Abstract #14657

Title

Artificial intelligence-based breast density classifier improves mammography reporting reliability

Preferred Presentation Format
Oral Presentation
Topic
Breast
Support programme applications
none

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Purpose or Learning Objective

To demonstrate superior reliability of an AI-based tissue density classifier for mammography using an innovative semi-supervised learning (SSL) method which addresses reader variability, poor consistency of quantitative classifiers, and the complex issues in machine training based on the subjective assessment goals of BIRADS 5th-edition. The use of SSL removes human bias from the training of software.

Methods or Background

The AI-based density classifier (cmDensity™, CureMetrix.) is trained using SSL without explicit labeling, eliminating human bias. The classifier was compared to 7 MQSA qualified readers in 4-class (A-D) assessments using 792 mammograms from 3 institutions, 2 continents, and 3 vendors. Borderline exams between density classes were chosen to maximally test performance. Kappa (k) statistics at 95% confidence interval (CI) including intraclass correlation coefficient (ICC) were used for measuring inter-reader agreement, intra-reader reliability, and comparison with cmDensity. cmDensity's reliability was also tested using agreement across tomosynthesis images.

Results or Findings

The cmDensity agreement increased with degree of consensus (4/7 to 7/7 readers) (k=0.65,0.82,0.94,0.97). In cases with 100% reader consensus, there was near perfect agreement with cmDensity. The intra-reader reliability ranged from ICC=0.70-0.82 vs near perfect cmDensity reliability (ICC=0.99). Dense cases were correctly scored by cmDensity, despite variation in fibroglandular tissue (which is the downfall of non-AI based volumetry software). The density classifier showed high agreement in the tomosynthesis evaluation.

Conclusion

cmDensity shows higher reliability compared to radiologists in tissue density categorization and addresses the BIRADS 5th-edition subjective goal of reporting perceived masking effect of dense tissue. Benefits including reduced reporting variability, enhanced radiologist efficiency (including population of reports), and improved accuracy and consistency in communication of tissue density to clinicians and patients.

Limitations
A larger sample size could be useful.

Ethics committee approval
As a retrospective study, an IRB waiver was obtained.

Funding for this study
None.

Multicategories

Area of Interest
Artificial Intelligence, Breast, Computer applications

Imaging Technique
CAD, Mammography

Procedure
Computer Applications-Detection, diagnosis

Special Focus
Tissue characterisation

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