Long-term Breast Cancer Risk Prediction in Black Women: External Validation of a Mammography-driven AI Model

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Introduction

Despite the demonstrated potential of artificial intelligence (AI) in breast cancer risk assessment for personalizing screening recommendations, further validation is required regarding AI model bias and generalizability. We performed external validation in Black women of a mammography-driven AI breast cancer risk model (Mirai) originally developed on screening cohorts primarily consisting of White women. In this institutional review board-approved, Health Insurance Portability and Protection Act compliant and HIPAA compliant study, we retrospectively analyzed a case–control sample nested within the core academic breast cancer screening practice of BJC Healthcare, the hospital partner of Washington University in St. Louis. For the purposes of this validation study, relying on 2D digital mammography (DM) images, we focused on Black women presenting for annual DM screening (Selenia or Selenia Dimensions; Hologic) between 2008 and 2018. Eligible breast cancer cases were derived from all women with a breast cancer diagnosis (with associated biopsy-confirmed tumor pathology via institutional cancer registry) after negative (BI-RADS 1 or 2) DM screening 1 to 5 years prior to cancer diagnosis. We also identified a random sample of controls, defined as women who had negative (BI-RADS 1 or 2) DM screening, with 1 to 5 years of screening follow-up without a cancer diagnosis. A 5-year risk score for each DM exam was calculated via the Mirai model. Evaluation was performed using concordance-index (C) analyses and associated 95% CIs.

Results

A previously developed mammography-driven AI model showed moderate performance in long-term breast cancer risk assessment in a database of Black women only reporting BC risk subtype. Performance was lower compared to previously reported validation results from similar studies on predominantly White and racially diverse screening cohorts. Strengths: Focus on Black women. Limitations: Relatively small sample size. Single-site study. Discussion

Better methods to assess long-term breast cancer risk among Black women, who bear the highest disease burden, are urgently needed to develop precision screening and prevention approaches that reduce rather than exacerbate existing disparities. Our results suggest that further refinements are needed to more accurate long-term breast cancer risk assessment in Black women.

Methods & Materials

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References

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