Methodology of Elasto-Mammography

Tech ID: 18779 / UC Case 2006-605-0

BACKGROUND

It has been well recognized that the tissue stiffness plays an important role for diagnosis of breast cancers, as tumors are stiffer than the surrounding breast tissues, and malignant tumors are much stiffer than benign ones. In other words, in vivo identification of the elastic moduli of normal and abnormal breast tissues, which describe the stiffness, should improve the accuracy for breast-cancer diagnosis. There have been elastography studies based on either ultrasound or MRI breast imaging.

Magnetic resonance elastography (MRE) as the second-generation elastography modality was developed by several research groups. MRE is able to produce sufficient spatial and contrast resolution. It is, however, at a high cost of the MR imaging procedure, and not generally applicable to all the patients. Further, the penetration depth of shear waves within organic tissue is limited to only a few centimeters. Due to a large frequency-dependent attenuation, only low-frequency waves of about 50-100 Hz are feasible. This limits the spatial resolution and the achievable detectability of small lesions.

TECHNOLOGY DESCRIPTION

Current imaging modalities, such as X-ray mammography, ultrasound, and MRI, are not quite specific in terms of tumor benignity and malignancy. The development of the novel imaging modality, elasto-mammography, has the potential to characterize and differentiate breast cancers from benign and normal tissues through the modulus elastograms based on conventional mammographs. It provides higher specificity than the conventional mammography on its own for breast cancer diagnosis. The development is based on that the elastic responses of lesion masses are significantly different from those of the surrounding tissues. At little additional hardware cost, the methodology of elasto-mammography enables to generate the elastic modulus mammograms informative to identify and characterize the breast masses with improved specificity.

In preliminary studies, displacement and geometry measured from deformed and undeformed mammography projections are applied as input data to reconstruct the isotropic material parameters for normal breast tissue and tumor. The simulations demonstrate that unique and accurate results can be obtained using information extracted from only two sets of projections. Displacement noise, geometry mismatch, and material contrast ratio do not adversely affect the results, demonstrating that the method is stable and robust.

APPLICATIONS

This noninvasive, cost-effective methodology, elasto-mammography, is established as a unique and robust new tool for characterization, differentiation, and follow-up of breast cancers. The technique can be easily implemented on a desktop computer, which can be immediately coupled with any digital mammography device. Hence, the healthcare benefits would be enormous.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,010,176	08/30/2011	2006-605

CONTACT

Alvin Viray
aviray@uci.edu
tel: 949-824-3104.

OTHER INFORMATION

CATEGORIZED AS

- » **Imaging**
  - » Other
- » **Medical**
  - » Devices

RELATED CASES

2006-605-0

UCI Beall
Applied Innovation

5270 California Avenue / Irvine,CA
92697-7700 / Tel: 949.824.2683