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Comparative Predictive Utility of Oncotype DX and MammaPrint Using a Clinicopathologic Model in Matched HR+/HER2− Early Breast Cancer Cohorts: The BRAIN Study

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Background

- Oncotype DX (ODX) and MammaPrint (MMP) are widely used multigene assays guiding adjuvant chemotherapy.
- in patients with hormone receptor-positive (HR+), HER2-negative early breast cancer
- Despite similar clinical indications, these assays frequently yield discordant risk classifications.
- Direct head-to-head testing in the same patient is limited by cost and reimbursement constraints.

Aim

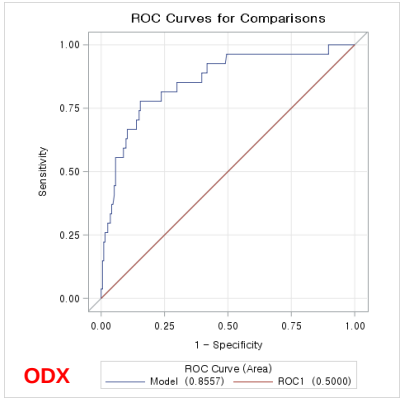
- To indirectly compare the predictive performance of ODX and MMP using a clinicopathologic model applied to matched cohorts.

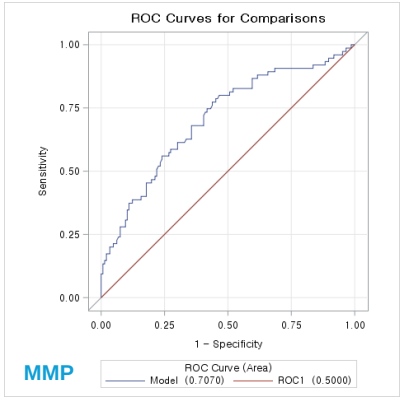
Methods

- Retrospective cohort of **2,542** HR+/HER2− early breast cancer patients
- ODX cohort: n = 2,011; MMP cohort: n = 531
- **1:1 matching** by age and nodal status to control key prognostic factors
- Risk classification compared between cohorts
- Tennessee nomogram applied to assess concordance with assay-defined risk
- ✓ Model performance was evaluated using the area under the receiver operating characteristic (**ROC**) curve (**AUC**), specificity, positive predictive value (**PPV**), and negative predictive value (**NPV**).

Results

- High-risk classification rates differed markedly between assays
  - ODX: 12.22% (8.21–17.28)
  - MMP: 33.94% (27.72–40.59)
- MMP classified nearly three times more patients as high-risk than ODX.
- Tennessee model performance differed by assay:
  - ➢ AUC for predicting high-risk ODX: 85.57 (77.49–93.65)
  - ➢ AUC for predicting high-risk MMP: 70.70 (63.32–78.08)
- Model specificity and NPV were higher in the ODX cohort:
  - ➢ ODX: 90.21% / 94.59%
  - ➢ MMP: 89.04% / 73.45%





Conclusion

- The clinicopathologic Tennessee model showed stronger alignment with ODX than with MMP.
- These findings suggest that ODX and MMP may capture distinct biological dimensions of tumor behavior.
- Multigene assays should not be considered interchangeable without understanding their underlying characteristics.
- Clinicopathologic and AI-based models may offer cost-effective tools for refining risk stratification.

Tennessee model

the **BR**east **A**rtificial **I**ntelligence **N**etwork (**BRAIN**)

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