

X-CUBE 90

Attenuation Imaging (ATI)

Attenuation imaging Overview

Background

The four major liver diseases are HBV, HCV, nonalcoholic fatty liver disease (NAFLD) and alcoholic liver disease. Currently, the incidence of nonalcoholic steatohepatitis (NASH), which is defined as hepatic steatosis with combined fibrosis and inflammation, is increasing. It is known that about 20% of patients progress to liver cirrhosis and then liver cancer. It is important to detect and quantify hepatic steatosis for a early to prevent the progressing to severe liver disease.

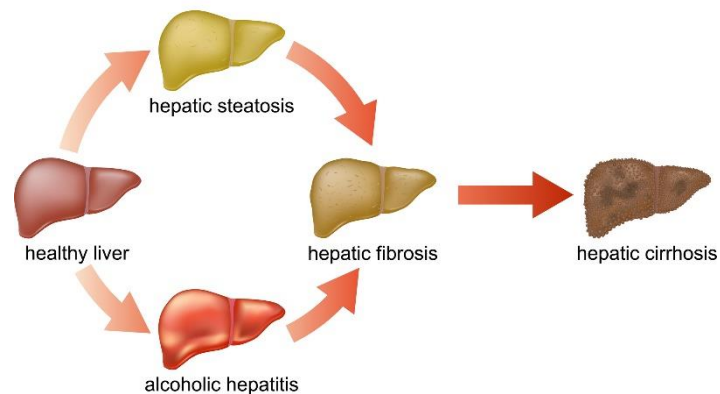


Figure 1. Stage of liver disease

Ultrasound attenuation

ATI is a feature that quantifies fatty liver disease using the attenuation coefficient (dB/cm/MHz) of B-mode ultrasound. The ultrasound wave pulse transmitted in the body gradually spreads and it converts into heat, absorbed by tissue and occur scattering and attenuation. Attenuation of ultrasound signals depends on the acoustic characteristics and the tissue structure. Attenuation is shown the signal intensity as figure 2. Fatty liver typically represents ultrasound images with increasing attenuation.

Advantages

- Clinical benefits for steatosis stage
- Potential to reduce the need for elevated liver biochemistry (ALT, AST) and MRI (PDFF)
- Non-invasive method and cost effective
- Easy & short exam time
- Quantification, Objectification result value

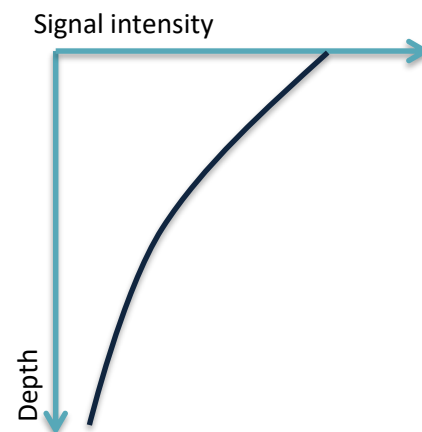


Figure 2. Attenuation Beam profile

Easy Steps for ATI Measurement



Figure 3. ATI option



Figure 4. ATI Measurement

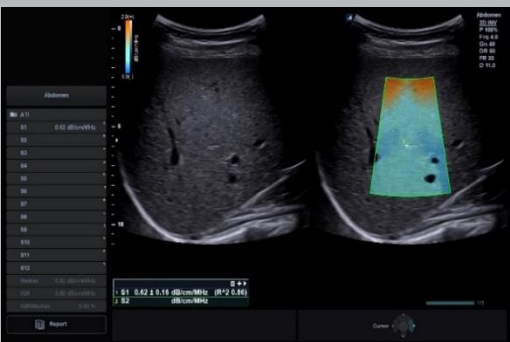


Figure 5. ATI measurement result

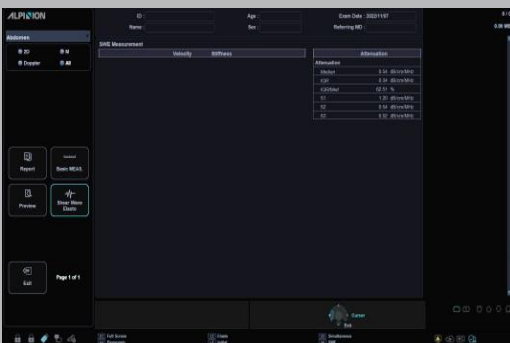


Figure 6. Report page

- 1 Select **[ATI]** on the touch screen.
- 2 Measurement should be taken at an intercostal space with the patient in the supine or slight lateral decubitus (30°) position with right arm in extension.
- 3 Scan the liver segment 7 or 8, avoiding structure such as diaphragm, rib shadowing, vessels.
- 4 Use **[Trackball]** to move the ROI box.
- 5 Press the **[Priority]** key to obtain the desired ROI.
- 6 Ask the patient to pause breathing rather than taking deep inspiration.
- 7 To measure the attenuation, press the **[Set]** key. The attenuation coefficient and reliable index are calculated and shown on the display. The measured value is fixed and assigned to the corresponding sample.
- 8 Fewer than 10 measurements with ATI can be obtained however, the IQR/M should be within the recommended range. (IQR/M of $\leq 30\%$)
- 9 Touch **[Report]** on the touch screen.
- 10 Select Shear Wave Elasto button on the touch screen to view the Attenuation coefficients values.



NOTE

R-Squared Index (R^2)
The R-squared index indicates the reliability of ATI results. The higher index indicates the higher reliability. (0 to 1)

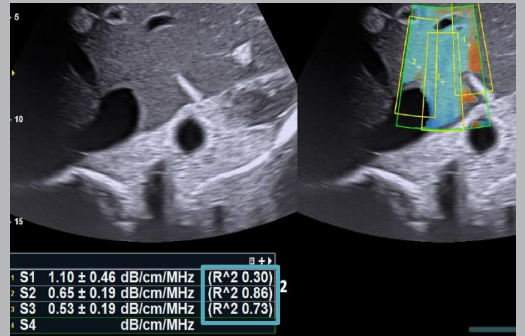


Figure 7. R-Squared Index

NOTE

Inhomogeneity structure results in no attenuation data, it is removed.

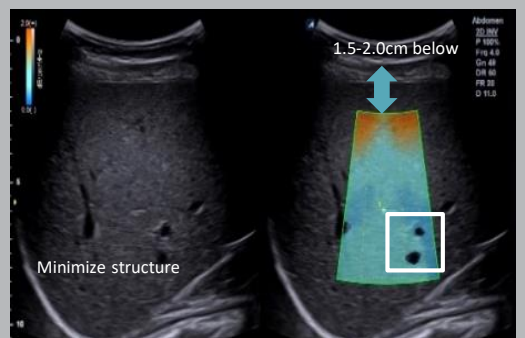


Figure 8. ATI ROI Position

Available transducers and applications

Transducer type	Transducer	Application
Convex	SC1-7H	Abdomen