ALErT – Artificial Intelligent Lymph node Evaluation post-neoadjuvant Therapy for Breast Cancer: A Preliminary Cohort

Mary Hou[1,2], May Lynn Quan [1,3], Susan Isherwood[1], Michael Mah[3], Shuang Lu[3], Katherine Fleshner [4], Shangke Liu[2], Cameron Hoerig[2], Jonathan Mamou[2], Anne-Marie Brisson[1,3]

1. University of Calgary, Calgary, AB, Canada
2. Weill Cornell Medicine, New York, NY, United States
3. Alberta Health Services, Alberta, Canada
4. Cedars Sinai Medical Center, Los Angeles, CA, United States

THE PROBLEM

Neoadjuvant therapy can be used to downstage the axilla

Knowing whether pathologic complete response was achieved before surgery, changes the operation

Current axillary ultrasound gets it right **46.7%** of the time

WHAT WE DID

29 node-positive breast cancer patients undergoing neoadjuvant treatment in Alberta 2016–2021

Axilla imaged before and after treatment

Frozen ResNet-50 embeds each image

Model learns the difference, alone or with clinical features

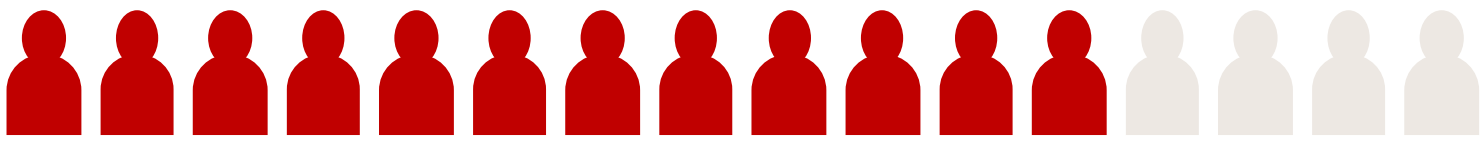
Ultrasound image change plus clinical data best predicted residual nodal disease after neoadjuvant therapy

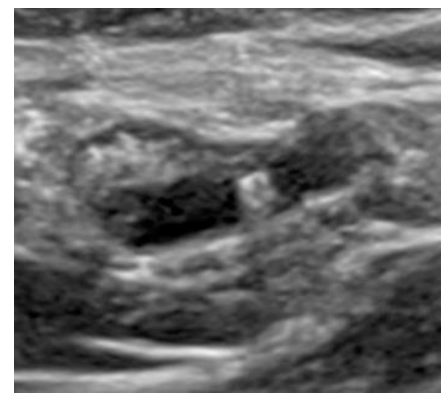
Of 16 patients who still had nodal disease at surgery, **how many were identified before the operation?**

Traditional Ultrasound Interpretation **3** of 16

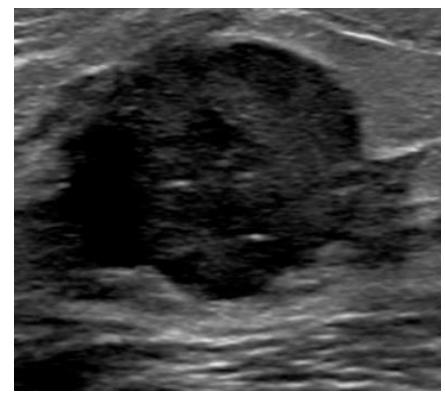


AI model Image + Clinical **12** of 16





Node with residual disease



Node with pathologic complete response

RESULTS

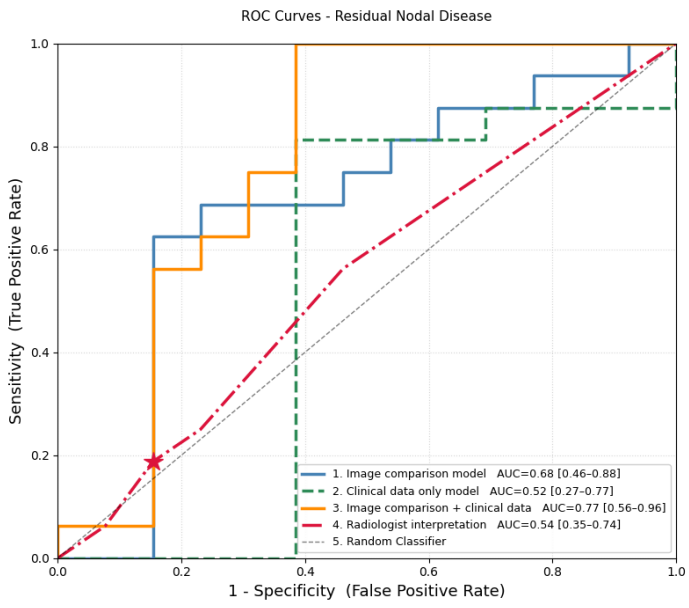


Figure 1. ROC curves, all models.

MODEL	AUC	95% CI	SENS	SPEC	ACC
Image comparison + clinical	**0.77**	**0.56-0.96**	**0.75**	**0.69**	**0.72**
Image comparison	0.68	0.46-0.88	0.81	0.46	0.66
Clinical data only	0.52	0.27-0.76	0.75	0.62	0.69
Radiology Interpretation	0.54	0.35-0.74	0.19	0.85	0.48

Image + clinical data model better identified residual disease compared to every other model, and radiology interpretation, whose **specificity was high (0.85) but sensitivity was 0.19**

WHAT IT MEANS

AI may extract clinically meaningful information from ultrasound images beyond conventional radiology methods

Limitation: Small cohort, wide confidence intervals — hypothesis-generating

Next steps: larger cohort, node segmentation, threshold tuning, external validation

Questions?
mary.hou@ucalgary.ca

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