Exploring Variations in AI-Based Breast Cancer Risk Prediction: An Analysis of Pathology and Receptor Types

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Background

❖Breast cancer, a leading cause of cancer death among women, exhibits diverse pathologies and receptor types, affecting prognosis and treatment.

❖AI algorithms have emerged as a promising tool in predicting breast cancer risk, potentially revolutionizing early detection and personalized treatment plans.

❖This study investigates the performance of a commercially available AI model in predicting risk across different breast cancer classifications.

Objective

❖To assess whether a commercially available image-based AI model predicts breast cancer risk differently across various breast cancer pathologies and receptor types.

Methods

❖Conducted a retrospective analysis of patients who had screening mammograms across a network of breast imaging clinics in 2021.

❖Clinical features and pathology reports collected for patients diagnosed with breast cancer.

❖AI risk scores analyzed from mammograms taken the year prior to diagnosis.

❖Statistical analysis performed using logistic regression in STATA software.

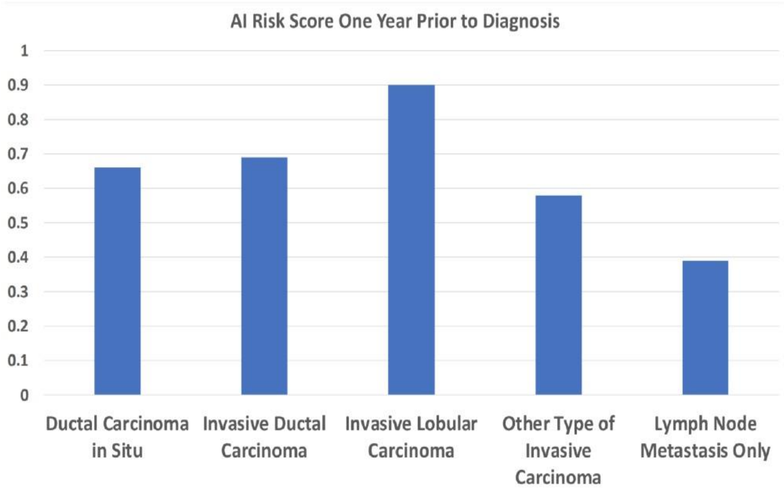
Results

❖Analyzed 790 patients, with an average age of 65±12 years.

❖Patient demographics included 73% white, 11% black, 9% Hispanic, 3% Asian, and 5% other or unknown races.

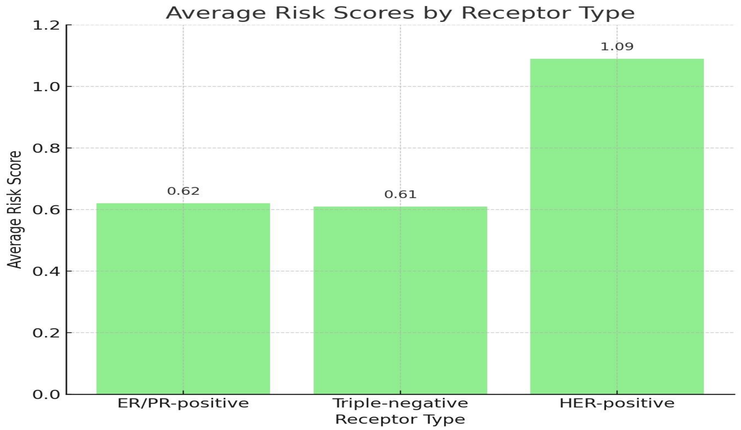
❖Cancer pathologies: 32% had ductal carcinoma in situ (DCIS), 58% had invasive ductal carcinoma, 7% had invasive lobular carcinoma, 2% had other types of invasive carcinoma, and 1% had lymph node metastasis only.

❖AI risk scores available for 506 patients: DCIS (0.66±0.56), invasive ductal carcinoma (0.69±0.54), invasive lobular carcinoma (0.90±0.46), other invasive carcinomas (0.58±0.51), lymph node metastasis only (0.3±0.17).



Results

❖Receptor status risk scores: ER and PR-positive cancers (0.62±0.46), triple-negative cancers (0.61±0.62), HER-positive cancers (1.09±0.60).



Conclusions

❖ The study revealed significant variations in AI-predicted breast cancer risk scores across different pathologies and receptor types, particularly noting higher scores for patients with invasive lobular carcinoma and HER-positive cancer.

❖ These findings underscore the potential for AI models to aid in developing more personalized screening and preventive strategies for breast cancer, thereby improving patient outcomes by tailoring care to individual risk profiles.