

Effect of radiologists' experience on breast cancer detection and localization using digital breast tomosynthesis

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Objective

To evaluate the diagnostic performance of adding 2-view digital breast tomosynthesis (DBT) to the standard 2-view digital mammography (DM) and also to evaluate the dependence of performance on reader experience with DBT.

Materials and Methods

A set of 50 cases (27 cancer, 23 normal) from patients who underwent both DBT and DM in the same exam were included in this study. The 2-view DBT and 2-view DM images were acquired with Hologic's Selenia[®] Dimensions[®] system. These cases were reviewed by 26 radiologists with varying level of experience with DBT (9 radiologists - no experience, 8 radiologists - workshop experience, and 8 radiologists - clinical experience). Images were interpreted in two modes: DM alone and then followed by a combined mode of DM + DBT. In both these modes, the task of the reader was to detect and localize breast lesions. The diagnostic performance of these readers using DM was compared with that using DM + DBT, and evaluated by area under receiver-operating characteristic curve (AUC), jackknife free-response receiver-operator characteristics figure of merit (JAFROC FOM), sensitivity, location sensitivity, and specificity.

Results

The results show that diagnostic performance using DM+DBT is significantly higher for all readers combined as compared to DM alone. The results also show that there is no significant difference in the performance metrics among the three groups of readers, for either DM alone or for DM + DBT.

| Metric | No DBT experience | | Workshop experience | | Clinical DBT experience | |
|-----------------------------|-------------------|--------|---------------------|--------|-------------------------|--------|
| | DM | DM+DBT | DM | DM+DBT | DM | DM+DBT |
| ROC AUC | 0.682 | 0.775 | 0.680 | 0.790 | 0.681 | 0.789 |
| Sensitivity | 0.630 | 0.704 | 0.630 | 0.704 | 0.649 | 0.704 |
| Specificity | 0.652 | 0.826 | 0.652 | 0.783 | 0.718 | 0.718 |
| Location Sensitivity | 0.484 | 0.547 | 0.453 | 0.594 | 0.469 | 0.563 |
| JAFROC FOM | 0.603 | 0.695 | 0.621 | 0.758 | 0.632 | 0.764 |

Conclusion

The authors conclude that the addition of DBT to DM improved radiologists' performance regardless of prior DBT experience; and both increased the number of cancers detected and led to more accurate localization of breast lesions.

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