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02) Machine Learning for Identifying the Value of Digital Breast Tomosynthesis using Data from a Multicentre Retrospective Study

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BACKGROUND

We sought to identify subgroups of women for whom digital breast tomosynthesis (DBT) showed improved diagnostic accuracy for different types of malignant lesions than 2D mammography. The study used multicenter retrospective data from 6,040 women (934 biopsy-confirmed cancers) who underwent both DBT and 2D mammography. An ensemble of 20 state-of-the-art machine learning models was created to predict biopsy outcomes based on radiological classification of 2D and DBT images, Volpara breast composition measures and age. We used this ensemble to assess the diagnostic accuracy of DBT- and 2D-based predictors, to identify subgroups of women for whom DBT is more informative, and to quantify the value of the individual predictors with respect to different types of malignant lesions.

EVALUATION

Accuracy and precision of DBT-based and 2D-based predictive models were evaluated using the area under receiver operating characteristic curve (AUC-ROC) and the area under precision-recall curve (AUC-PR), respectively. At the population level, DBT-based models significantly outperformed 2D-based models in terms of both AUC-ROC (0.943 ± 0.009 vs 0.915 ± 0.018) and AUC-PR (0.812 ± 0.042 vs 0.776 ± 0.051). The gains achieved by DBT-based models were superior in patient groups with fibroglandular volume ranging from 40 cm^3 - 80 cm^3, and in invasive lobular cancers compared to ductal tumours. The gain from DBT became insignificant for patients >60 years old or with fibroglandular volume exceeding 80 cm^3.

DISCUSSION

Using state-of-the-art machine learning techniques, we established that DBT mammography is significantly more informative than 2D mammography, especially for patients with moderate fibroglandular breast volume but was not advantageous in those women > 60 years or in those with dense breast volume >80cm^3. For both DBT and 2D imaging, our machine learning models lead to higher detection rates and fewer false alarms.

PURPOSE

** no data entered **

METHOD AND MATERIALS

** no data entered **

RESULTS

** no data entered **

CONCLUSION

Machine learning helps to identify subpopulations of women who benefit most from DBT, and can be used to design individualized screening.

CLINICAL RELEVANCE/APPLICATION

**** no data entered ****

FIGURE (OPTIONAL)

**** no data entered ****

Disclosures:

Nothing to disclose:	Ahmed Alaa
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Nothing to disclose:	Yuan Huang
Nothing to disclose:	Mihaela van der Schaar

Questions:

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