Hand-Held Portable Low-Cost Scanner for Breast Cancer Detection

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Technology description

Background:
The incidence of breast cancer is rising rapidly worldwide. Globally, breast cancer is the most common cancer in women, representing one in four cases of all cancers among women. The imaging of breast tissue for early detection has improved the survival rate, reduced treatment costs, and lowered overall disease burden in these patients.
The clinical utility of current diagnostic imaging modalities has been limited due to high costs, inappropriate referrals for assessment, resolution, and tissue ionization. Two common imaging techniques, Computer Tomography (CT) and X-ray, require tissue irradiation and produce low contrast images in soft tissues. Likewise, ultrasound which utilizes acoustic properties of tissue, produces images with low contrast as a result of high levels of noise. Although techniques such as Magnetic Resonance Imaging (MRI) does not require tissue irradiation, the use of contrast agents, its expense and the fact that it can miss some cancers limit the use of this method as a first line approach. The above imaging techniques reconstruct tissue images based on different physical properties of tissue. Among the physical properties of tissues that have been insufficiently explored are the electrical properties for medical imaging. Electrical Impedance Tomography (EIT) is one method based upon electrical properties. This method requires an impractical number of electrodes for widespread clinical utilization while reliable EIT image reconstruction is very challenging. As such, most EIT applications are experimental and yet to be developed for clinical applications.
Description of Invention:
Unlike EIT, this inexpensive handheld device does not use discrete electrodes while it is designed to alleviate difficulties associated with image reconstruction, leading to reliable breast images. It produces four different images of tissue electrical conductance, capacitance, impedance and phase angle to detect breast masses for further investigation. Previous studies have shown that pathological growths such as tumors have significantly different capacitance and phase angle than healthy tissue. The handheld scanner was developed as a tool that could potentially identify breast malignancies based on the observation of altered electrical parameters in neoplastic tissue. This hypothesis was tested in pre-clinical phantom studies to validate the capacity of the scanner to detect anomalous inclusions, with promising results.
High PortabilitySafety: no radiation or contrast agents requiredLow-costEasy to use

Application area

· high portability
· safety: no radiation or contrast agent is required
Low cost,
· easy to use

Institution

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