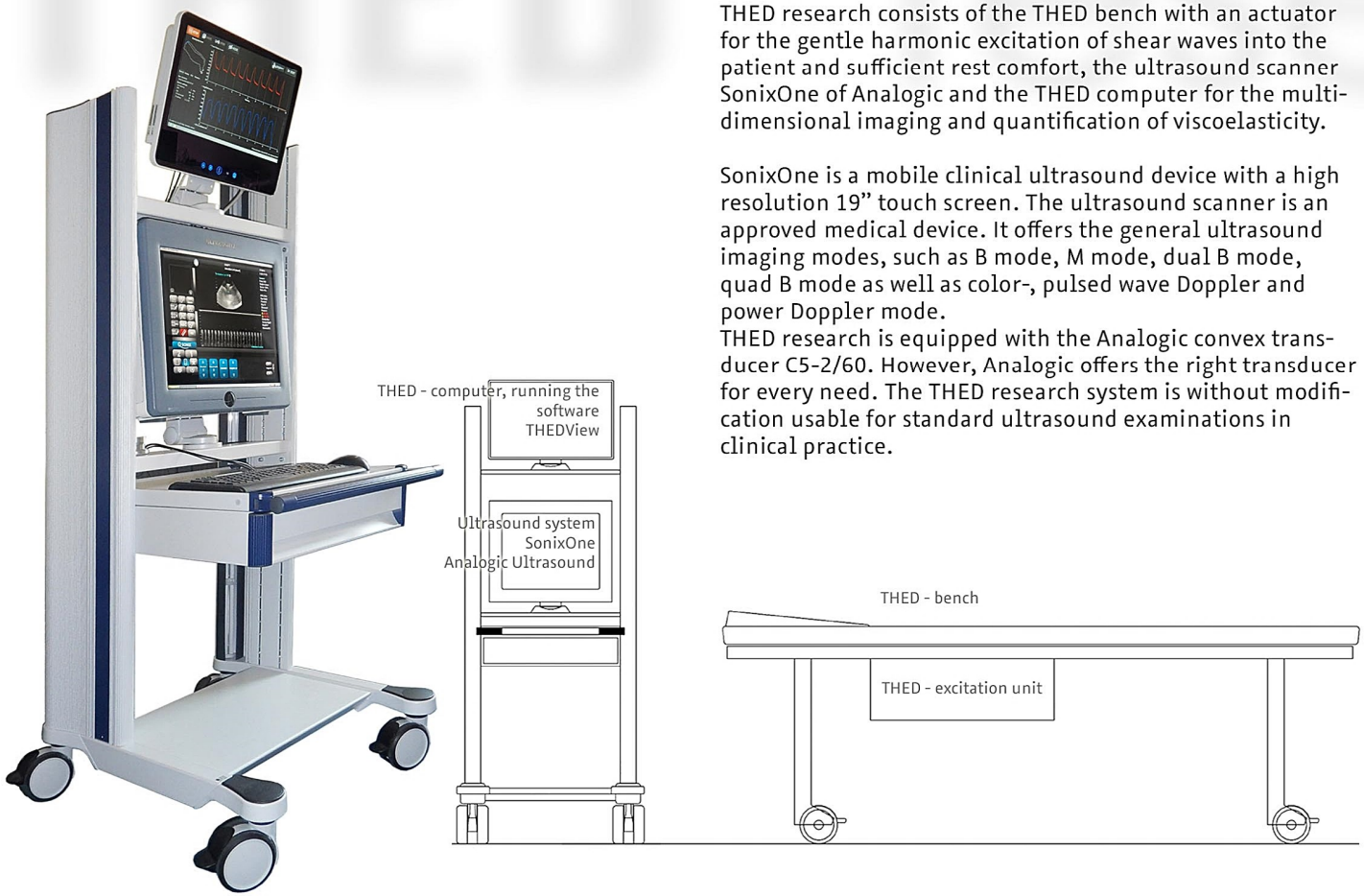
THED® research

Time harmonic elastography -
Quantifying pathological and physiological changes through deep palpation



TIME HARMONIC ELASTOGRAPHY

THED research is a highly innovative research platform for establishing the MRI-validated method Time Harmonic Elastography (THE) as an ultrasound imaging modality. THED research offers quantitative analysis of shear wave speed up to a penetration depth of 13 cm, which allows for shear wave propagation beyond fluid collections (ascites) and the examination of obese patients.

With THED research structural changes (fibrosis, tumors and kidney damages) as well as functional changes (perfusion and medication) can be imaged at high resolution and contrast.

THED research consists of the THED bench with an actuator for the gentle harmonic excitation of shear waves into the patient and sufficient rest comfort, the ultrasound scanner SonixOne of Analogic and the THED computer for the multi-dimensional imaging and quantification of viscoelasticity.

SonixOne is a mobile clinical ultrasound device with a high resolution 19” touch screen. The ultrasound scanner is an approved medical device. It offers the general ultrasound imaging modes, such as B mode, M mode, dual B mode, quad B mode as well as color-, pulsed wave Doppler and power Doppler mode.
THED research is equipped with the Analogic convex transducer C5-2/60. However, Analogic offers the right transducer for every need. The THED research system is without modification usable for standard ultrasound examinations in clinical practice.

FUNCTIONS

THED research combines high quality real-time images with remote palpation of organs towards improved diagnosis. With a penetration depth of 13 cm, the device offers a substantial improvement in terms of range of organs that are measurable. Full field of view elastograms are calculated with a controlled aliasing algorithm. By such means standard non-specialized ultrasound hardware is applied and the thermal as well as the mechanical ultrasound limits are satisfied.

THED research offers one- and two-dimensional techniques for viscoelastic tissue analysis. Dedicated parameter sets were developed for the analysis of the heart and the liver. A default parameter set is available for the screening of all other organs.

The judgment of spatial relationships is assisted by offering a semi-transparent overlay of the elastogram onto the B mode image. Using side-by-side display with the B mode image simplifies 2D guidance and increases safety.

The system is intended for research in the advance development of elastographical methods and devices. Based powerful features as well as a state of the art development process, THED research constitutes an ideal tool to overcome current limitations in elastography.

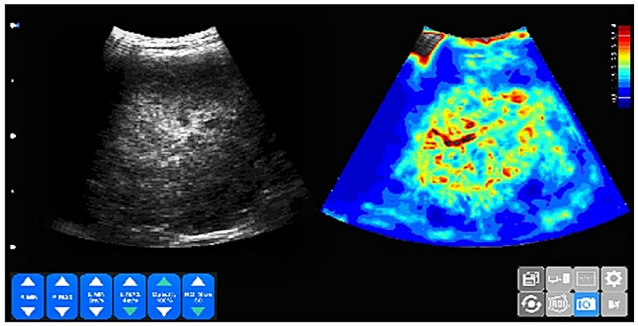


Figure: Side by side display of the ultrasound B mode image with the B mode large elastogram on the THED computer screen. Marked differences of elasticity are shown and are locatable with high precision.

PURPOSE

THED research is used to assess the severity of of liver fibrosis in patients with chronic liver diseases, provided that confounding factors are taken into account, and especially to distinguish patients with nil/mild fibrosis from those with significant fibrosis and identify those with cirrhosis. Prospectively, the method shall facilitate the non-invasive threshold control before biopsy.

In pilot studies at the Charité Berlin, THED research showed the reliable detection of fibrosis in children with NASH and was successfully applied during the assessment of liver fibrosis.

Time harmonic elastography is a sensitive and reproducible method that shows a strong dependency on decompression (e. g. after implantation of TIPS) and fibrotic collagen accumulation. The Charité research team used these possibilities for developing validated examination procedures for the exclusion confounding factors during the identification of fibrosis and NASH.

Efficient shear wave excitation by our vibration bed allows surface based examinations of deep tissue regions which are difficult to access by other elastography methods. For example, THED of the liver was 100 % successful in obese patients (BMI > 30) and patients with ascites.

Furthermore, pilot studies demonstrated that THED can be applied to the native kidney, prostate, uterus, pancreas, heart aorta, and even the brain.

THED research is a collaboration of the Charité Universitätsmedizin Berlin and GAMPT mbH in Merseburg/Germany.

Please contact Prof. Ingolf Sack at Charité Berlin for scientific questions and Dr. Anton Schlesinger at GAMPT mbH for purchase and support.

A demonstrations of THED research can easily be arranged in Merseburg or at our clinical partner in Berlin.

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