



# Auto Tissue Optimization and Continuous Tissue Optimization

Optimal adjustment of multiple B-Mode imaging parameters (gain, time gain compensation, and dynamic range, e.g.) is needed to perform precise and efficient diagnosis. However, it is difficult to perform an optimal adjustment manually during various exams where the target anatomy and/or view is changing throughout the exam, requiring the operator to frequently adjust the probe and/or patient position. In addition, manual adjustment may cause variations among operators.

GE Healthcare developed two features to adjust B-Mode quality automatically: Auto Tissue Optimization (ATO) and Continuous Tissue Optimization (CTO). They assist the user with optimally adjusting the B-Mode imaging parameters and thus contribute to improved diagnostic accuracy and exam efficiency.

## Auto Tissue Optimization (ATO)

- Map Optimization
- Improvement of Contrast
- Update by Auto Button

## Continuous Tissue Optimization (CTO)

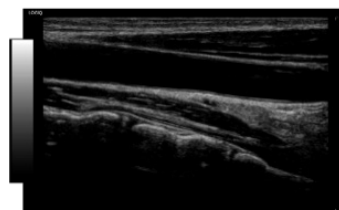
- Gain Optimization
- Improvement of image uniformity, keeping optimal overall gain, noise suppression
- Updates continuously

## Auto Tissue Optimization

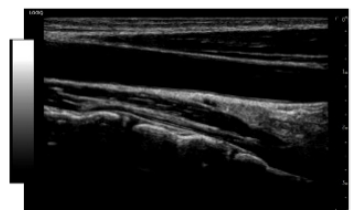
ATO improves the contrast resolution of the B-Mode image. The algorithm analyzes the histogram of grayscale/brightness values that make up the B-Mode image and then dynamically creates an optimal map for improved visualization of the image data. Every time the Auto button is pushed, ATO reassesses the current B-Mode image and the optimal mapping is recalculated and applied to subsequent images.

*Figure 1* shows a use case in the carotid. As ATO optimized the map based on the brightness levels in the original image, the contrast of the resulting B-Mode image was automatically improved. On the B-Mode image with ATO, the noise with low brightness was suppressed while the contrast resolution of the intima and vascular wall was improved by stretching the dynamic range of the brightness levels used to visualize these structures. This cleared visualization of the inside of the carotid.

**Without ATO**



**With ATO**



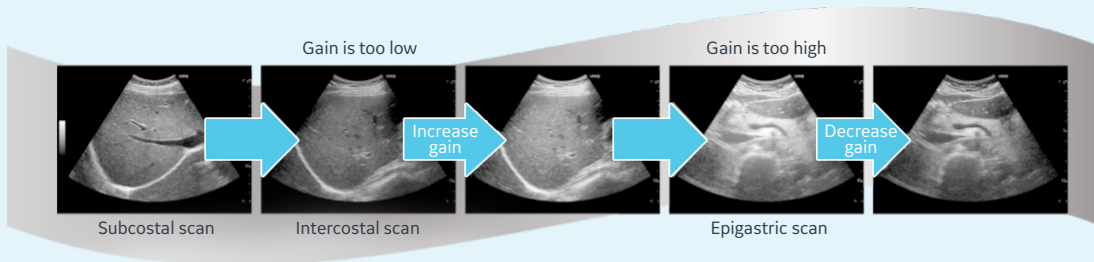
**Figure 1. Example of ATO on carotid (L3-12-D Carotid CHI 12 MHz)**

# Continuous Tissue Optimization

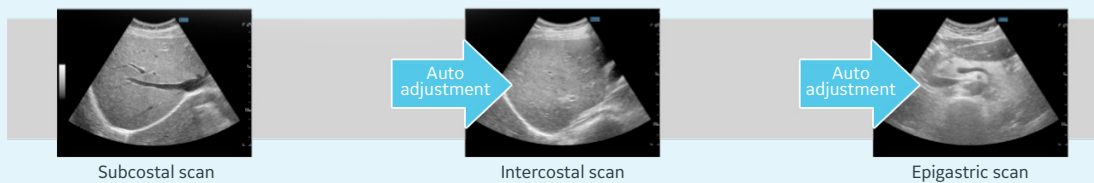
CTO improves image uniformity and adjusts overall image brightness. The tissue and noise areas of the B-Mode image are analyzed and the brightness of the tissue area is automatically adjusted to improve the uniformity both in depth and laterally. In addition to the image uniformity improvement, noise suppression is also performed in parallel. The brightness of the noise area is suppressed using theoretical noise values calculated inside of the system. When CTO is activated by Auto button, CTO continuously adjusts to the incoming B-Mode image data.

Figure 2 shows a comparison of scanning with and without CTO. In the example without CTO, Gain and TGC adjustments were needed to get optimal B-Mode images when the probe position was changed from subcostal scan to intercostal scan, and the target anatomy was changed from liver to pancreas. On the other hand, in the example with CTO, optimal overall gain was automatically adjusted as the probe position and target anatomy changed. This auto adjustment maintained the overall image brightness, while also improving image uniformity by decreasing the brightness in the subcutaneous tissue and increasing the brightness of the shadowed edge of the B-Mode image. In addition, the haze in the liver surface was suppressed and the noise inside of vessels was not visible even as the overall image brightness was increased.

**Without CTO** – Need to adjust gain according to observed B-Mode images



**With CTO** – Gain is always kept and noise is always suppressed automatically



**Figure 2. Example of CTO on abdominal anatomy (C1-6-D Abd CHI 4.5 MHz)**

ATO and CTO are available on various probes and applications. Either ATO or CTO, or both, are selectable according to the use case. ATO and CTO are designed to improve exam efficiency and repeatability, while reducing the complexity and stress of performing clinical exams.

Product may not be available in all countries and regions. Full product technical specification is available upon request. Contact a GE Healthcare Representative for more information. Please visit [www.gehealthcare.com/promotional-locations](http://www.gehealthcare.com/promotional-locations).

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