Magellan HEALTHCARE®

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Advanced Imaging Digest

iSono Health wearable 3D breast ultrasound and radiomics

iSono Health wearable 3D breast ultrasound

The Food and Drug Administration recently approved, iSono Health wearable 3D breast ultrasound, an automated whole-breast ultrasound system and intuitive software for image acquisition and analysis. The 3D breast ultrasound unit can automatically scan and analyze an entire breast in under two minutes. This unique system does not require a trained sonographer and allows for 3D visualization of the breast tissue.

Breast ultrasound is a useful supplement to mammography to improve breast cancer detection in women with dense breasts. This system has the potential to improve breast cancer screening worldwide, especially in countries with limited resources. Currently, iSono Health is conducting prospective case studies to validate the deep learning software that aids clinicians in localization and classification of breast lesions. This up-and-coming technology made for point-of-care physicians should be watched by healthcare professionals as it could potentially be performed during an in-office visit by a breast surgeon or gynecologist.

Radiomics

While in its early stages, radiomics deals with the mining of quantitative textural information for tissue characterization from medical images in a specific region of interest (ROI) that is not visually detectable by radiologists using advanced mathematical analysis. Utilizing a mathematical analysis of the gray-scale pattern, spatial distribution of signal intensities, and pixel interrelationships in the ROI, radiomics can quantify underlying textural information on the images and has the potential to act as a “virtual biopsy.” Radiomics, in contradistinction to standard biopsies, can analyze the whole tumor (rather than a focal area) and can be applied at various time points for disease monitoring, offering potentially

Magellan Healthcare clinical leaders continually review imaging trends and needs in light of current medical concerns, available literature, and society and Centers for Disease Control and Prevention recommendations and guidelines. This document is a summary of our latest findings. Please consult references for detailed information.

important diagnostic information related to disease evolution. This diagnostic information can then be combined with other patient characteristics and other clinically available information to develop a more patient-tailored treatment approach. For example, research has shown radiomics analyses can distinguish prostate cancer from benign prostate tissue and even add information about prostate cancer aggressiveness. Radiomics in the evaluation of lung cancer and glioblastoma multiforme (a malignant tumor affecting the brain or spine) has demonstrated it can be an adjunct to assess patient prognosis.

How does the process work?

1. Images are acquired on standard imaging units (e.g., MRI, CT, positron emission tomography (PET)).
2. The radiologist analyzes the image and selects the ROI of the sample. (While most ROI identification is performed manually by a radiologist, it can be automated with segmentation software.)
3. Radiomic features of the ROI are extracted based on the texture and shape properties from the images. Lastly, mined data points are sorted (e.g., distinguishing malignant tumors from benign tumors, metastatic potential or survival expectations) into a report.

Radiomics can be applied to almost all imaging modalities, including radiographs, ultrasound, CT, MRI, and PET studies, and can integrate across modalities using the potential compounded additive value. Most of the work in radiomics has been in the oncology realm, but potentially can be applied to any disease. For example, in breast cancer, multiple studies have been conducted using radiomic analysis to differentiate between benign and malignant breast tumors, classify histological types of invasive breast cancer, and predict chemotherapy response in breast cancer patients. Additionally, several articles have detailed the use of radiomics to predict axillary lymph node metastases in breast cancer patients. Several small studies have explored radiomics in esophageal, prostate, and colorectal cancers, as well as differentiating malignant from benign adnexal lesions on MRI. As the field of radiomics matures, radiological reports will also evolve into mineable patient-specific imaging biomarkers, creating a tailored approach to patient care.

Magellan Healthcare will continue to monitor this field as it continues to evolve in both the oncologic and non-oncologic settings.

About the authors

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Dr. Khalid joined Magellan in 2014. As a board-certified diagnostic radiologist with a career spanning more than twenty years, he has a thorough understanding of the complexities of the U.S. healthcare system and current standards of care. In his current role, Dr. Khalid is involved in training new physicians, auditing, continuing education and policy development.

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Dr. Mazzie, a board-certified radiologist with over 19 years of experience, joined Magellan in 2014. He is a graduate of the New York Institute of Technology College of Osteopathic Medicine, where he is currently an associate professor of radiology.

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