MSSW-CFMRA3

*Product Data*
***No. MPDMR0340EAJ***

# Contrast Free MRA Application

## *APPLICATION*

The Contrast Free MRA Application is an optional application for Canon Medical Systems magnetic resonance imaging (MRI) systems. This application expands the functions of the mVascular Package for Contrast Free MRA.

## *APPLICABLE COMBINATIONS*

This application is applicable to the following systems.

| System | Software version |
|---|---|
| Vantage Galan 3T | V4.0 or later |
| Vantage Titan 3T | V2.21 or later |
| Vantage Orian | V4.5 or later |
| Vantage Fortian | V8.0 or later |
| Vantage Titan | V2.10 or later |
| Vantage Elan | V3.0 or later |

The optional mVascular Package and cardiac gating system must be installed in the MRI system.

It is recommended that the optional peripheral pulse and/or respiratory gating system be installed in the MRI system to ensure stable image quality by triggering based on the peripheral pulse and/or respiratory pattern.

## *COMPOSITION*

Software (License).....1 set

This application does not include an operation manual. Refer to the operation manual supplied with the MRI system.

## *PERFORMANCE SPECIFICATIONS*

### Short ETS FASE*

This is a type of FASE sequence with a shorter echo train spacing (ETS) than in conventional FASE pulse sequences. This type of sequence improves depiction of tissues with relatively short T2, moving structures, and blood vessels.

### Long ETS FASE*

This is a pulse sequence with a long TE. It is designed for image acquisition with high T2 weighting, such as myelography and inner ear imaging. This sequence improves the SNR by narrowing the data acquisition bandwidth.

### Sequential FASE*

When ECG gating or peripheral-pulse gating is selected for FASE 2D multislice acquisition, gated scanning is performed for each slice and each shot. This method is useful for the sequential acquisition of different slice images in the same cardiac phase.

### Multishot FASE*

The number of shots for each of the FASE 2D pulse sequences can be selected over a wider range than in conventional FASE. In conventional FASE, only 1, 2, or 4 can be selected, but in Multishot FASE, the available range is increased to 32. When the number of shots is increased, the scanning time increases, but image blurring due to T2 relaxation and motion decreases. Multishot FASE is particularly useful when combined with breath-hold scanning, which suppresses respiratory motion artifacts.

### FSE/FASE T2 Plus

Instead of waiting for natural relaxation, a 90° RF pulse is applied after data acquisition in order to accelerate relaxation to longitudinal magnetization. This accelerated relaxation increases the signal strength of the components with long T1 and T2 even when a shorter repetition time is set, and the T2-weighted scanning time is thus reduced.

### Intermittent breath-hold

In ECG- or PPG-gated scanning, data acquisition is paused for the specified period after data acquisition for the specified number of slice encodings in order to allow the patient to breathe.

### SPEED (Swap Phase Encode Extended Data) technique

Two images whose phase encode directions are perpendicular to each other are automatically acquired and superimposed through MIP processing. This technique can be used to observe vessels running in various directions (for example, pulmonary blood vessels) in a single image.

### ECG-Prep

In FASE 2D scan with ECG gating or peripheral-pulse gating, this function sequentially acquires images for the same slice in different cardiac phases. This function can be used to determine the optimal delay time for visualizing the vessel of interest when scanning is performed with FBI.

### FBI (Fresh Blood Imaging) technique

This is a vascular imaging technique employing ECG gating or peripheral-pulse gating. FBI makes it possible to visualize the fresh blood ejected from the heart by setting the appropriate delay time relative to the R wave and performing gated scanning for each shot.

Sequences marked with an asterisk (*) are available as standard from software version V4.0

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### Flow-Spoiled FBI (non-contrast MRA of the lower limbs)
The signal strength of blood flowing in the readout direction at low velocities is reduced by applying a weak dephasing pulse in the readout direction in order to increase the difference between the signals in systole and diastole. This function permits the arteries and veins of the lower extremities (in which the flow velocity is low) to be visualized separately by FBI scanning without the use of contrast medium.

### FBI-Navi
FBI-Navi automatically obtains the optimal delay time for Flow-Spoiled FBI based on the images acquired in ECG-Prep scan. The obtained delay times can be registered and loaded into the Gating Plan window for Flow-Prep scan and Flow-Spoiled FBI.

### FASE flow compensation (available in 1.5-T systems only)
FASE3Dfc with flow compensation applies gradient moment nulling (GMN) in the readout direction to improve the detectability of the flow component in the readout direction. This technique can thus suppress the artifacts that typically appear in single-shot images at a location FOV/2 away from the original position in the phase encode direction.

### TrueSSFP
Images with T2/T1 contrast are acquired in a shorter time by taking advantage of the steady-state free precession. This technique is suitable for depicting tissues and blood vessels with relatively long T2 during breath-holding. In addition, a pre-contrast pulse (PreT2) can be specified. This pre-pulse allows the signal intensity of spins with relatively short T2 to be weakened.

### Time-SLIP
Time-SLIP (Time-Spatial Labeling Inversion Pulse) extracts or suppresses blood flowing into the imaging slice by setting the Black Blood prepulse application position independently of the imaging slice. This technique can be used for non-contrast MRA with FASE or TrueSSFP to observe regional blood flow and/or CSF flow during BBTI.

### BBTI-Prep (FASE2D Time-SLIP)
With the FASE2D Time-SLIP sequence, the same slices can be acquired sequentially for each phase by changing the BBTI value. Various flow dynamics, such as those for blood and CSF, can be observed.

### DelayTracker
DelayTracker sets an appropriate ECG delay time automatically, making it possible to acquire both diastolic and systolic images in Flow-Spoiled FBI.

### 2D-RMC (Real-time Motion Correction)
2D-RMC estimates and corrects the positional changes of the liver associated with respiratory motion based on movement of the diaphragm. This technique can be applied to some types of FFE3D[1)], SEEPI2D[2)] and FASE 3D sequences. Even if the patient's respiratory level changes during the main scan, the threshold can be changed manually.

1) This feature is available for software V3.0 or later
2) This feature is available for software V4.0 or later.

### Arterial Spin Labeling (ASL)
Using the ASL method, vascular images or perfusion-weighted images can be generated without contrast medium for both 2D and 3D. The ASL method labels the blood itself with the RF pulse and uses the magnetically labeled blood as a tracer to obtain vascular images or perfusion-weighted images in a relatively simple manner.
When ASL is used, images only of the flow components flowing into the imaging slice can be obtained. This is done by eliminating the stationary tissues by subtracting the tag image (which includes the contribution of the labeled flow) from the control image (which does not include the contribution of the labeled flow).

Note: 3D ASL is available for software V2.30 or later

### mASTAR
Non-contrast MRA is performed using ASTAR pulses in FFE3D sequences. After uniform Tag pulses are applied, sequential acquisition is performed with different TI timings to acquire MRA images with the different TI timings, allowing hemodynamics to be observed.

Note: This feature is available for software V4.0 or later

## *INSTALLATION CONDITIONS*
The power and environmental conditions are the same as for the MRI system.

## *COMPLIANCE WITH STANDARDS*
This application complies with the same standards as the MRI system.

## *MASS*

| Unit | Mass (kg) |
|---|---|
| Contrast Free MRA Application | Approx. 0.5 |

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Canon Medical Systems Corporation meets internationally recognized standards for Quality Management System ISO 9001, ISO 13485.
Canon Medical Systems Corporation meets the Environmental Management System standard ISO 14001.



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