

Real-Time Tissue Change Monitoring

Unique feature of Sonablate® 500 monitors changes in tissue during minimally invasive HIFU therapy.



Tissue Change Monitoring (TCM)

is a unique quantitative software module exclusively designed for the Sonablate 500 that monitors real-time tissue changes during HIFU (high intensity focused ultrasound) therapy for the treatment of malignant and benign prostate disease. TCM provides feedback on the status of the ablative therapy in real time so the physician knows exactly what is happening to the prostatic tissue during HIFU.

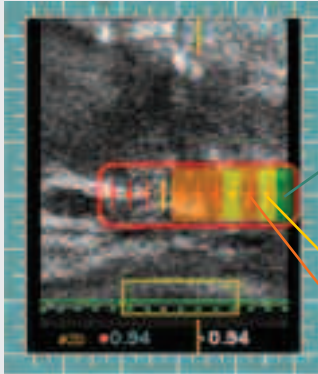
Features of TCM

- Real-Time Feedback of HIFU therapy by tissue response
- Dual Stack with Synchronisation
- Colour Overlay Display
- Visualisation Guidance Tools
- Focal Point Markers
- Precise Adjustment of Power Dosage

How does TCM work?

A radio frequency (RF) signal is sent to a treatment site prior to delivery of HIFU and then another signal is sent after delivery of HIFU in the same treatment site. TCM calculates the change that took place and displays it on-screen. TCM quantifies tissue changes based on a comparison of radio frequency (RF) ultrasound pulse-echo signals at each treatment sites.

Enlarged Sagittal View



TCM Colour Coding

During therapy, the display gives the physician enhanced feedback about the change in tissue at the point where HIFU is delivered. Change in tissue is signified by four different colours.

GREY

No TCM calculation was made. The RF signal was too small at this site to make a TCM calculation.

GREEN

TCM did not see enough change in the RF signal pre-HIFU vs. post-HIFU. The site may not have been treated OR tissue at site may have already been changed from a neighbouring treatments – so no large additional change in RF signal could occur OR some other properties such as near field heating or a calcium deposit in the near field may prevent a significant tissue (RF signal) change.

YELLOW

TCM saw a moderate change in RF signal. The site appears to be treated.

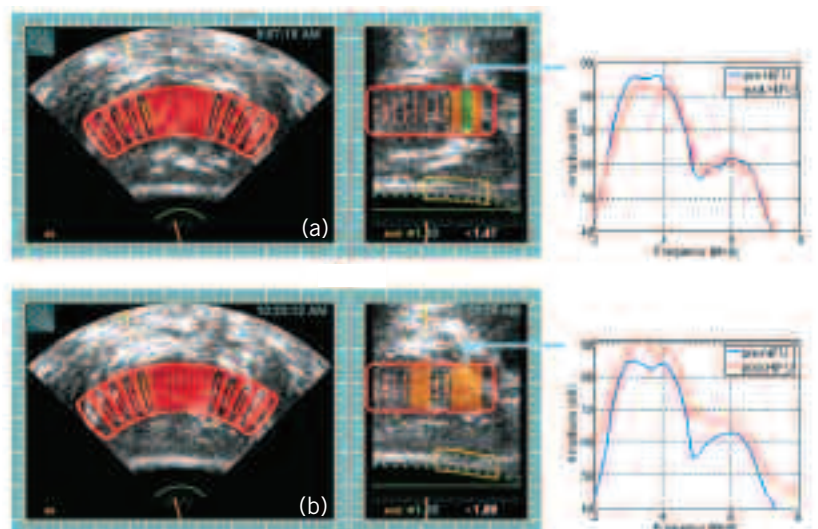
ORANGE

TCM saw a larger change in RF signal. The site appears to be treated.

Real-Time Feedback

(a) Displays a treatment where with a green TCM result due to obstruction in the near field. The corresponding graph displays the post-HIFU RF signal smaller than the pre-HIFU RF signal, hence the result is green.

(b) The bottom image shows a situation where a specific lesion resulted in an orange TCM marker. The corresponding graph shows a much greater change between the pre and post HIFU signals, therefore the result was orange.



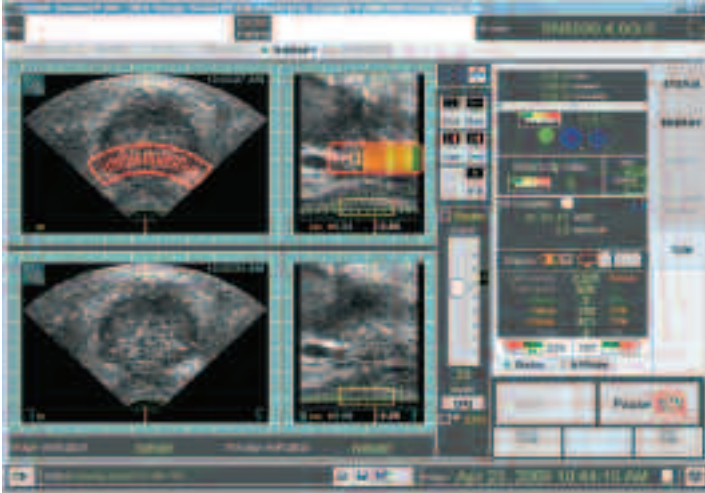
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Sonablate® 500
Breaking Barriers in Ultrasound Technology



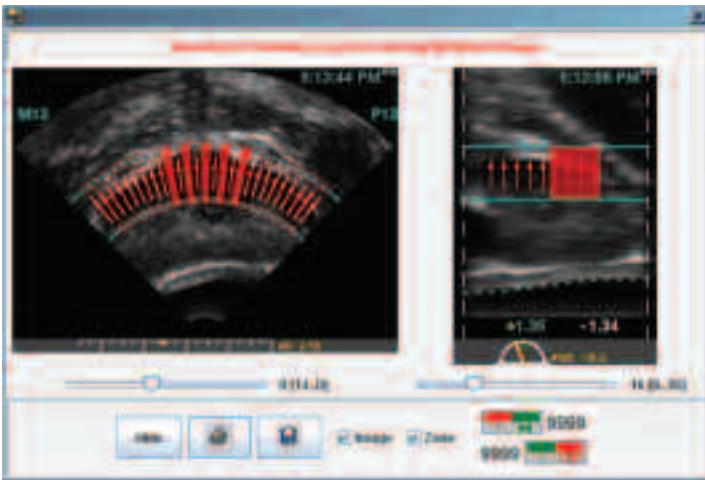
Focal Point Markers

TCM software includes focal point markers displayed on therapy site's vertical red line. The focal point marker appears as a red diamond located at the transducer's focal radius. These focal point markers can help determine whether to keep or take away a lesion at the boundaries of the prostate.



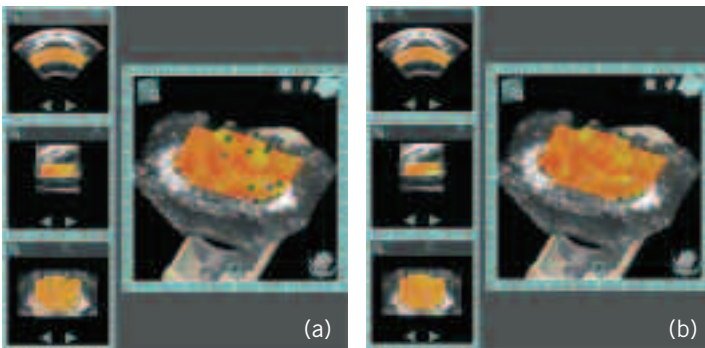
Treatment Display

The TCM treatment screen displays real-time images and reference images at the same time. The live sagittal view of the prostate includes the overlay displaying the colours which indicate the amount of change in the tissue at that particular point. This screen also displays the slider for easy adjustment of the power to be delivered as well as the number and percentage of TCM calculations in each colour category. Above the TCM display is the standard therapy status display.



Dual Stack with Synchronisation

Dual Stack, unique to TCM, is an additional way for a user to review and plan where HIFU energy will be delivered. The Dual Stack loads images of the prostate in the transverse and the sagittal view and displays them side-by-side. Therefore the user can see both without having to open additional windows and make a quick decision on therapy sites at the boundaries of the prostate. It is synchronised because if a HIFU treatment is applied or removed in one view, it will automatically be shown and labelled in the other view.



Treatment Review with TCM

Sonablate allows physicians to view therapy of prostate and tissue changes in transverse, sagittal, coronal, and 3D views.

- (a) Shows a small number of treatment sites in green and grey.
- (b) Created after additional energy is selectively applied; shows yellow and orange colour-coding at those sites.