Hand-held, Optical Probe-based Imaging System with 3D Tracking Facilities

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Field
- Breast Cancer Diagnosis & Prognosis
- Functional Brain Mapping
- Drug Deliver
- Detection of tissue hemorrhages
- Lie detection

Technology
Non-invasive, portable tool for 3D body and tissue imaging

Key Features
- Non-invasive
- Portable
- Flexible imaging of tissue curvatures
- Simultaneous illumination and detection
- Coregistration facilities

Key Benefits
- Reduction in imaging time
- Portability and flexibility to image any tissue volume, shape, and size
- Hand-held based imager that can perform 3D tumor localization

Stage of Development
Prototype of the product is currently in developmental stage and in vivo studies are underway.

Patent Status
Applications submitted for hand-held device and coregistration capabilities.
Published patent application:
- WO/2008/039988

Background

Breast cancer affects one in every seven women and is the second largest cause of death in women in the United States. Early diagnosis of the disease is critically important in reducing breast cancer mortality rates. Optical imaging is an emerging tool that offers non-invasive, non-ionizing, inexpensive method for providing optical contrast between disease and normal tissues. Specifically, the minimal absorption of the near-infrared optical signals makes them attractive towards deep tissue imaging applications.

An Improved Hand-Held Imaging System with Coregistration Facilities

The Optical Imaging Laboratory of the Department of Biomedical Engineering at Florida International University is currently developing a novel hand-held based optical imager with capabilities of automated co-registration on any tissue volume and curvature for real time surface imaging. Furthermore, the implementation of user-friendly coregistration software provides a method for performing 3D tomography studies using the hand-held device. The unique features of the hand-held probe design are its ability to simultaneously illuminate the tissue phantom at multiple point locations, flex the probe into any tissue shape, image a wide range of tissue volumes, and automatically locate and track the 3D location of the probe on any given tissue with precision.

Significance

Development of this hand-held based optical imaging system will expedite in translating the technology from individual efforts of various research groups to a more standardized tool towards initial diagnostic studies in breast cancer. The hand-held probe can be used for optical imaging studies that both use and do not use external molecular markers. Additionally, the probe can easily adapt to other imaging applications, with least changes to the design. Many versions of hand-held optical probes have been developed to date, but the present invention is the first hand-held optical imaging system that not only performs 3D real-time imaging of curved tissue geometries, but can also provide 3D depth information by implementing 3D tomographic analysis to the obtained time-dependent reflectance and trans-illumination measurements. The imaging tool can be the first of its kind to be available in the clinical radiology setting to be used as a diagnostic tool towards looking below the skin, for applications not limited to cancer diagnosis, but any kind of body imaging, and at various stages of disease or abnormalities.

Opportunity

Florida International University is looking for a commercial partner well-positioned in the marketplace to both further develop and introduce this device and software technology.