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AI to support Breast Tomosynthesis Image Interpretation

Digital breast tomosynthesis (DBT) is increasingly used in breast cancer screening, as it increases sensitivity of mammography. Due to the large number of images, reading errors occur as well as an increase in reading time.

This is based on findings from a study on the “Impact of artificial intelligence support on accuracy and reading time in breast tomosynthesis image interpretation: a multi-reader multi-case study” published in the Journal of the European Society of Radiology.

The aim of the study was to established whether the accuracy of breast radiologists reading wide-angle DBT would increase if an AI support system was used. In addition, the impact on reading was evaluated. The stand-alone performance of the system was compared to that of the average radiologist to detect malignancies.

According to the report, a deep learning-based AI system enables users to increase the detection of breast cancer regarding overall accuracy and sensitivity at similar specificity, with shorter reading times. The improved accuracy compared well to previous evaluations with another AI program for narrow angle DBT. Improved sensitivity could help reduce the number of DBT screening false negatives, such as lesions being misdiagnosed or overlooked. Screening in sites that are often overlooked, as DBT is seen as too time intensive, may now benefit from the time-saving aspect. An overall improvement in the area under the receiver operating characteristic (ROC) curve (AUC) for all radiologists was observed, regardless of the time they dedicated to breast imaging in clinical practice.

An important finding is that functionality of the reading environment is an important factor based on observations of the largest reading time reduction for readers using a synthetic mammography (SM) for navigation. In other words, the largest reading time reduction can be achieved for the lowest exam-based AI scores, suggesting that readers were confident to spend less time on cases they deemed normal, despite the short time to understand the AI system.

Results showed that the AI system’s performance was equivalent to that of radiologists, which suggests that other implementation strategies should be explored, such as using AI for efficient triaging of the screening workload. This could include identifying a large group of normal exams with a high negative predictive value, alternative strategies such as single-reading when double-reading, or exclusion from radiologist evaluation.

Van Winkel pointed out that a limitation of the study was the use of a cancer-enriched dataset instead of a consecutively collected sample of screening mammograms from a clinical setting, which allowed the researcher to do a multi-reader evaluation with sufficient findings that would lead to useful conclusions. Therefore, it may not be fully representative of a real screening situation.

In conclusion, results from this study showed that radiologists improved detecting cancer in DBT examinations when using an AI support system and reducing time. Consequently, an AI reading support system could allow for more cost-effective screening with DBT in future.

Source: European Radiology

Image credit: iStock

Reference:

Van Winkel, SL et al. (2021) Impact of artificial intelligence support on accuracy and reading time in breast tomosynthesis image interpretation: a multi-reader multi-case study. Eur Radiol. Doi: 10.1007/s00330-021-07992-w

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