Press the [Measurement] button on the touch panel.
3. Select [Site<Right>] or [Site<Left>] from the measurement menu.
IMT automatic measurement menu
There are four: [CCA_IMT], [ICA_IMT], [ECA_IMT] and [BIF_IMT].
4. Press the [Caliper]key to switch between Diastole or Systole.
5. Set up the ROI.

- a. Move the left line of the ROI to the start point.



- b. Align the + mark with the inner membrane and press [Enter] key.
- c. Use [Pointer]rotary encoder to adjust the height of the ROI to enclose the entire IMT.
- d. Move the right line of the ROI to the end point.
- e. Align the + mark with the inner membrane and press [Enter] key.



The inner membrane and outer membrane are automatically traced and the measurement results are displayed.

An error message may be displayed if the ROI is too narrow or the inner membrane is not detected. Select [Cancel] and reset the ROI.

6. If necessary, use [Pointer] rotary encoder to adjust the trace level of the inner and outer membranes.
 - a. Adjust the light blue (cyan) display line trace level using the [Pointer] rotary encoder.
Temporarily deleting the trace line
 Select [Mark Display] from the [Meas] tab in the function menu.
 - b. Press the [Enter] key.
 The second line is displayed in light blue (cyan).
 - c. Adjust the trace level using [Pointer] rotary encoder.

Example of Measurement Results Display

Rt.CCA_IMT F		: Right and left and measurement menu of selected study
[Diastole]		
max:	mm	: Maximum IMT value
min:	mm	: Minimum IMT value
avg:	mm	: Average IMT value
SD:	mm	: Standard deviation
points:		: Amount of IMT measurement points
width:	mm	: ROI width

9.2.2 D mode

The following precautions are necessary when taking measurements in D mode.

- When recording an arterial blood flow Doppler waveform (pulse method), set the Doppler angle of incidence as low as possible. If the Doppler angle of incidence 60°, the blood velocity measurement error increases.
- When measuring the blood velocity using multiple blood flow waveform images, use identical recording conditions (forward and reverse flow directions) for all blood flow waveforms. The blood flow measurement values of the system are recorded as real numbers but the ± sign is not displayed on the screen.
 Completely different values might be displayed, particularly when the display of measurement values of reports is set at average value (Display Data is set at "Average" in the measurement preset ([Create Measurement Tools > Application Measurement > Report Data])).

(1) Carotid Artery Study

Obtains PSV (peak systolic flow velocity), EDV (end-diastolic velocity) or minimum diastolic velocity, and S/D, from carotid artery blood flow. You can also calculate the flow volume by measuring vessel diameter.

Use the following measurement menus to measure carotid artery blood flow. Measurement menus are indicated by the names of the blood vessels they measure.

- pCCA (CCA proximal)

- mCCA (CCA mid)
- dCCA (CCA distal)
- ICA
- pICA
- mICA
- dICA
- ECA
- BIFUR
- VERT

In this measurement, set the following 2 points:

- Peak Systolic Velocity (PSV)
- End-diastolic velocity (EDV) or minimum diastolic velocity
NOTE: End-diastolic flow velocity (EDV) and minimum diastolic blood flow velocity are not necessarily identical. Set the EDV time phase to match the blood velocity to be used for the measurement.

Blood flow can be measured by tracing the Doppler waveform (Doppler Trace method, Dop.Trace) or by directly pointing to the Doppler waveform using the Dop.Caliper method. The factory default measurement method is set to [Auto] in Dop.Trace. Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to set the measurement method for each measurement parameter.

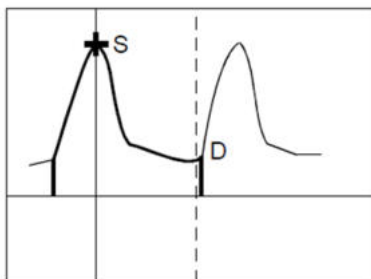
Using the Dop Trace (Doppler Trace Method) for Measuring

Trace the Doppler waveform to detect the peak systolic velocity (PSV) and end-diastolic velocity (EDV) points.

The Doppler Trace method consists of [Auto] (Auto Trace) and [Manual] (Manual Trace). Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Methods and Display Items > D.Mode]) to set the measurement method for each measurement parameter.

Procedure

1. Record the carotid artery blood flow Doppler waveform.
2. Press the [Measurement] button on the touch panel.
3. Select the name of the blood vessel to be measured from the measurement menu.
A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.
4. Using the Doppler Trace method, trace the blood flow Doppler waveform.
When the blood flow Doppler waveform is traced, a line cursor accompanied by "S" (peak systolic velocity point) and "D" (end diastolic velocity point) is displayed.



5. Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity if necessary.

Example of Measurement Results Display

Rt. ICA	:	Name of selected blood vessel and its side (left or right)
PSV: . cm/s	:	Peak systolic velocity
EDV: . cm/s	:	End diastolic velocity
S/ D: .	:	PSV/EDV ratio
MnV: . cm/s	:	Mean velocity
PI: .	:	Pulsatility Index
RI: .	:	Resistance Index
[1Beat avg.]	:	Detected heartbeats

Reference information

1.2.5 Doppler Trace Method on page 31

Using Dop Caliper for Measuring

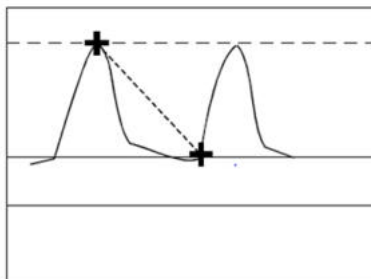
Directly specify 2 points for the peak systolic velocity (PSV) and end diastolic velocity (EDV). Set each measurement parameters to [Caliper] in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode>]).

Procedure

1. Record the carotid artery blood flow Doppler waveform.
2. Press the [Measurement] button on the touch panel.
3. Select the blood flow you want to measure from the measurement menu.
4. Set the peak systolic velocity (PSV) point.
 - a. Move the caliper mark to the PSV position.
 - b. Press the [Enter]key.
5. Set the end diastolic velocity (EDV) point.

EDV time phase

Select the blood flow velocity (end diastolic velocity or minimum diastolic velocity) you want to use for the measurement.



- a. Move the caliper mark to the EDV position.
- b. Press the [Enter]key.
Set PSV or EDV to display "S/D" and other values.

Example of Measurement Results Display

Rt. ICA		: Name of selected blood vessel and its side (left or right)
PSV:	cm/s	: Peak systolic velocity
EDV:	cm/s	: End Diastolic Velocity
S/ D:		: PSV/EDV ratio
RI:		: Resistance Index

(2) Examination of Upper and Lower Extremity Arteries: Lwr Extr. A, Upr Extr. A

Obtains PSV (peak systolic velocity) and EDV (end diastolic velocity), or the minimum diastolic velocity, and S/D, from blood flow in arteries on the right and left sides in the upper and lower extremities. You can also calculate the flow volume by measuring vessel diameter. This examination is comprised of the following four studies: R-Lwr Extr. A, L-Lwr Extr. A, R-Upr Extr. A, and L-Upr Extr. A.

Use the following measurement menus to measure blood flow in arteries on the right and left sides in the upper and lower extremities.

Study	Names of available menus (vessel names)
R-Lwr Extr. A, L-Lwr Extr. A	CIA, EIA, IIA, CFA, DFA, SFA, PopA, PTA, ATA, PerA, DPA
	User settings (Lwr Art.1 through Lwr Art.8)
R-Upr Extr. A, L-Upr Extr. A	ScA, AA, BA, DBA, BasA, RA, UA, SPA
	User settings (Upr Art.1 - Upr Art.8)

You can use Name Assignment in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to change the names of user-defined menus.

In this measurement, set the following 2 points:

- Peak Systolic Velocity (PSV)
- End-diastolic velocity (EDV) or minimum diastolic velocity
NOTE: End-diastolic flow velocity (EDV) and minimum diastolic blood flow velocity are not necessarily identical. Set the EDV time phase to match the blood velocity to be used for the measurement.

Blood flow can be measured by tracing the Doppler waveform (Doppler Trace method, Dop.Trace) or by directly pointing to the Doppler waveform using the Dop.Caliper method. The factory default measurement method is set to [Auto] in Dop.Trace. Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to set the measurement method for each measurement parameter.

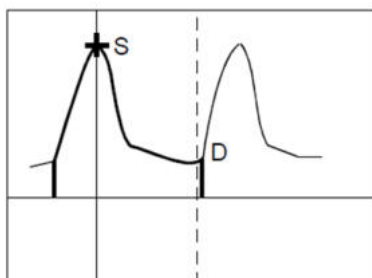
Using the Dop Trace (Doppler Trace Method) for Measuring

Trace the Doppler waveform to detect the peak systolic velocity (PSV) and end-diastolic velocity (EDV) points.

The Doppler Trace method consists of [Auto](Auto Trace) and [Manual](Manual Trace). Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to set the measurement method for each measurement parameter.

Procedure

1. Switch measurement study to [R-Lwr Extr. A], [L-Lwr Extr. A], [R-Upr Extr. A], or [L-Upr Extr. A].
2. Record the blood flow Doppler waveform for the target blood vessel.
3. Press the [Measurement] button on the touch panel.
4. Select the blood flow you want to measure from the measurement menu.
A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.
5. Using the Doppler Trace method, trace the blood flow Doppler waveform.
When the blood flow Doppler waveform is traced, a line cursor accompanied by "S" (peak systolic velocity point) and "D" (end diastolic velocity point) is displayed.



6. Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

Rt. ICA		: Name of selected blood vessel and its side (left or right)
PSV:	cm/s	: Peak systolic velocity
EDV:	cm/s	: End Diastolic Velocity
S/D:		: PSV/EDV ratio
MnV:	cm/s	: Mean velocity
PI:		: Pulsatility Index
RI:		: Resistance Index

Reference information

1.2.5 Doppler Trace Method on page 31

Using Dop Caliper for Measuring

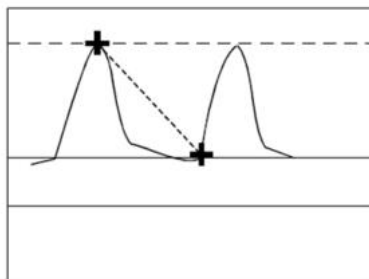
Directly specify 2 points for the peak systolic velocity (PSV) and end diastolic velocity (EDV). Set each measurement parameters to [Caliper] in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]).

Procedure

1. Switch measurement study to [R-Lwr Extr. A], [L-Lwr Extr. A], [R-Upr Extr. A], or [L-Upr Extr. A].
2. Record the blood flow Doppler waveform for the target blood vessel.
3. Press the [Measurement] button on the touch panel.
4. Select the blood flow you want to measure from the measurement menu.
5. Set the peak systolic velocity (PSV) point.
 - a. Move the caliper mark to the PSV position.
 - b. Press the [Enter]key.
6. Set the end diastolic velocity (EDV) point.

EDV time phase

Select the blood flow velocity (end diastolic velocity or minimum diastolic velocity) you want to use for the measurement.



- a. Move the caliper mark to the EDV position.
- b. Press the [Enter]key.
Set PSV or EDV to display "S/D" and other values.

Example of Measurement Results Display

Rt.CIA		: Name of selected blood vessel and its side (left or right)
PSV:	cm/s	: Peak systolic velocity
EDV:	cm/s	: End Diastolic Velocity
S/ D:		: PSV/EDV ratio
RI:		: Resistance Index

(3) Examination of Blood Flow in Upper and Lower Extremities Veins: Lwr Extr. V Study, Upr Extr. V Study

Measure the peak blood flow velocity for venous flow in the upper and lower extremities.

This examination is comprised of the following four studies: R-Lwr Extr V, L-Lwr Extr V, R-Upr Extr V and L-Upr Extr V.

Use the following measurement menus to measure venous flow on the right and left sides in the upper and lower extremities. Measurement menus are indicated by the names of the blood vessels they measure.

Study	Names of available menus (vessel names)
R-Lwr Extr. V, L-Lwr Extr. V	CIV, EIV, IIV, CFV, DFV, SFV, GSV, PopV, LSV, PTV, ATV, PerV
	User settings (Lwr Vein 1 through Lwr Vein 8)
R-Upr Extr. V, L-Upr Extr. V	IJV, ScV, CV, AV, BV, DBV, BasV, RV, UV
	User settings (Upr Vein 1 through Upr Vein 8)

You can use Name Assignment in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to change the names of user-defined menus.

You can set the following point in these measurements.

- Peak Systolic Velocity (PSV)

Blood flow can be measured by tracing the Doppler waveform (Doppler Trace method, Dop.Trace) or by directly pointing to the Doppler waveform using the Dop.Caliper method. The factory default measurement method is set to [Auto] in Dop.Trace. The measurement method can be changed from each measurement parameter of the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]).

Measuring with the Dop.Trace

Trace the Doppler waveform to detect the maximum velocity point.

The Doppler Trace method consists of [Auto](Auto Trace) and [Manual](Manual Trace). Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to set the measurement method for each measurement parameter.

Procedure

1. Switch measurement study to [R-Lwr Extr. V], [L-Lwr Extr. V], [R-Upr Extr. V], or [L-Upr Extr. V].
2. Record the blood flow Doppler waveform for the target blood vessel.
3. Press the [Measurement] button on the touch panel.
4. Select the name of the blood vessel to be measured from the measurement menu.
A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace.
5. Using the Doppler Trace method, trace the blood flow Doppler waveform.
The traced waveform is displayed when the trace ends. The + mark is displayed at the pV position.

- Adjust the pV position as required.

Example of Measurement Results Display

Rt . AV	: Name of selected blood vessel and its side (left or right)
pV: cm/s	: Peak Systolic Velocity

Reference information

1.2.5 Doppler Trace Method on page 31

Using Dop Caliper for Measuring

This function directly points to the peak flow velocity point.

Set each measurement parameters to [Caliper] in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]).

Procedure

- Switch measurement study to [R-Lwr Extr. V], [L-Lwr Extr. V], [R-Upr Extr. V], or [L-Upr Extr. V].
- Record the blood flow Doppler waveform for the target blood vessel.
- Press the [Measurement] button on the touch panel.
- Select the name of the blood vessel to be measured from the measurement menu.
- Move the + mark to the peak velocity (pV) point, and select [Enter].

Example of Measurement Results Display

Rt . AV	: Name of selected blood vessel and its side (left or right)
pV: cm/s	: Peak blood flow velocity

(4) Transcranial Doppler Examination: TCD Study

Obtains the PSV (peak systolic velocity) and EDV or minimum diastolic velocity, and S/D from transcranial artery blood flow. You can also calculate the flow volume by measuring vessel diameter.

Use the following menus for TCD Study. Measurement menu is displayed in blood vessel names.

- ACA
- MCA
- PCA
- BA
- VA
- TICA
- ACoA
- PCoA

In this measurement, set the following 2 points:

- Peak Systolic Velocity (PSV)
- End-diastolic velocity (EDV) or minimum diastolic velocity
NOTE: End-diastolic flow velocity (EDV) and minimum diastolic blood flow velocity are not necessarily identical. Set the EDV time phase to match the blood velocity to be used for the measurement.

Blood flow can be measured by tracing the Doppler waveform (Doppler Trace method, Dop.Trace) or by directly pointing to the Doppler waveform using the Dop.Caliper method. The factory default measurement method is set to [Auto] in Dop.Trace. Use the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]) to set the measurement method for each measurement parameter.

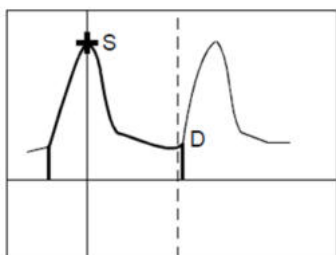
Using the Dop Trace (Doppler Trace Method) for Measuring

Trace the Doppler waveform to detect the peak systolic velocity (PSV) and end-diastolic velocity (EDV) points.

The Doppler Trace method consists of Auto Trace and Manual Trace. Set the measurement method using each measurement parameters in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items>> D.Mode]).Select [Auto] for Auto Trace, and select [Manual] for Manual Trace.

Procedure

1. Switch measurement study to [R-TCD] or [L-TCD].
2. Record the blood flow Doppler waveform for the target blood vessel.
3. Press the [Measurement] button on the touch panel.
4. Select the name of the blood vessel to be measured from the measurement menu.
A line cursor (vertical line) is displayed for Auto Trace and a + mark is displayed for Manual Trace..
5. Using the Doppler Trace method, trace the blood flow Doppler waveform.
When the blood flow Doppler waveform is traced, a line cursor accompanied by "S" (peak systolic velocity point) and "D" (end diastolic velocity point) is displayed.



6. Modify the EDV time phase to the end diastolic velocity or minimum diastolic velocity, if necessary.

Example of Measurement Results Display

Rt .MCA		: Name of selected blood vessel and its side (left or right)
PSV:	cm/s	: Peak systolic velocity
EDV:	cm/s	: End Diastolic Velocity

S/D:		: PSV/EDV ratio
MnV:	cm/s	: Mean velocity
PI:		: Pulsatility Index
RI:		: Resistance Index
[1Beat avg.]		: Detected heartbeats

Reference information

1.2.5 Doppler Trace Method on page 31

Using Dop Caliper for Measuring

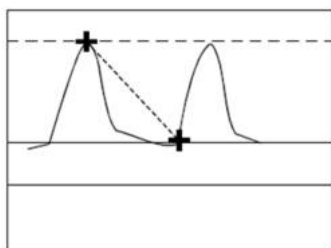
Directly specify 2 points for the peak systolic velocity (PSV) and end diastolic velocity (EDV). Set each measurement parameters to [Caliper] in the measurement preset ([Create Measurement Tools > Application Measurement > Measured Method & Display Items > D.Mode]).

Procedure

1. Switch measurement study to [R-TCD] or [L-TCD].
2. Record the blood flow Doppler waveform for the target blood vessel.
3. Press the [Measurement] button on the touch panel.
4. Select the name of the blood vessel to be measured from the measurement menu.
5. Set the peak systolic velocity (PSV) point.
 - a. Move the caliper mark to the PSV position.
 - b. Press the [Enter]key.
6. Set the end diastolic velocity (EDV) point.

EDV time phase

Select the blood flow velocity (end diastolic velocity or minimum diastolic velocity) you want to use for the measurement.



- a. Move the caliper mark to the EDV position.
 - b. Press the [Enter]key.
- Set PSV or EDV to display "S/D" and other values.

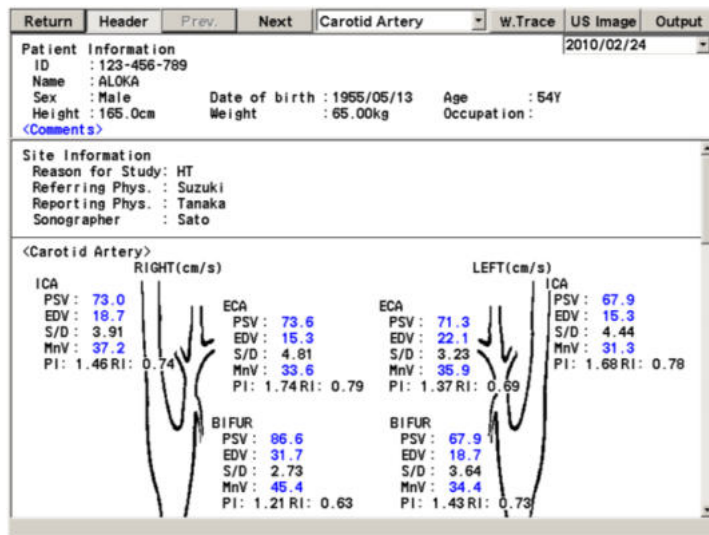
Example of Measurement Results Display

Rt.MCA		: Name of selected blood vessel and its side (left or right)
PSV:	cm/s	: Peak systolic velocity
EDV:	cm/s	: End Diastolic Velocity

S/ D:	: PSV/EDV ratio
RI:	: Resistance Index

9.3 Reports

Measurement results and obtained index values are sorted and displayed in the report.



The following operations are available using the report.

I) Displaying measurement results and images

- Measurement results
- Doppler waveform (only blood flow measurement results acquired using Dop Trace)
- Recorded ultrasonograms
- Past exam results

II) Editing results, comments and findings

III) Outputting reports (printing and saving)

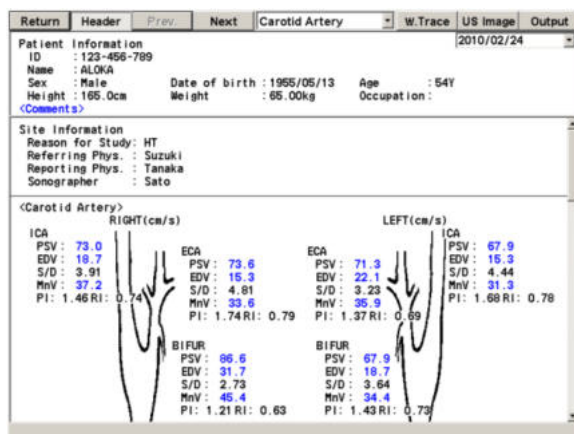
9.3.1 Displays a Report

NOTE: Report display requires patient data input. Enter patient data on the ID screen.

(1) Displays a Report

Procedure

1. Display the report.
 - Press the [Measurement] button on the touch panel and select [Report] from the measurement menu.
 - Select [Report] from the [Accessories] tab in the function menu.



The following switches are located at the top of the report.

[Return]	Closes the report.
[Header]	Switches the Header block display (patient data display) between Long Form and Short Form.
[Prev.]	Displays the previous page.
[Next]	Displays the next page.
[(Study list)]	Switches the Study in the report.
[(W.Trace)]	Displays the Doppler waveform.
[US Image]	Displays an ultrasonic image in the report.
[Output]	Outputs report data to a personal computer, storage media, printer or other destination.

Switching from Report Screen to the Scanning Screen

- Select [Return] on the upper corner of the report screen.

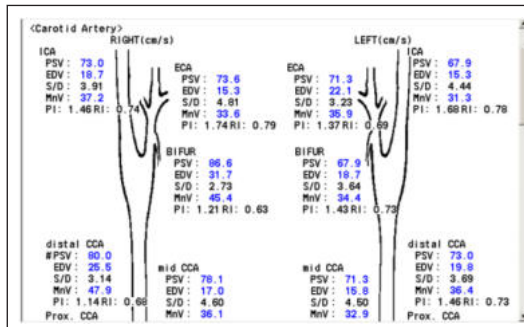
(2) Information Blocks Displayed in a Report

Reports are displayed in Study units.

Vascular measurement studies comprise of 12 types when blood vessels on both right and left side are accounted for. Each Study displays the following information classified into blocks. The Header Block and Site Information Block are displayed in reports for all studies. Other blocks are set in the measurement preset ([Study Assignment > (Study Name) > Combined Report Display]), while blocks that include measurement results registered in a report are displayed.

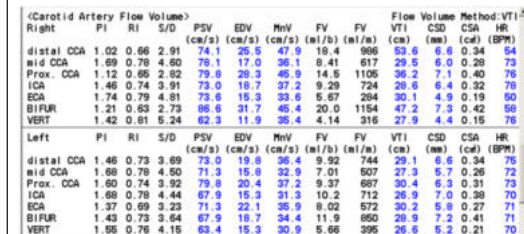
	Header Block Patient information that was entered in the ID screen. [<Comment>] Show/hide the comment input field.
	Site Information Block Facility information, doctor in charge, and other information

The block below is one example.



Carotid Artery Block

Measurement results of carotid artery blood flow. In the factory default setting, the R-Carotid A and L-Carotid A studies are displayed.



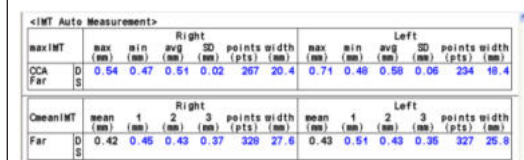
Carotid F. Volume Block

Measurement results for carotid artery blood flow volume. In the factory default setting, this block is not displayed.



IMT Auto Measurement Block

The CmeanIMT measurement result and the maxIMT automatic measurement result. In the factory default setting, this block is not displayed.



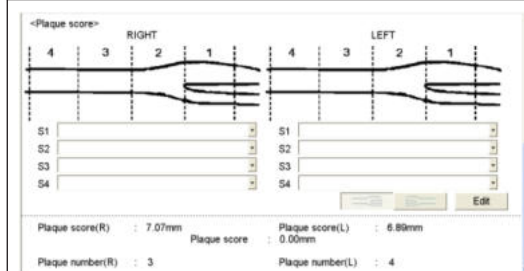
IMT Block

IMT blood flow measurement results. In the factory default setting, the R-Carotid A and L-Carotid A studies are displayed.



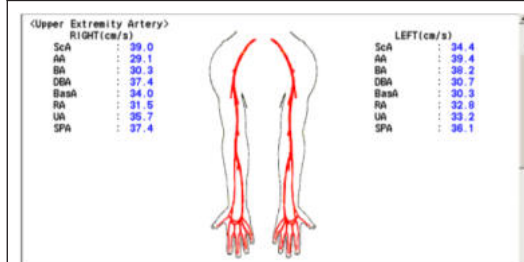
%Stenosis Block

Stenosis rate measurement results. The figure shows R-Carotid A and L-Carotid A Study results. In the factory default setting, studies other than R-TCD and L-TCD studies are displayed.



Plaque Score Block

Input findings. In the factory default setting, the R-Carotid A and L-Carotid A studies are displayed.



Upper Extr. A Block

Measurement results of upper extremity artery blood flow. In the factory default setting, the R-Up Extr. A and L-Up Extr. A studies are displayed.

Upper Extremity Artery Flow Volume										
Right	PI	RI	S/D	PSV	EDV	MnV	FV	FV	VTI	CSD
				(cm/s)	(cm/s)	(cm/s)	(ml/b)	(ml/m)	(cm)	(mm)
ScA	1.07	0.64	2.76	39.0	14.1	23.2	2.15	139	21.6	3.6
AA	1.45	0.73	3.68	29.1	7.9	14.6	1.77	115	13.5	4.1
BA	1.01	0.60	2.52	39.3	12.0	15.2	2.66	192	15.1	4.7
DBA	2.06	0.86	6.92	37.4	5.4	15.5	2.17	134	15.0	4.3
BasA	0.97	0.57	2.34	34.0	14.5	20.2	1.99	143	16.9	3.9
RA	0.98	0.58	2.45	31.5	12.9	19.0	2.15	151	12.2	4.5
UA	1.39	0.73	3.74	35.7	9.5	19.9	1.37	107	14.4	3.5
SPA	1.18	0.69	3.21	37.4	11.6	21.7	1.75	118	19.3	3.4

Upper Extr. A F. Volume Block

Measurement results of upper extremity artery blood flow.

In the factory default setting, this block is not displayed.

Upper Extremity Venous										
Right (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)
IJV	47.3	IJV	47.2	IJV	47.2	IJV	47.2	IJV	47.2	IJV
ScV	46.8	ScV	49.3	ScV	49.3	ScV	49.3	ScV	49.3	ScV
CV	56.0	CV	37.9	CV	37.9	CV	37.9	CV	37.9	CV
AV	19.7	AV	34.8	AV	34.8	AV	34.8	AV	34.8	AV
BV	29.5	BV	23.3	BV	23.3	BV	23.3	BV	23.3	BV
DBV	37.9	DBV	42.5	DBV	42.5	DBV	42.5	DBV	42.5	DBV
BasV	20.9	BasV	42.0	BasV	42.0	BasV	42.0	BasV	42.0	BasV
RV	36.3	RV	50.3	RV	50.3	RV	50.3	RV	50.3	RV
UV	30.1	UV	36.8	UV	36.8	UV	36.8	UV	36.8	UV

Upper Extr. V Block

Measurement results of upper extremity venous blood flow.

In the factory default setting, this block is not displayed.

Lower Extremity Artery										
Right (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)	Left (cm/s)
CIA	47.3	CIA	45.7	CIA	45.7	CIA	45.7	CIA	45.7	CIA
EIA	46.7	EIA	39.0	EIA	39.0	EIA	39.0	EIA	39.0	EIA
CFA	40.7	CFA	37.4	CFA	37.4	CFA	37.4	CFA	37.4	CFA
DFA	51.0	DFA	38.2	DFA	38.2	DFA	38.2	DFA	38.2	DFA
SFA	41.5	SFA	40.7	SFA	40.7	SFA	40.7	SFA	40.7	SFA
PopA	42.3	PopA	30.7	PopA	30.7	PopA	30.7	PopA	30.7	PopA
ATA	32.0	ATA	29.5	ATA	29.5	ATA	29.5	ATA	29.5	ATA
PerA	45.7	PerA	29.9	PerA	29.9	PerA	29.9	PerA	29.9	PerA
PTA	36.5	PTA	44.8	PTA	44.8	PTA	44.8	PTA	44.8	PTA
DPA	36.9	DPA	35.3	DPA	35.3	DPA	35.3	DPA	35.3	DPA

Lower Extr. A Block

Measurement results of lower extremity artery blood flow.

In the factory default setting, the R-Lwr Extr A and L-Lwr Extr A studies are displayed.

Lower Extremity Artery Flow Volume										
Right	PI	RI	S/D	PSV	EDV	MnV	FV	FV	VTI	CSD
				(cm/s)	(cm/s)	(cm/s)	(ml/b)	(ml/m)	(cm)	(mm)
CIA	1.36	0.70	3.35	47.3	14.1	24.5	1.88	139	19.9	3.5
EIA	1.47	0.72	3.55	45.7	12.9	22.3	3.26	221	19.7	4.6
CFA	1.46	0.73	3.74	40.7	12.9	24.1	4.59	342	19.4	5.5
DFA	1.25	0.62	2.65	40.7	15.4	20.3	2.31	169	16.7	4.2
SFA	1.65	0.76	4.10	51.0	12.5	23.4	2.14	157	19.1	3.8
PopA	1.26	0.69	3.23	41.5	12.9	22.8	2.09	145	19.7	3.7
ATA	1.47	0.74	3.78	42.3	11.2	21.2	2.63	198	18.0	4.3
PerA	1.91	0.82	5.50	32.0	5.8	14.4	2.77	198	12.1	5.4
PTA	2.31	0.87	7.86	45.7	5.8	17.2	1.51	93.3	16.7	3.4
DPA	1.72	0.81	5.18	36.5	7.1	17.1	2.41	178	13.9	4.7
SPA	1.43	0.74	3.87	36.9	9.5	19.1	2.91	208	15.5	4.8

Lower Extr. A F. Volume Block

Measurement results of lower extremity artery blood flow volume.

In the factory default setting, this block is not displayed.

Lower Extremity Artery Flow Volume										
Right	PI	RI	S/D	PSV	EDV	MnV	FV	FV	VTI	CSD
				(cm/s)	(cm/s)	(cm/s)	(ml/b)	(ml/m)	(cm)	(mm)
CIA	1.36	0.70	3.35	47.3	14.1	24.5	1.88	139	19.9	3.5
EIA	1.47	0.72	3.55	45.7	12.9	22.3	3.26	221	19.7	4.6
CFA	1.46	0.73	3.74	40.7	12.9	24.1	4.59	342	19.4	5.5
DFA	1.25	0.62	2.65	40.7	15.4	20.3	2.31	169	16.7	4.2
SFA	1.65	0.76	4.10	51.0	12.5	23.4	2.14	157	19.1	3.8
PopA	1.26	0.69	3.23	41.5	12.9	22.8	2.09	145	19.7	3.7
ATA	1.47	0.74	3.78	42.3	11.2	21.2	2.63	198	18.0	4.3
PerA	1.91	0.82	5.50	32.0	5.8	14.4	2.77	198	12.1	5.4
PTA	2.31	0.87	7.86	45.7	5.8	17.2	1.51	93.3	16.7	3.4
DPA	1.72	0.81	5.18	36.5	7.1	17.1	2.41	178	13.9	4.7
SPA	1.43	0.74	3.87	36.9	9.5	19.1	2.91	208	15.5	4.8

Lower Extr. V Block

Measurement results of lower extremity venous blood flow.

In the factory default setting, this block is not displayed.

Transcranial Doppler										
Rt. TICA	Rt. ACA	Rt. PCA	Rt. MCA	Rt. VA	Rt. PCA	Rt. MCA	Rt. VA	Rt. PCA	Rt. MCA	Rt. VA
PSV	EDV	S/D	MnV	PI	RI	PSV	EDV	S/D	MnV	PI
38.9	6.3	4.69	19.2	1.60	0.79	47.2	16.6	2.84	28.0	1.09
47.2	16.6	2.84	28.0	1.09	0.65	47.2	16.6	2.84	28.0	1.09
47.2	16.6	2.84	28.0	1.09	0.65	47.2	16.6	2.84	28.0	1.09
47.2	16.6	2.84	28.0	1.09	0.65	47.2	16.6	2.84	28.0	1.09
47.2	16.6	2.84	28.0	1.09	0.65	47.2	16.6	2.84	28.0	1.09
47.2	16.6	2.84	28.0	1.09	0.65	47.2	16.6	2.84	28.0	1.09
47.2	16.6	2.84	28.0	1.09	0.65	47.2	16.6	2.84	28.0	1.09
47.2	16.6	2.84	28.0	1.09	0.65	47.2	16.6	2.84	28.0	1.09
47.2	16.6	2.84	28.0	1.09	0.65	47.2	16.6	2.84	28.0	1.09
47.2	16.6	2.84	28.0	1.09	0.65	47.2	16.6	2.84	28.0	1.09

TCD Block

Transcranial artery blood flow measurement results.

In the factory default setting, the R-Lwr Extr A and L-Lwr Extr A studies are displayed.

<Transcranial Doppler Flow Volume>														Flow Volume Method: VTI	
Right	PI	RI	S/D	PSV	EDV	HRV	FV	FV	VTI	CSD	CSA	HR			
				(cm/s)	(cm/s)	(cm/s)	(ml/b)	(ml/m)	(cm)	(mm)	(cm)	(BPM)			
ACA	1.09	0.66	2.84	47.2	16.6	29.0	6.06	431	23.6	5.7	0.26	71			
MCA	1.28	0.72	3.53	58.6	16.6	32.8	7.52	570	27.0	6.1	0.29	73			
PCA	1.17	0.68	3.11	43.6	14.0	25.2	6.64	391	21.8	5.7	0.26	69			
VA	0.98	0.57	2.34	35.3	15.0	20.8	6.11	404	19.9	6.4	0.32	66			
TICA	1.60	0.79	4.69	38.9	9.3	19.2	4.86	362	15.4	6.3	0.31	74			
PCoH	1.11	0.62	2.63	36.9	14.0	20.5	6.97	446	16.5	6.8	0.36	74			
Left	PI	RI	S/D	PSV	EDV	HRV	FV	FV	VTI	CSD	CSA	HR			
				(cm/s)	(cm/s)	(cm/s)	(ml/b)	(ml/m)	(cm)	(mm)	(cm)	(BPM)			
ACA	1.27	0.72	3.56	46.2	13.0	26.2	5.50	404	21.4	5.7	0.26	73			
MCA	1.49	0.77	4.38	65.9	15.0	34.2	13.6	907	30.9	7.5	0.44	87			
PCA	1.22	0.63	2.68	52.9	19.7	27.1	11.0	652	27.6	7.1	0.40	89			
VA	1.91	0.83	6.00	40.5	6.7	17.7	2.39	150	16.9	4.2	0.14	63			
TICA	0.69	0.47	1.87	37.9	20.2	25.4	3.40	278	18.6	4.8	0.18	82			
PCoH	1.39	0.69	3.19	44.6	14.0	22.1			16.9			79			
BA	PI	RI	S/D	PSV	EDV	HRV	FV	FV	VTI	CSD	CSA	HR			
				(cm/s)	(cm/s)	(cm/s)	(ml/b)	(ml/m)	(cm)	(mm)	(cm)	(BPM)			
BA	1.31	0.75	3.93	30.6	7.8	17.5	3.75	307	12.8	6.1	0.29	82			
ACoH	0.96	0.56	2.27	38.9	17.1	23.0	4.01	284	19.5	5.1	0.21	71			

TCD F.Volume Block

Transcranial artery blood flow volume measurement results.

In the factory default setting, this block is not displayed.

<Anatomy Check List>	RIGHT	LEFT
Proximal CCA	☐	☐
Mid CCA	☐	☐
Distal CCA	☐	☐
Bifurcation	☐	☐
Internal Carotid Artery	☐	☐
External Carotid Artery	☐	☐
Vertebral Artery	☐	☐

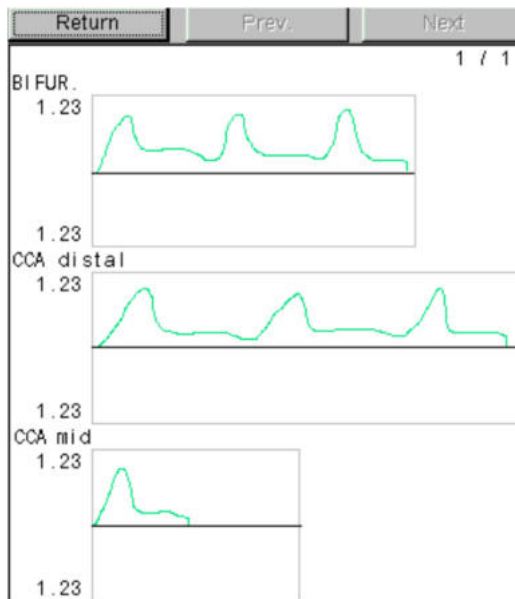
Anatomy Check List Block

Check list for the blood vessel condition and Doppler findings.

In the factory default setting, this block is not displayed.

(3) Displaying the Blood Flow Waveform

A report can display the Doppler trace line for each blood flow measurement value that was obtained. This means you can compare the waveform patterns before and after a stenosis. NOTE: The appearance of a blood flow waveform will vary with the display format used during measurement. Use the same B/D mode display format (right and left, upper and lower B/D, DopWide, Normal) to make measurements for each artery blood flow. Measurements made using different display formats are displayed as follows.



From the top:

- Measurements made in B/D mode using UL/ Normal
- Measurements made in B/D mode using UL/ Wide
- Measurements made in the B/D mode using LRWide or LR Normal

Procedure

1. Select [W.Trace] on the upper corner of the report screen.
The following dialog box is displayed.

Select target vessel group
Carotid Artery

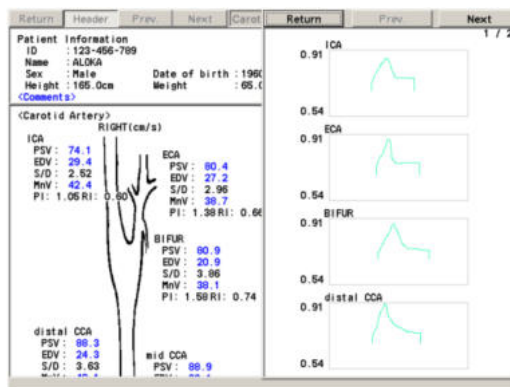
☒ RIGHT ☐ LEFT

Select vessels to display

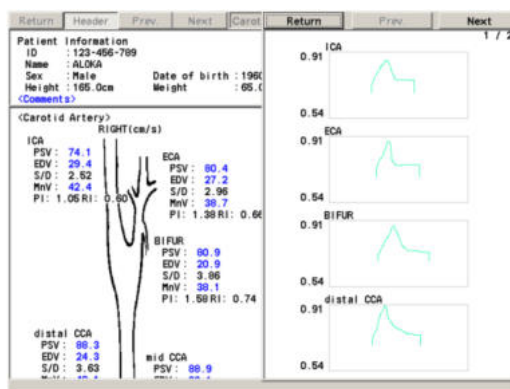
- ICA
- ECA
- BIFUR
- distal CCA
- mid CCA
- Prox. CCA
- Vertebral

OK Cancel

- Select the Block from the drop-down list.
The Select vessels to display field displays a list of blood vessels that can be displayed.
- Select the location of the Doppler pattern.
 - [RIGHT]: Displays the pattern on the right side.
 - [LEFT]: Displays the pattern on the left side.
- Select [OK].
If you select [RIGHT], the Doppler pattern will be displayed on the right side of the screen.



If you select [LEFT], the Doppler pattern will be displayed on the left side of the screen.



- To return to the report page, select [Return].

(4) Attaching Ultrasonic Images

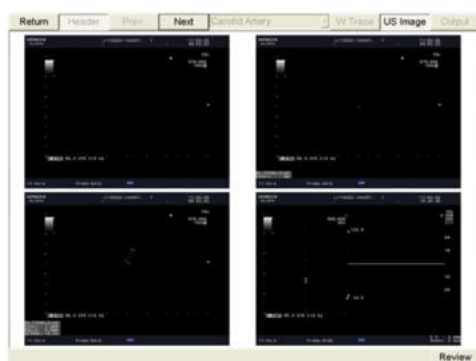
You can attach ultrasonic images to reports. The attached ultrasonic images will be displayed in the US Image Block. You can add stored images of the patient whose report is being displayed from the system hard disk or a USB flash drive.

Use the following options in [Report Data] under preset to select images to display in the US Image Block.

- Use Display Pasted US Image Form on the Screen to set the display format.
- Set the number of images to display immediately after selecting US Image Block in Automatically be Displayed US Images Number.

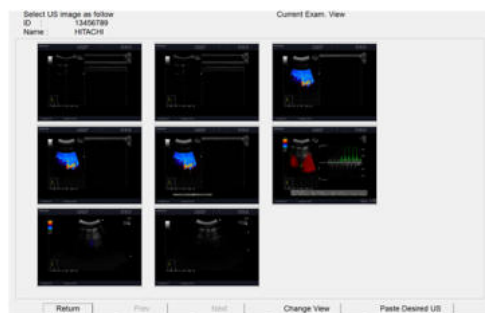
Procedure

1. Select [US Image] on the upper corner of the report screen.
The US Image Block is displayed. The number of images configured with the preset are displayed in the order of top-left, top-right, etc., from the latest image saved to the system's hard disc or connected media, such as USB flash drive.
Images will be displayed as shown below when [Display Pasted US Image Form on the Screen] is set to [2×2] and [4] is selected in [Automatically be Displayed US Images Number].



When 4 images are stored

2. If necessary, change the displayed images.
 - a. Select [Review] at the bottom of the screen.
Images on the system hard disk and connected media are displayed as thumbnails. Only today's images of the current patient are displayed. Current Exam.View is displayed at the top right of the screen.



- b. Select an image to display.
Selected images will be displayed with a blue frame.

- c. After selecting all the images to display, select [Paste Desired US].
Only the selected images are displayed in the US block.

Displaying images from past examination dates

Select [Change View] under the thumbnails. Current&Past Exam View is displayed in the upper right corner of the screen and past exam images of the current patient are displayed. You can also select images from past examinations to display in the US Image Block

When you re-select [Change View], the screen switches to display the images of the day only (Current Exam.View). "Current Exam.View" is displayed at the top right of the screen.

3. To return to the report page, select [Return].

(5) Displaying Past Reports

NOTE: You cannot modify the data in the past reports.

Procedure

1. Select [▼] on the upper right corner of the report screen.
When past reports are available, a list of the report dates is displayed.

Return	Header	Prev.	Next	Carotid Artery	W.Trace	US Image	Output
Patient Information							2011/02/25
ID	: 123-456-7890						2011/02/25
Name	: ALOKA						2010/08/24
Sex	: Male	Date of birth	: 1960/06/11	Age	: 50Y		2010/03/07
Height	: 168.0cm	Weight	: 70.00kg	Occupation	:		2009/08/08
BSA	: 1.79m ²	BMI	: 24.8				2009/02/03
<Comments>							

2. Select the date of the report you want to open.
The report of the selected date opens.

9.3.2 Editing Reports

You can edit the following contents in the report.

- Comments
- Findings
- Measurement results

(1) Entering Comments

Enter comments including ultrasound comments in the Comments field in Header Block.

Procedure

1. Select [<Comments>].
When the [<Comments>] are hidden
Select [Header] on the upper corner of the report screen and select [<Comments>].
A text box is displayed.

2. Enter a comment using the keyboard.
3. Select [OK] when you finish entering the comments.
The entry is confirmed.
To cancel the entry, select [Cancel].

(2) Entering Findings

Enter ultrasound findings. Enter in Plaque score Block or Anatomy Check List Block in the report.

Making Entries in Plaque score Block

- Select from the list.

The selected finding is displayed.

Editing the Finding List

Procedure

1. Select [Edit].
The following dialog box is displayed.

2. Edit the finding list.
Editing the finding list
I) Select the item you want to revise.
II) Select [Edit]. An input dialog box is displayed.

- III) Enter a finding using the keyboard.
- IV) Select [OK]. An input dialog box closes.

Adding to the finding list

- I) Select [Add].
- II) Enter a finding using the keyboard.
- III) Select [OK]. The dialog box closes.

Deleting from the finding list

- I) Select the item you want to revise.
- II) Select [Delete].

3. Select [OK].

Entering Data in the Anatomy Check List

Anatomy Check List is a function that displays the properties of the carotid artery and the blood vessels of the upper and lower limbs, as well as Doppler findings, as a checklist. In the factory default setting, the Anatomy Check List Block is not displayed. Use the measurement preset ([Study Assignment > (Study Name) > Combined Report Display]) to display this block in a report.

Procedure

1. Open a report and switch to the Study containing the Anatomy Check List Block.
2. Select the findings from the list.

Setting Items You Want to Display in the Anatomy Check List

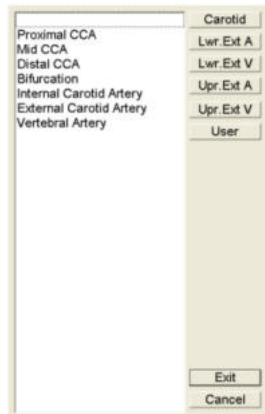
Use preset for the setting.

Procedure

1. Select [Anatomy Check List Assign] in the measurement preset ([Study Assignment > (Study Name)]).

Anatomy Check List Assign is displayed.

2. Select the item you want to change.
The following dialog box is displayed.



3. Select the items you want to display.

Deleting items

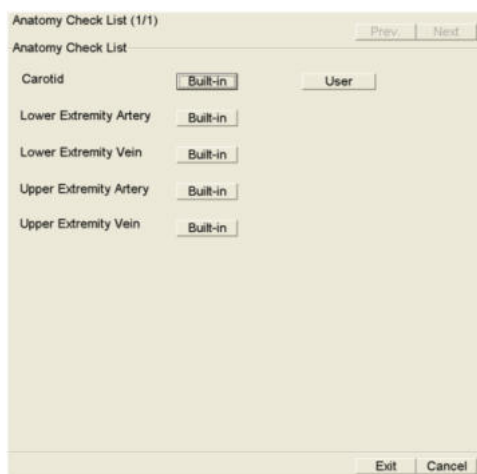
Select the empty field at the top of the dialog box.

Specifying Anatomy Check List Item Options

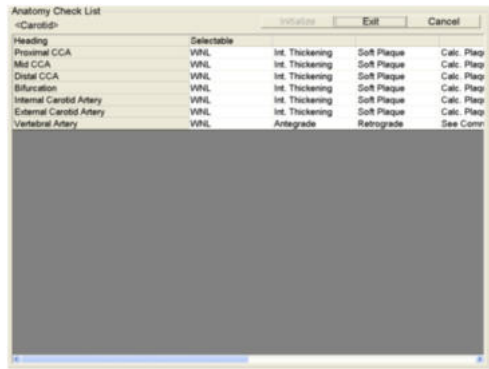
Sets options and user-defined settings for Anatomy Check List items.

Procedure

1. Select [Anatomy Check List] in the measurement preset ([Create Measurement Tools > Application Measurement > Report Data]).
The Anatomy Check List is displayed.



2. Select [Built-in] to change internal system data. Select [User] to set Heading and Selectable.
Selecting [Built-in] displays the following screen.

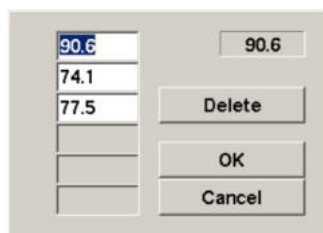


3. Select the item you want to change.
4. Enter the options from the keyboard.
5. Enter the option and select [Exit].

(3) Editing Measurement Results

Procedure

1. Select the measurement value to be modified.
The dialog box with the measurement value opens.



When Display Data in [Report Data] under preset is set to [Current], the data at the top appears in the report screen. If set to Average, an average value is displayed.

2. Revise the data.

Deleting data

- I) Select the measurement value from the dialog box.
- II) Select [Delete] from the dialog box.
- III) Select [OK] from the dialog box.

Revising data

Some measurement results, such as PI and RI, correlate to 2 blood flow velocities (EDV and PSV) within the same heartbeat cycle. Modify as necessary to maintain the mutual time-phase relationship.

- I) Select the measurement value from the dialog box.
- II) Enter values from the keyboard.
- III) Select [OK] from the dialog box.

A # mark will be added to the name of the modified item.

<Carotid Artery Flow Volume>													
Right							Flow Volume Method: VT1						
PI	RI	S/D	PSV	EDV	ReV	FV	VT1	CSD	CSA	HR			
			(cm/s)	(cm/s)	(cm/s)	(ml/b)	(ml/m)	(cm)	(mm)	(cm)			
distal CCA	1.14	0.68	3.14	25.5	47.9	16.4	986	53.6	6.6	0.34	54		
mid CCA	1.69	0.78	4.60	76.1	17.0	26.1	617	29.6	6.0	0.28	73		
Prox. CCA	1.12	0.65	2.62	79.9	29.3	45.9	14.6	1105	36.2	7.1	0.40	76	
ICA	1.46	0.74	3.91	73.0	16.7	37.2	9.29	724	26.6	6.4	0.32	70	
ECA	1.74	0.79	4.91	73.6	15.3	33.6	5.67	284	35.1	4.9	0.19	60	
BIFUR	1.21	0.63	2.73	96.6	31.7	45.4	20.0	1154	47.2	7.3	0.42	68	
VERT	1.42	0.81	5.24	62.3	11.9	35.4	4.14	316	27.9	4.4	0.15	76	
Left													
PI	RI	S/D	PSV	EDV	ReV	FV	VT1	CSD	CSA	HR			
			(cm/s)	(cm/s)	(cm/s)	(ml/b)	(ml/m)	(cm)	(mm)	(cm)			
distal CCA	1.46	0.73	3.69	73.0	19.6	36.4	5.92	744	29.1	6.6	0.34	76	
mid CCA	1.68	0.78	4.50	71.3	16.8	32.9	7.01	607	27.3	5.7	0.26	72	
Prox. CCA	1.60	0.74	3.92	79.9	20.4	37.2	9.37	687	30.4	6.3	0.31	73	
ICA	1.69	0.76	4.44	67.9	15.3	31.3	10.2	712	26.9	7.0	0.39	70	
ECA	1.37	0.69	3.23	71.3	22.1	35.9	8.02	572	30.2	5.8	0.27	71	
BIFUR	1.43	0.73	3.64	67.9	16.7	34.4	11.9	650	28.9	7.2	0.41	71	
VERT	1.55	0.76	4.15	63.4	15.2	30.9	5.66	396	26.6	5.2	0.21	70	

Display example: The PSV value of dCCA has been revised.

Selecting the data you want to display

If Display Data of [Report Data] in the preset has been set to "Current", you can change the measurement value to be displayed on the report screen.

I) Select the measurement value from the dialog box.

II) Select [OK] from the dialog box.

Displaying a modified report

9.3.3 Outputting Reports

There are 3 ways to output a report.

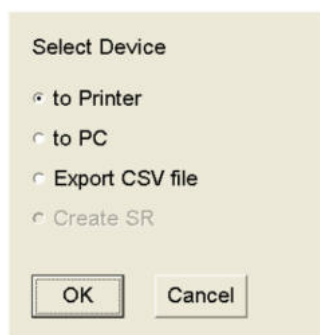
- Outputting to a local printer: Select the Block to output.
- Outputting as a CSV file: Output the values registered to the report to a connected media or device.
- Creating a DICOM SR file: Create a DICOM SR file.

(1) Printing

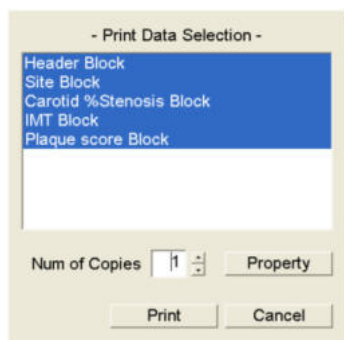
Print a report to the local printer (printer connected to the system).

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.



2. Select [to Printer].
3. Select the [OK].
The following dialog box is displayed.

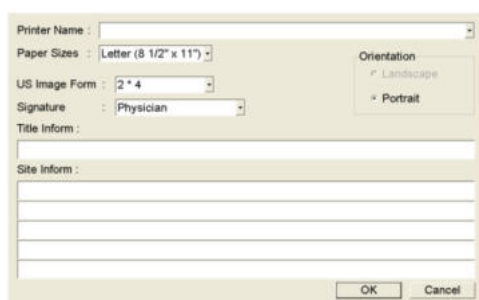


4. Select the blocks to be printed.
 - a. Select the blocks to be printed.
 - b. Repeat this step and highlight all the blocks you wish to print.

To cancel a selected block, select that block again.
5. Use Num of Copies to set the number of copies to print.
6. If necessary, configure the printer properties.
 - a. Select [Property].
 - b. See the next section to configure the printer property.
7. Select [Print].

Printer Properties

You can set the advanced printer properties.



Item	Options	Description
Printer Name		Select the printer model.
Paper Sizes	US Letter	Prints on US letter size paper.
	A4	Prints on A4 size paper.
Orientation	Portrait	Sets the direction of the paper to the vertical orientation (there is no other option).

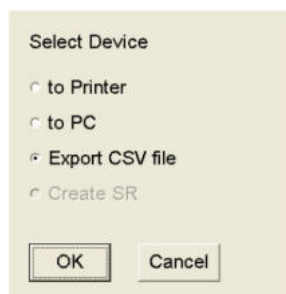
Item	Options	Description
US Image Form	1x2	Prints a US Image block with 1 row of 2 images per sheet.
	1×3	Prints a US Image block with 1 row of 3 images per sheet.
	2 x 2	Prints a US Image block with 2 rows of 2 images per sheet.
	2×4	Prints a US Image block with 2 rows of 4 images per sheet.
Signature	Physician	Sets the Physician signature field.
	Phys. & Sonographer	Sets the Physician and Sonographer signature fields.
	None	Hides the signature field.
Title Inform		You can enter a report title using no more than 80 characters.
Site Inform		Enter the facilities information (department, address, telephone No., FAX No., etc.).

(2) Outputting as a CSV File

You can output data registered in the report as a CSV file.

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.



2. Select [Export CSV file], and press [OK].
The dialog box is displayed.



The file name is displayed in the format ID_Date_Application.
Select [Cancel] to return to the report screen.

3. Select the storage destination from the [Target Medium] list.
4. Change the file name if necessary.
5. Select [OK].
The selected CSV file is saved in the specified media.
A CSV file contains patient information, numerical values and comments.

(3) Creating a DICOM SR File

You can create a DICOM SR file from the data displayed in the reports.

NOTE The optional DICOM SR compatible software (SOP-AR50-21) is necessary for creating DICOM SR files.

Procedure

1. Select [Output] on the upper corner of the report screen.
The dialog box is displayed.



2. Select [Create SR], and press [OK].
A DICOM SR file is created for the examination date shown on the report. Any existing file will be overwritten.
The DICOM SR file is not sent at this time.

Sending a DICOM SR File

NOTE: The optional DICOM networking software (SOP-AR50-10) is necessary for connecting to a DICOM SR server.

The DICOM SR file you have created is sent to the DICOM SR server when you select [New Patient] or [End Study] to complete an examination.

If [SR Auto Creation] is "On" in preset ([Common Preset > DICOM SR]) and today's DICOM SR file has not yet been created, an SR file containing the current examination will be created and sent together with other created DICOM SR files to the DICOM SR server.

9.4 Presets

Vascular Measurement presets (Vascular preset) can be broadly divided into 3 types.

- **Create Measurement Tools**
Settings for measurement methods, caliper mark display, and report display.
Settings for basic measurement, and for applied measurement.
- **Study Assignment**
Enables you to set menus, transfer items and report view in the study.
These are set for each study.
- **SW Assignment**
Assigns measurement functions to menu items.

Table3: Vascular preset configuration

Create Measurement Tools	Basic Measurement	Measured Method & Display Items	B.Mode
			M.Mode
			D.Mode
			F.Mode
		Caliper Mark Control	
		Unit Selection	
		Caliper Auto Off	
		Display Form	Mark Display
	Application Measurement	Measured Method & Display Items	B.Mode
			D.Mode
		Caliper Mark Control	
		Unit Selection	
		Caliper Auto Off	
		Report Data	
		Display Form	Mark Display
		User's Calculation	Reserved Word

Study Assignment	R-Carotid A	Menu Assign
	L-Carotid A	Anatomy Check List Assign
	R-Lwr Extr. A	Combined Report Display
	L-Lwr Extr. A	
	R-Lwr Extr. V	Transfer List Assign
	L-Lwr Extr. V	Other
	R-Upr Extr. A	
	L-Upr Extr. A	
	R-Upr Extr. V	
	L-Upr Extr. V	
	R-TCD	
	L-TCD	

SW Assignment	Touch Panel SW Assignment
	+Mark Key Assignment

9.4.1 Vascular Presets

The pages of the preset are displayed as shown below.



[Vascular Preset]
Vascular preset top page

(1) Create Measurement Tools

Settings for measurement methods, caliper marks, and report display.

Basic Measurement

Refer to the presets for basic measurements.

Reference information

2.2.7(3) Measurement-related Settings: Create Measurement Tools on page 82

Application Measurement

Settings for applied measurements (Vascular measurement).

[Measured Method & Display Items > B.Mode]
(1/2): B mode measurement settings

[Measured Method & Display Items > B.Mode]
(2/2): B mode measurement settings

Measured Method & Display Items (1/2) Prev Next

B.Mode
%STENO-Diam Caliper %STENO Vessel Residual

%STENO-Area
Vessel Ellipse %STENO Vessel Residual
Residual Trace

max-IMT Caliper max-IMT

Measured Max Number at same time
Max = 7

mean-IMT IMT mean-IMT

Exit Cancel

[Measured Method & Display Items > D.Mode]
(3/10): D mode measurement settings

Measured Method & Display Items (2/2) Prev Next

B.Mode
IMT Auto Measurement

maxIMT Diastole Systole max min avg
ROI 20 mm SD points width
Height 5 mm Hist

CmeanIMT Diastole Systole mean points width
ROI 20 mm
Height 5 mm

Exit Cancel

[Measured Method & Display Items > D.Mode]
(4/10): D mode measurement settings

Measured Method & Display Items (3/10) Prev Next

D.Mode [Rt./Lt. Carotid Artery]

VERT Auto Vertical L PI RI S/D PSV EDV
Manual Cross Point MnV Vm FT AccT ACC
Caliper Horizontal L AccT/FT F.Vol

Trace Condition
Position Peak Level -18 dB Smooth No

F.Volume Selection CSD CSA CSA Method Caliper
F.Volume(MnV) MnV VTI FV(MnV) FVm(MnV)
COEF 1.00
F.Volume(VTI) VTI FV(beat) FV(min) HR

Exit Cancel

[Measured Method & Display Items > D.Mode]
(5/10): D mode measurement settings

Measured Method & Display Items (4/10) Prev Next

D.Mode [Rt./Lt. Lower Extremity Artery]

Lower Extremity Artery
Auto Vertical L PI RI S/D PSV EDV
Manual Cross Point MnV Vm FT AccT ACC
Caliper Horizontal L AccT/FT F.Vol

Trace Condition
Position Peak Level -18 dB Smooth No

Lwr Art. 1~8
Auto Vertical L PI RI S/D PSV EDV
Manual Cross Point MnV Vm FT AccT ACC
Caliper Horizontal L AccT/FT F.Vol

Trace Condition
Position Peak Level -18 dB Smooth No

F.Volume Selection CSD CSA CSA Method Caliper
F.Volume(MnV) MnV VTI FV(MnV) FVm(MnV)
COEF 1.00
F.Volume(VTI) VTI FV(beat) FV(min) HR

Exit Cancel

[Measured Method & Display Items > D.Mode]
(6/10): D mode measurement settings

Measured Method & Display Items (5/10) Prev Next

D.Mode [Rt./Lt. Lower Extremity Veins]

Lower Extremity Veins
Auto Vertical L pV
Manual Cross Point
Caliper Horizontal L

Trace Condition
Position Peak Level -18 dB Smooth No

Lwr Vein. 1~8
Auto Vertical L pV
Manual Cross Point
Caliper Horizontal L

Trace Condition
Position Peak Level -18 dB Smooth No

Exit Cancel

[Measured Method & Display Items > D.Mode]
(7/10): D mode measurement settings

Measured Method & Display Items (6/10) Prev Next

D.Mode [Rt./Lt. Upper Extremity Artery]

Upper Extremity Artery
Auto Vertical L PI RI S/D PSV EDV
Manual Cross Point MnV Vm FT AccT ACC
Caliper Horizontal L AccT/FT F.Vol

Trace Condition
Position Peak Level -18 dB Smooth No

Upr Art. 1~8
Auto Vertical L PI RI S/D PSV EDV
Manual Cross Point MnV Vm FT AccT ACC
Caliper Horizontal L AccT/FT F.Vol

Trace Condition
Position Peak Level -18 dB Smooth No

F.Volume Selection CSD CSA CSA Method Caliper
F.Volume(MnV) MnV VTI FV(MnV) FVm(MnV)
COEF 1.00
F.Volume(VTI) VTI FV(beat) FV(min) HR

Exit Cancel

[Measured Method & Display Items > D.Mode]
(8/10): D mode measurement settings

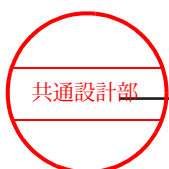
[Measured Method & Display Items > D.Mode]
(9/10): D mode measurement settings

[Measured Method & Display Items > D.Mode]
(10/10): D mode measurement settings

[Caliper Auto Off]: Caliper mark and
measurement result display setting for result
display settings for when freeze is canceled

[Report Data] (1/2)
Report display data settings

[Report Data] (2/2)
Report display data settings



Report Data (1/2) Prev Next

Display Data
Current

Transfer from Report Data
OFF

Storage Data Number
1 2 3 4 5 6

Pasted US Image Screen
Display Pasted US Image Form on the Screen
1x1 2x2 3x2 3x3

Automatically be Displayed US Images Number
0 1 2 3 4 5 6 7 8 9

Save Wave Trace
ON

Exit Cancel

Report Data (2/2) Prev Next

ICA Report Display
ICA

Exit Cancel

[Report Data > Anatomy Check List]

Anatomy Check List (1/1) Prev Next

Anatomy Check List

Carotid Built-in User

Lower Extremity Artery Built-in

Lower Extremity Vein Built-in

Upper Extremity Artery Built-in

Upper Extremity Vein Built-in

Exit Cancel

[Report Data > Anatomy Check List > Built-in]
Internal options

Anatomy Check List
<Carotid> Initiate Exit Cancel

Heading	Selectable			
Proximal CCA	VHL	Int. Thickening	Soft Plaque	Calc. Plaq
Mid CCA	VHL	Int. Thickening	Soft Plaque	Calc. Plaq
Distal CCA	VHL	Int. Thickening	Soft Plaque	Calc. Plaq
Bifurcation	VHL	Int. Thickening	Soft Plaque	Calc. Plaq
Internal Carotid Artery	VHL	Int. Thickening	Soft Plaque	Calc. Plaq
External Carotid Artery	VHL	Int. Thickening	Soft Plaque	Calc. Plaq
Vertebral Artery	VHL	Antegrade	Retrograde	See Conn

[Report Data > Anatomy Check List > User]
User settings

Anatomy Check List
<User> Initiate Exit Cancel

Heading	Selectable		
User1	Seen	Not Seen	
User2	Seen	Not Seen	
User3	Seen	Not Seen	
User4	Seen	Not Seen	
User5	Seen	Not Seen	
User6	Seen	Not Seen	
User7	Seen	Not Seen	
User8	Seen	Not Seen	
User9	Seen	Not Seen	
User10	Seen	Not Seen	
User11	Seen	Not Seen	
User12	Seen	Not Seen	
User13	Seen	Not Seen	
User14	Seen	Not Seen	
User15	Seen	Not Seen	
User16	Seen	Not Seen	
User17	Seen	Not Seen	
User18	Seen	Not Seen	
User19	Seen	Not Seen	
User20	Seen	Not Seen	

[Display Form]: Vertical and horizontal display of measurement results, display of multiple results, settings for simultaneous display with basic measurement

[Display Form > Mark Display]:
Caliper mark display settings

Display Form

Result Display Window Style
Sideways

Package Result Display
Multi

Basic measurements are displayed together.
No

Exit Cancel

[User's Calculation]:
User index calculation formula settings

Mark Display (1/6)

Carotid Artery
Mark Display Mark Active

Lower Extremity Artery
Mark Display Mark Active

Lower Extremity Veins
Mark Display Mark Active

Upper Extremity Artery
Mark Display Mark Active

Upper Extremity Veins
Mark Display Mark Active

%STENO-Diam
Mark Display Mark Active

%STENO-Area
Mark Display Mark Active

Exit Cancel

[User's Calculation > Reserved Word]:
Reserved word settings for user index calculation formulas

User's Calculation

Equation Program
Create User's Calculation
Delete User's Calculation

U-Calc. 1	U-Calc. 16
U-Calc. 2	U-Calc. 17
U-Calc. 3	U-Calc. 18
U-Calc. 4	U-Calc. 19
U-Calc. 5	U-Calc. 20
U-Calc. 6	U-Calc. 21
U-Calc. 7	U-Calc. 22
U-Calc. 8	U-Calc. 23
U-Calc. 9	U-Calc. 24
U-Calc. 10	U-Calc. 25
U-Calc. 11	U-Calc. 26
U-Calc. 12	U-Calc. 27
U-Calc. 13	U-Calc. 28
U-Calc. 14	U-Calc. 29
U-Calc. 15	U-Calc. 30

Exit Cancel

User's Calculation: Reserved Word (1/2)

Reserved Word Registration
Create Reserved Word
Delete Reserved Word

Reserved Word 1	Reserved Word 16
Reserved Word 2	Reserved Word 17
Reserved Word 3	Reserved Word 18
Reserved Word 4	Reserved Word 19
Reserved Word 5	Reserved Word 20
Reserved Word 6	Reserved Word 21
Reserved Word 7	Reserved Word 22
Reserved Word 8	Reserved Word 23
Reserved Word 9	Reserved Word 24
Reserved Word 10	Reserved Word 25
Reserved Word 11	Reserved Word 26
Reserved Word 12	Reserved Word 27
Reserved Word 13	Reserved Word 28
Reserved Word 14	Reserved Word 29
Reserved Word 15	Reserved Word 30

Exit Cancel

(2) Study Assignment

You can configure the menu, transferred items and report view in each study.

[Study Assignment]:
Tree view display settings of Study and user-defined Study

Study Assignment

Select Study
R-Carotid A Delete

Copy from Other Study
Copy

Select Display Study on the Left Tree View

Rt. Study Name	ON	OFF	Lt. Study Name	ON	OFF
R-Carotid A	ON	OFF	L-Carotid A	ON	OFF
R-Lwr Extr.A	ON	OFF	L-Lwr Extr.A	ON	OFF
R-Lwr Extr.V	ON	OFF	L-Lwr Extr.V	ON	OFF
R-Upr Extr.A	ON	OFF	L-Upr Extr.A	ON	OFF
R-Upr Extr.V	ON	OFF	L-Upr Extr.V	ON	OFF
R-TCD	ON	OFF	L-TCD	ON	OFF
User1	OFF	ON	User1	OFF	ON
User2	OFF	ON	User2	OFF	ON
User3	OFF	ON	User3	OFF	ON
User4	OFF	ON	User4	OFF	ON
User5	OFF	ON	User5	OFF	ON
User6	OFF	ON	User6	OFF	ON

Exit Cancel

[Menu Assign]

Measurement menu parameter settings

[Anatomy Check List Assign]

Editing Anatomy Check List items

[Combined Report Display]

Report display block settings

[Transfer List Assign]

Settings for transferring basic measurement results

[Other]

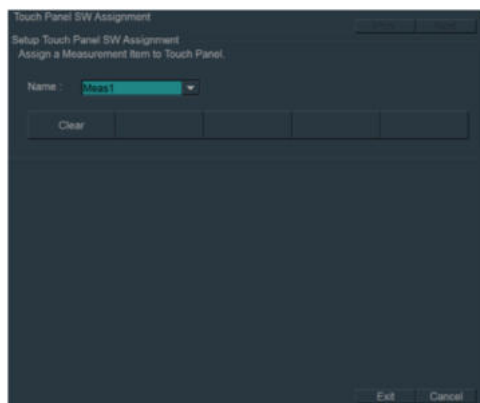
Measurement guide message display settings

(3) SW Assignment

Assigns measurement menus to the [Meas] tab in the function menu or select the basic measurement menu that will appear when you press the [Caliper] key.

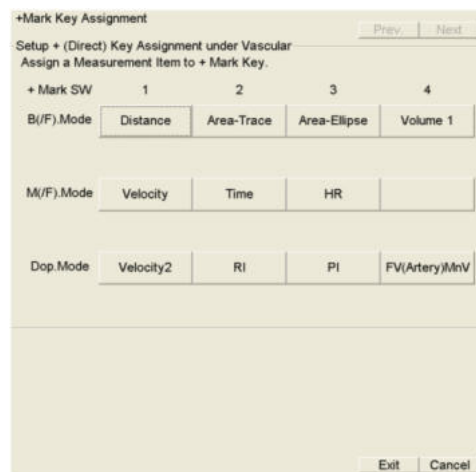
[Touch Panel SW Assignment]

Configures the items that can be assigned to the [Meas] tab in the function menu.



[+Mark Key Assignment]

Sets the measurement item to launch when the [Caliper] key is pressed.



9.5 References

9.5.1 Formulas

B mode calculation formula

Calculated parameters	Formulas
%STENO Diam	$\%STENO = 100 \times (A - B) \div A$ A: Vessel lumen diameter B: Residual diameter
%STENO Area	$\%STENO = 100 \times (A - B) \div A$ A: Vessel lumen area B: Residual area
mean-IMT	$mean-IMT = (a + b + c) \div 3$ a: Maximum IMT value b: Peripheral IMT value c: Central IMT value

D mode calculation formula

Calculated parameters	Formulas
PI	$PI = (PSV - EDV) \div MnV$ $PSV \geq EDV$
RI	$RI = (PSV - EDV) \div PSV$ $PSV \geq EDV$
SD Ratio	$SD\ Ratio = PSV \div EDV$

Calculated parameters	Formulas
Flow Volume	$FV \text{ (MnV) ml/min} = MnV \text{ (cm/s)} \times CSA \text{ (cm}^2\text{)} \times 60 \text{ (sec)} \times COEF$
	$FVm \text{ (MnV) ml/min} = Vm \text{ (cm/s)} \times CSA \text{ (cm}^2\text{)} \times 60 \text{ (sec)}$
	$FV \text{ (ml/beat)} = VTI \text{ (cm)} \times CSA \text{ (cm}^2\text{)}$
	$FV \text{ (ml/min)} = FV \text{ (ml/beat)} \times HR \text{ (BPM)}$
TDI Study	$AI \text{ (Asymmetry Index)} = (Rt.MnV - Lt.MnV) \div ((Rt.MnV - Lt.MnV) \div 2) \times 100$

9.5.2 Anatomy Check List

Carotid Study

Heading	Selectable					
Proximal CCA	WNL	Int. Thickening	Soft Plaque	Calc. Plaque	Occluded	See Comment
Mid CCA	WNL	Int. Thickening	Soft Plaque	Calc. Plaque	Occluded	See Comment
Distal CCA	WNL	Int. Thickening	Soft Plaque	Calc. Plaque	Occluded	See Comment
Bifurcation	WNL	Int. Thickening	Soft Plaque	Calc. Plaque	Occluded	See Comment
Internal Carotid Artery	WNL	Int. Thickening	Soft Plaque	Calc. Plaque	Occluded	See Comment
External Carotid Artery	WNL	Int. Thickening	Soft Plaque	Calc. Plaque	Occluded	See Comment
Vertebral Artery	WNL	Antegrade	Retrograde	See Comment		

Upper Extremity Artery Study

Heading	Selectable				
Subclavian Artery	WNL	Monophasic	Biphasic	Triphasic	See Comment
Axillary Artery	WNL	Monophasic	Biphasic	Triphasic	See Comment
Brachial Artery	WNL	Monophasic	Biphasic	Triphasic	See Comment
Deep Brachial Artery	WNL	Monophasic	Biphasic	Triphasic	See Comment
Basilar Artery	WNL	Monophasic	Biphasic	Triphasic	See Comment
Radial Artery	WNL	Monophasic	Biphasic	Triphasic	See Comment
Ulnar Artery	WNL	Monophasic	Biphasic	Triphasic	See Comment
Superficial Palmar Arch	WNL	Monophasic	Biphasic	Triphasic	See Comment
Upr Art.1	WNL	Monophasic	Biphasic	Triphasic	See Comment
Upr Art.2	WNL	Monophasic	Biphasic	Triphasic	See Comment

Upper Extremity Vein Study

Heading	Selectable				
IJV-Compressibility	Complete	Non	Partial	See Comment	
IJV-Spontaneous	Present	Absent	See Comment		
IJV-Phasic	Present	Absent	See Comment		
IJV-Augmentation Above	Present	Reversed	See Comment		
IJV-Augmentation Below	Present	Dampened	Absent	See Comment	
IJV-Competency	Competent	Incompetent	See Comment		
ScV-Compressibility	Complete	Non	Partial	See Comment	
ScV-Spontaneous	Present	Absent	See Comment		
ScV-Phasic	Present	Absent	See Comment		
ScV-Augmentation Above	Present	Reversed	See Comment		
ScV-Augmentation Below	Present	Dampened	Absent	See Comment	
ScV-Competency	Competent	Incompetent	See Comment		
CV-Compressibility	Complete	Non	Partial	See Comment	
CV-Spontaneous	Present	Absent	See Comment		
CV-Phasic	Present	Absent	See Comment		
CV-Augmentation Above	Present	Reversed	See Comment		
CV-Augmentation Below	Present	Dampened	Absent	See Comment	
CV-Competency	Competent	Incompetent	See Comment		
AV-Compressibility	Complete	Non	Partial	See Comment	
AV-Spontaneous	Present	Absent	See Comment		
AV-Phasic	Present	Absent	See Comment		
AV-Augmentation Above	Present	Reversed	See Comment		
AV-Augmentation Below	Present	Dampened	Absent	See Comment	
AV-Competency	Competent	Incompetent	See Comment		
BV-Compressibility	Complete	Non	Partial	See Comment	
BV-Spontaneous	Present	Absent	See Comment		
BV-Phasic	Present	Absent	See Comment		
BV-Augmentation Above	Present	Reversed	See Comment		
BV-Augmentation Below	Present	Dampened	Absent	See Comment	
BV-Competency	Competent	Incompetent	See Comment		
DBV-Compressibility	Complete	Non	Partial	See Comment	
DBV-Spontaneous	Present	Absent	See Comment		
DBV-Phasic	Present	Absent	See Comment		
DBV-Augmentation Above	Present	Reversed	See Comment		
DBV-Augmentation Below	Present	Dampened	Absent	See Comment	
DBV-Competency	Competent	Incompetent	See Comment		
BasV-Compressibility	Complete	Non	Partial	See Comment	
BasV-Spontaneous	Present	Absent	See Comment		
BasV-Phasic	Present	Absent	See Comment		
BasV-Augmentation Above	Present	Reversed	See Comment		
BasV-Augmentation Below	Present	Dampened	Absent	See Comment	
BasV-Competency	Competent	Incompetent	See Comment		
RV-Compressibility	Complete	Non	Partial	See Comment	
RV-Spontaneous	Present	Absent	See Comment		
RV-Phasic	Present	Absent	See Comment		
RV-Augmentation Above	Present	Reversed	See Comment		
RV-Augmentation Below	Present	Dampened	Absent	See Comment	
RV-Competency	Competent	Incompetent	See Comment		
UV-Compressibility	Complete	Non	Partial	See Comment	
UV-Spontaneous	Present	Absent	See Comment		
UV-Phasic	Present	Absent	See Comment		
UV-Augmentation Above	Present	Reversed	See Comment		
UV-Augmentation Below	Present	Dampened	Absent	See Comment	
UV-Competency	Competent	Incompetent	See Comment		
Upr Vein 1-Compressibility	Complete	Non	Partial	See Comment	
Upr Vein 1-Spontaneous	Present	Absent	See Comment		
Upr Vein 1-Phasic	Present	Absent	See Comment		
Upr Vein 1-Augmentation Above	Present	Reversed	See Comment		
Upr Vein 1-Augmentation Below	Present	Dampened	Absent	See Comment	
Upr Vein 1-Competency	Competent	Incompetent	See Comment		
Upr Vein 2-Compressibility	Complete	Non	Partial	See Comment	
Upr Vein 2-Spontaneous	Present	Absent	See Comment		
Upr Vein 2-Phasic	Present	Absent	See Comment		
Upr Vein 2-Augmentation Above	Present	Reversed	See Comment		
Upr Vein 2-Augmentation Below	Present	Dampened	Absent	See Comment	
Upr Vein 2-Competency	Competent	Incompetent	See Comment		

Upper Extremity Vein Study

Heading	Selectable					
Common Iliac Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Internal Iliac Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
External Iliac Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Common Femoral Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Deep Femoral Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Superficial Femoral Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Popliteal Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Posterior Tibial Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Anterior Tibial Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Peroneal Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Dorsalis Pedis Artery	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Lwr Art.1	WNIL	Monophasic	Biphasic	Triphasic	See Comment	
Lwr Art.2	WNIL	Monophasic	Biphasic	Triphasic	See Comment	

Lower Extremity Vein Study

Heading	Selectable					
CIV-Compressibility	Complete	Non	Partial	See Comment		
CIV-Spontaneous	Present	Absent	See Comment			
CIV-Phasic	Present	Absent	See Comment			
CIV-Augmentation Above	Present	Reversed	See Comment			
CIV-Augmentation Below	Present	Dampened	Absent	See Comment		
CIV-Competency	Competent	Incompetent	See Comment			
EIV-Compressibility	Complete	Non	Partial	See Comment		
EIV-Spontaneous	Present	Absent	See Comment			
EIV-Phasic	Present	Absent	See Comment			
EIV-Augmentation Above	Present	Reversed	See Comment			
EIV-Augmentation Below	Present	Dampened	Absent	See Comment		
EIV-Competency	Competent	Incompetent	See Comment			
IVV-Compressibility	Complete	Non	Partial	See Comment		
IVV-Spontaneous	Present	Absent	See Comment			
IVV-Phasic	Present	Absent	See Comment			
IVV-Augmentation Above	Present	Reversed	See Comment			
IVV-Augmentation Below	Present	Dampened	Absent	See Comment		
IVV-Competency	Competent	Incompetent	See Comment			
CFV-Compressibility	Complete	Non	Partial	See Comment		
CFV-Spontaneous	Present	Absent	See Comment			
CFV-Phasic	Present	Absent	See Comment			
CFV-Augmentation Above	Present	Reversed	See Comment			
CFV-Augmentation Below	Present	Dampened	Absent	See Comment		
CFV-Competency	Competent	Incompetent	See Comment			
DFV-Compressibility	Complete	Non	Partial	See Comment		
DFV-Spontaneous	Present	Absent	See Comment			
DFV-Phasic	Present	Absent	See Comment			
DFV-Augmentation Above	Present	Reversed	See Comment			
DFV-Augmentation Below	Present	Dampened	Absent	See Comment		
DFV-Competency	Competent	Incompetent	See Comment			
GSV-Compressibility	Complete	Non	Partial	See Comment		
GSV-Spontaneous	Present	Absent	See Comment			
GSV-Phasic	Present	Absent	See Comment			
GSV-Augmentation Above	Present	Reversed	See Comment			
GSV-Augmentation Below	Present	Dampened	Absent	See Comment		
GSV-Competency	Competent	Incompetent	See Comment			
SFV-Compressibility	Complete	Non	Partial	See Comment		
SFV-Spontaneous	Present	Absent	See Comment			
SFV-Phasic	Present	Absent	See Comment			
SFV-Augmentation Above	Present	Reversed	See Comment			
SFV-Augmentation Below	Present	Dampened	Absent	See Comment		
SFV-Competency	Competent	Incompetent	See Comment			
LSV-Compressibility	Complete	Non	Partial	See Comment		
LSV-Spontaneous	Present	Absent	See Comment			
LSV-Phasic	Present	Absent	See Comment			
LSV-Augmentation Above	Present	Reversed	See Comment			
LSV-Augmentation Below	Present	Dampened	Absent	See Comment		
LSV-Competency	Competent	Incompetent	See Comment			
PopV-Compressibility	Complete	Non	Partial	See Comment		
PopV-Spontaneous	Present	Absent	See Comment			
PopV-Phasic	Present	Absent	See Comment			
PopV-Augmentation Above	Present	Reversed	See Comment			
PopV-Augmentation Below	Present	Dampened	Absent	See Comment		
PopV-Competency	Competent	Incompetent	See Comment			
PTV-Compressibility	Complete	Non	Partial	See Comment		
PTV-Spontaneous	Present	Absent	See Comment			
PTV-Phasic	Present	Absent	See Comment			
PTV-Augmentation Above	Present	Reversed	See Comment			
PTV-Augmentation Below	Present	Dampened	Absent	See Comment		
PTV-Competency	Competent	Incompetent	See Comment			
ATV-Compressibility	Complete	Non	Partial	See Comment		
ATV-Spontaneous	Present	Absent	See Comment			
ATV-Phasic	Present	Absent	See Comment			
ATV-Augmentation Above	Present	Reversed	See Comment			
ATV-Augmentation Below	Present	Dampened	Absent	See Comment		
ATV-Competency	Competent	Incompetent	See Comment			
PerV-Compressibility	Complete	Non	Partial	See Comment		
PerV-Spontaneous	Present	Absent	See Comment			
PerV-Phasic	Present	Absent	See Comment			
PerV-Augmentation Above	Present	Reversed	See Comment			
PerV-Augmentation Below	Present	Dampened	Absent	See Comment		
PerV-Competency	Competent	Incompetent	See Comment			
Lwr Vein 1-Compressibility	Complete	Non	Partial	See Comment		
Lwr Vein 1-Spontaneous	Present	Absent	See Comment			
Lwr Vein 1-Phasic	Present	Absent	See Comment			
Lwr Vein 1-Augmentation Above	Present	Reversed	See Comment			
Lwr Vein 1-Augmentation Below	Present	Dampened	Absent	See Comment		
Lwr Vein 1-Competency	Competent	Incompetent	See Comment			
Lwr Vein 2-Compressibility	Complete	Non	Partial	See Comment		
Lwr Vein 2-Spontaneous	Present	Absent	See Comment			
Lwr Vein 2-Phasic	Present	Absent	See Comment			
Lwr Vein 2-Augmentation Above	Present	Reversed	See Comment			
Lwr Vein 2-Augmentation Below	Present	Dampened	Absent	See Comment		
Lwr Vein 2-Competency	Competent	Incompetent	See Comment			

9.5.3 References

(1) B mode

I) Plaque Score

- Nobuo HANDA et al. "Guidelines for Ultrasonic Assessment of Carotid Artery Disease: Preliminary Report", Neurosonology, 2002, 15 (1), 20-33
- Handa N., Matsumoto M., Maeda H., Hougaku H., Ogawa S., Fukunaga R., Yoneda S., Kimura K., Kamada T. "Ultrasonic evaluation of early carotid atherosclerosis." Stroke, 1990, 21 (11), 1567-1572

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(2) D mode

I) Lower Extremity Arteries

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II) Lower Extremity Venous

- Nicolaidis A.N., et al.: detection and quantification of venous reflex, E. F. Bernstein ed. "Noninvasive diagnostic techniques in vascular disease." Mosby-Year Book Inc., 1990
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III) Transcranial Doppler

- Haruyuki Kanaya, Kintomo Takakura (monitoring): "TCD manual for transcranial ultrasound diagnosis," Tokyo: Chugai-Igakusha, 1996
- Manabu OHNO. Kenji HARA "Analysis of Middle Cerebral Artery Velocities with Transcranial Color Flow Imaging Using Two Types of US Machines: Preliminary Report." *Neurosonology*, 2000, 13(3): 127-129

IV) Asymmetry Index (AI)

- Zanette E. M., Fieschi C., Bozzao L., Roberti C., Toni D., Argentino C., Lenzi G. L. "Comparison of cerebral angiography and transcranial Doppler sonography in acute stroke." *Stroke*, 1989, 20 (7): 899-903

9.5.4 Terms and Abbreviations

Abbreviation	Meaning	Meaning
%STENO	% Stenosis	Stenosis Percentage
%STENO-A	% Stenosis by Area	%Stenosis by Area

Abbreviation	Meaning	Meaning
%STENO-D	% Stenosis by Diameter	%Stenosis by Diameter
AA	Axillary Artery	Axillary Artery
ACA	Anterior Cerebral Artery	Anterior Cerebral Artery
ACoA	Anterior Communicating Artery	Anterior Communicating Artery
ATA	Anterior Tibial Artery	Anterior Tibial Artery
ATV	Anterior Tibial Vein	Anterior Tibial Vein
AV	Axillary Vein	Axillary Vein
BA	Brachial Artery	Brachial Artery
BA	Basilar Artery (TCD)	Basilar Artery
BasA	Basilic Artery	Basilic Artery
BasV	Basilic Vein	Basilic Vein
BIFUR.	Bifurcation carotid artery	Bifurcation carotid artery
BV	Brachial Vein	Brachial Vein
Car%StenoD	Carotid Artery %Stenosis by Diameter	Carotid Artery % Stenosis by Diameter
CFA	Common Femoral Artery	Common Femoral Artery
CFV	Common Femoral Vein	Common Femoral Vein
CIA	Common iliac Artery	Common Iliac Artery
CIV	Common iliac Vein	Common Iliac Vein
CV	Cephalic Vein	Cephalic Vein
DBA	Deep Brachial Artery	Deep Brachial Artery
DBV	Deep Brachial Vein	Deep Brachial Vein
dCCA	Common distal carotid artery	Common distal carotid artery
DFA	Deep Femoris Artery	Deep Femoris Artery
DFV	Deep Femoris Vein	Deep Femoris Vein
DPA	Dorsalis Pedis Artery	Dorsalis Pedis Artery
ECA	External carotid artery	External carotid artery
EDV	End Diastolic Velocity	End diastolic velocity
EIA	External iliac Artery	External iliac artery
EIV	External iliac Vein	External iliac Vein
F.Volume	Flow Volume	Blood flow volume
GSV	Great Saphenous Vein	Great saphenous vein
ICA	Internal carotid artery	Internal carotid artery
IIA	Internal iliac Artery	Internal iliac artery
IIV	Internal iliac Vein	Internal iliac Vein
IJV	Internal Jugular Vein	Internal Jugular Vein
IMT	Intima-media thickness	Intima-media thickness
LSV	Lesser Saphenous Vein	Lesser Saphenous Vein
Lt.	Left	Left

Abbreviation	Meaning	Meaning
Lwr Art.	Lower Extremity Artery	Measurement of artery blood flow velocity in the lower extremities
Lwr Vein	Lower Extremity Vein	Measurement of venous blood flow velocity in the lower extremities
Lwr%StenoA	Lower Extremity Artery %Stenosis by Area	Lower Extremity Artery % Stenosis by Area
Lwr%StenoD	Lower Extremity Artery %Stenosis by Diameter	Lower Extremity Artery % Stenosis by Diameter
MCA	Middle Cerebral Artery	Middle Cerebral Artery
mCCA	Common middle carotid artery	Common middle carotid artery
MnV	Mean Velocity	Mean velocity
PCA	Posterior Cerebral Artery	Posterior Cerebral Artery
PCoA	Posterior Communicating Artery	Posterior Communicating Artery
pCCA	Common proximal carotid artery	Common proximal carotid artery
PerA	Peroneal Artery	Peroneal Artery
PerV	Peroneal Vein	Peroneal Vein
PopA	Popliteal Artery	Popliteal Artery
PopV	Popliteal Vein	Popliteal Vein
PSV	Peak Systolic Velocity	Peak Systolic Velocity
PTA	Posterior Tibial Artery	Posterior Tibial Artery
PTV	Posterior Tibial Vein	Posterior Tibial Vein
pV	Peak Velocity	Peak Velocity
RA	Radial Artery	Radial Artery
Resid	Residual	Residual diameter and cross-sectional area
Rt.	Right	Right
RV	Radial Vein	Radial Vein
S/D	S/D Ratio	Systolic/Diastolic Velocity Ratio
ScA	Subclavian Artery	Subclavian Artery
SFA	Superficial Femoral Artery	Superficial Femoral Artery
SFV	Superficial Femoral Vein	Superficial Femoral Vein
SPA	Superficial Palmar Arches	Superficial Palmar Arches
TICA	Terminal ICA	Terminal Internal Carotid Artery
UA	Ulnar Artery	Ulnar Artery
Upr Art.	Upper Extremity Artery	Measurement of artery blood flow velocity in the upper extremities
Upr Vein	Upper Extremity Vein	Measurement of venous blood flow velocity in the upper extremities
Upr%StenoA	Upper Extremity Artery %Stenosis by Area	Upper Extremity Artery % Stenosis by Area

Abbreviation	Meaning	Meaning
Upr%StenoD	Upper Extremity Artery %Stenosis by Diameter	Upper Extremity Artery % Stenosis by Diameter
UV	Ulnar Vein	Ulnar Vein
VA	Vertebral Artery(TCD)	Vertebral artery
VERT	Vertebral artery	Vertebral artery
Vessl	Vessel	Internal diameter of the blood vessel and cross-sectional area
Vm	Mean Velocity	Mean velocity (Mean method)



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