Breast Cancer Detection Using Artificial Intelligence for Breast Tomosynthesis

Preliminary Diagnostic Accuracy at a Tertiary Breast Referral Centre: First Local Experience

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OBJECTIVES

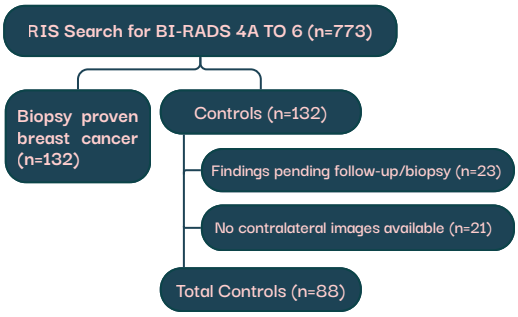
To evaluate the diagnostic accuracy of artificial intelligence (Lunit INSIGHT DBT v1.1.2.0) for breast cancer detection in breast tomosynthesis at a tertiary breast referral centre in Hong Kong.

METHODOLOGY

Study design and patient selection:
Retrospective search of Radiology Information System (RIS), from July 2023 to December 2024, for cases categorised as BI-RADS 4A to 6 that underwent breast tomosynthesis.

Patient Groups:
- Affected breasts with biopsy-proven breast cancer (n=132)
- Contralateral unaffected breasts (n=88)

Lunit INSIGHT DBT abnormality score:
- Threshold value set at 10 by manufacturer
- Low scores (<10) are not quantified (Considered as no suspicious area for breast cancer has been detected)
- Scores at or above the threshold are quantified numerically (10-100). Higher scores indicate a higher chance that a lesion is malignant.



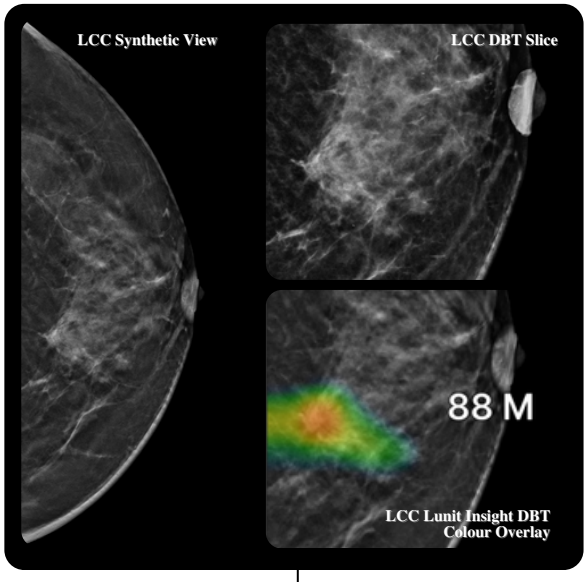
RESULTS

Statistic	Value	95% CI
Sensitivity	91.67%	(85.58% to 95.77%)
Specificity	94.32%	(87.24% to 98.13%)
Positive Likelihood Ratio	16.13	(6.88 to 37.85)
Negative Likelihood Ratio	0.09	(0.05 to 0.16)

DISCUSSION

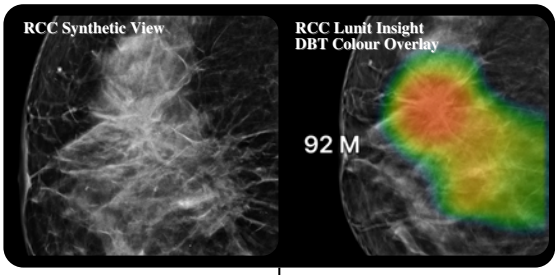
Results from this Hong Kong hospital cohort show high sensitivity (91.67%) and specificity (94.32%) for Lunit INSIGHT DBT v1.1.2.0, highlighting its potential to support and enhance breast cancer detection in breast tomosynthesis. It has demonstrated success in diagnostically challenging cases, such as detecting inconspicuous small masses, identifying the full extent of architectural distortions and detecting subtle global asymmetries. However, performance limitations, such as difficulties in detection of skin thickening, equal density masses, and inability to compare with prior imaging, suggest areas for improvement. Radiologists should remain aware of these constraints if utilising artificial intelligence to streamline workflows.

HEROES

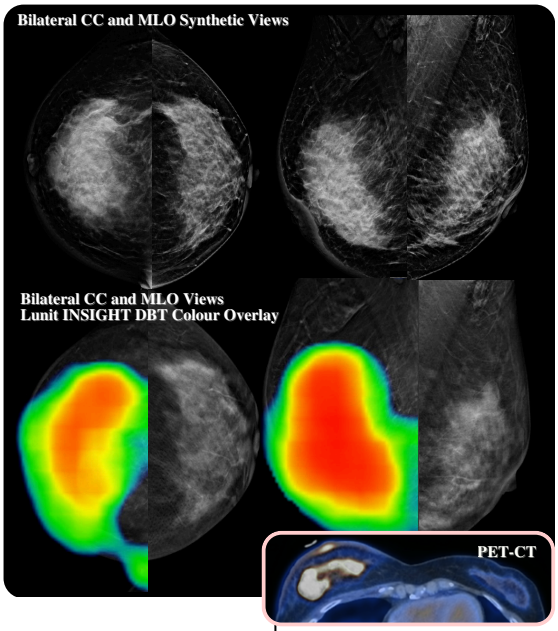


Detection of small masses. A subcentimeter irregular equal density mass with spiculated margins at posterior depth of inner left breast.
Pathology: **Invasive lobular carcinoma**
Lunit INSIGHT DBT abnormality score: 88

HEROES



Detection of architectural distortion. Architectural distortions at mid depth of outer right breast and posterior depth of central right breast. Pathology: **Invasive carcinoma**, no special type.
Lunit INSIGHT DBT abnormality score: 92

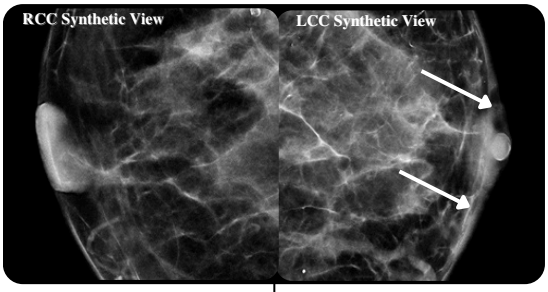


Detection of global asymmetry. Global asymmetry at right breast. Pathology: **Invasive carcinoma**, no special type.
Lunit INSIGHT DBT abnormality score: 97

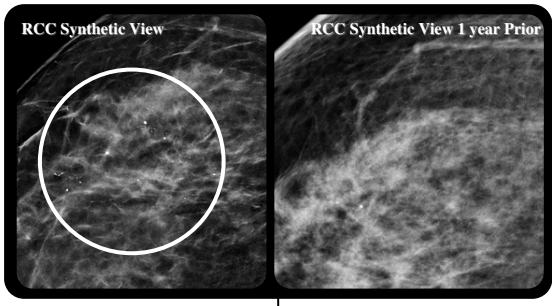
CONCLUSION

Artificial intelligence offers valuable support for breast tomosynthesis interpretation, achieving high diagnostic accuracy in this initial local study. While it demonstrates promise for improving breast cancer detection, especially in challenging cases, there remain hurdles in the integration of artificial intelligence systems into breast imaging workflows. Ongoing research and larger cohort analyses will be crucial to optimise its role and ensure effective application in Hong Kong's healthcare setting.

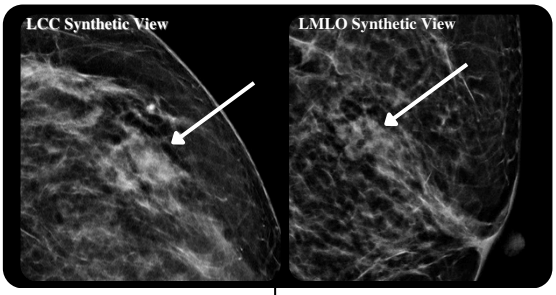
HURDLES



Detection of skin thickening. Periareolar skin thickening at left breast (arrow).
Pathology: **Invasive carcinoma**, no special type. Paget's disease of nipple.
Lunit INSIGHT DBT abnormality score: Low



Unable to perform comparison with previous images.
Interval increase in regional punctate, coarse heterogeneous and amorphous calcifications (circle).
Pathology: Apocrine **DCIS**, high grade.
Lunit INSIGHT DBT abnormality score: Low



Detection of equal density mass. Equal density mass with microlobulated margin at outer central left breast mid depth (arrows). Pathology: **Invasive carcinoma**, no special type.
Lunit INSIGHT DBT abnormality score: Low

REFERENCES

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