

#2457: Performance of radiologists versus a machine learning classifier for optoacoustic imaging of the breast

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Purpose

Our imaging device fuses laser optical imaging with grey-scale ultrasound (OA/US) to differentiate between benign and malignant masses of the breast. The study compared the performance of radiologists to a machine learning (ML) classifier.

Methods and materials

We used a subset of 1,585 masses from the PIONEER trial (USA, December 2012-September 2015) to train the ML classifier. The training set consisted of image feature scores that were assigned by 7 independent breast radiologists (5 ultrasound and 5 OA/US features), in addition to mass size, mass depth, patient age, and the mammogram BI-RADS category. We then tested the classifier using all 213 masses from the MAESTRO OA/US trial (Netherlands, March 2015-February 2016). Sensitivity, specificity, and AUC were calculated for both the radiologists and classifier predictions.

Results

The classifier's sensitivity was 97.0% versus 95.5% obtained by the radiologists. The classifier also outperformed the radiologists in specificity (55.5% vs 41.1%). AUC was 86.9% for the classifier and 83.1% for the radiologists. Partial AUC (over the sensitivity range 95.0% to 100%) was 73.9% (classifier) versus 61.0% (radiologists). Because the classifier and the radiologists use the same feature scores, the only difference between the classifier and the radiologist results is how those feature scores are combined into a final likelihood of malignancy score.

Conclusion

The ML classifier exceeds the performance of radiologists on new/external data. This indicates that the classifier might help radiologists improve their final OA/US assessment. The correct assignment of OA/US features is essential for an optimal classifier performance.

Limitations

The main limitations of our study were sample size and inclusion criteria of the Maestro trial. Only 213 BI-RADS 4A and 4B masses were included.

Ethics committee approval

n/a

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Author Disclosures:

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Assigned Session

Session no.: RPS 605b

Session title: Artificial intelligence and machine learning in breast cancer

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