



**THE UNIVERSITY of TEXAS**

**HEALTH SCIENCE CENTER AT HOUSTON**

Office of Technology Management

**ELASTOGRAPHY: HIGHLY SENSITIVE ULTRASOUND IMAGING OF TISSUE ELASTICITY IN VIVO FOR DETECTION AND EVALUATION OF BREAST CANCER AND OTHER ELASTIC ABNORMALITIES**

Market: Market reports indicate that the ultrasound market in Europe was estimated at \$719.0 million in 2006, with growth expected to reach \$1 billion in 2013. Similarly, the ultrasound market in the United States was estimated at \$1.27 billion in 2003. With an estimated 31.2 million patient exams in 2004 conducted by traditional clinical ultrasound segments alone, in addition to the recent adoption of ultrasound imaging by new user groups including surgeons, anesthesiologists, and emergency physicians, the ultrasound market is expected to continue to spur rapid new growth.

Current Problems: It is well known that tissue elasticity is correlated with pathology. This fact forms the basis for palpation, which is routinely used in the clinic. The drawbacks of manual palpation are low sensitivity, specificity and limited size and depth of the palpable pathology.

The Technology: Researchers at the University of Texas Health Science Center at Houston (UTHSC-H) pioneered the use of ultrasonics for imaging the elastic properties of tissues in vivo. This method is known as Elastography, and the strain image produced is known as an Elastogram, signified by pairs of echo RF signals acquired immediately before and after the application of a slight axial compression to the tissue. Segments of the echo signals are analyzed pairwise and local axial tissue displacements are estimated. The axial gradient of the displacement is computed. An image of this displacement gradient is then produced. This method allows imaging of small, deep hard or soft tumors and other pathologies, as well as normal elastic structure of various tissues. UT researchers have constructed an apparatus for practicing elastography in the breast, allowing for a direct comparison between sonograms and elastograms of a given anatomical site. They have demonstrated that: (1) elastograms convey new information, and thus the elastographic appearance of breast tumors is different than their sonographic appearance; and (2) it is possible to elastographically visualize known breast cancers which are poorly visualized or not visualized in sonograms.

**NON-CONFIDENTIAL TECHNOLOGY DESCRIPTION**

The preceding is intended to be a non-confidential summary of a novel technology created at the University of Texas Health Science center at Houston (UTHSCH), for which the University has obtained patent protection.

**UTHSC-H Ref. No.:** 1990-0001; 1993-0002; 1998-0009; 1999-0005; 2002-0005

**Inventors:** Dr. Jonathan Ophir

**Patent Status:** Issued U.S. Patent Nos.: 4,878,500; 4,993,416; 5,107,837; 5,143,070; 5,178,147; 5,247,937; 5,293,870; 5,474,070, 6,270,459; 6,494,834; 6,687,625

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Selected Publications: *Ultrasonic Imaging*, Ophir et. al.:1991, 13(2); 1993, 15(2); 1996, 18(3); 1997, 19(2); 1999, 21(3); 2003, (29)7; *Ultrasound Med Biol*, Ophir et. al.: 1998, 24(8); 1999, 25(4); 1999, 25(7); *Phys Med Biol*, Ophir et. al., 2000, 45(6); *J Acoust Soc Am*, Ophir et. al., 2002, 111(1 Pt 1); C. R. Acad. Sci. Paris, 2001, t. 2, Série IV.

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