# New AI method revolutionises mammogram analysis to predict breast cancer risk



Researchers at Washington University School of Medicine in St. Louis have developed a groundbreaking method for analysing mammograms that significantly enhances the ability to predict breast cancer risk, as reported in the December 5 issue of JCO Clinical Cancer Informatics. This innovative approach, powered by artificial intelligence, demonstrates a marked improvement over traditional methods based on clinical questionnaires, identifying individuals at high risk of developing breast cancer with an accuracy 2.3 times greater than the existing standard.

The senior author of the study, Graham A. Colditz, MD, DrPH, who serves as the associate director of the Siteman Cancer Center located at Barnes-Jewish Hospital, acknowledges the critical importance of early detection in successfully treating breast cancer. "We are seeking ways to improve early detection, since that increases the chances of successful treatment," he stated. This new predictive model could facilitate earlier screening, additional imaging, or even the use of risk-reducing medications for high-risk individuals.

The AI-driven analysis utilises data from up to three years of previous mammogram screenings to discern subtleties that may go unnoticed by even skilled radiologists. Lead author Shu (Joy) Jiang, Ph.D., highlighted the strength of the algorithm, explaining, "Our new method is able to detect subtle changes over time in repeated mammogram images that are not visible to the eye." Key indicators analysed by the algorithm include variations in breast density, texture, calcification, and asymmetry—all of which are crucial for understanding individual risk profiles.

For the research, the team trained the machine-learning model on mammograms taken from over 10,000 women who had undergone screenings at the Siteman Cancer Center between 2008 and 2012. These participants were closely monitored until 2020, during which time 478 were eventually diagnosed with breast cancer. The predictive power of the algorithm was further verified on a separate cohort of more than 18,000 women who had received mammograms at Emory University between 2013 and 2020, where 332 women were diagnosed during the follow-up period.

The findings revealed that women classified in the high-risk group were 21 times more likely to develop breast cancer within five years compared to those in the lowest-risk category. To illustrate this, within the high-risk group, 53 out of every 1,000 women screened were found to develop breast cancer over the subsequent five years. In stark contrast, just 2.6 women per 1,000 in the low-risk group received a diagnosis, thus underscoring the efficacy of the new AI method over its questionnaire-based predecessor, which had incorrectly classified many high-risk individuals.

Importantly, the algorithm's predictive accuracy was consistent across diverse demographic groups, including underrepresented populations, further enhancing its applicability in clinical settings. The research accounted for 27% of tested women being Black at Siteman and 42% at Emory, ensuring that the algorithm is not biased towards any particular race or ethnicity.

Looking forward, the researchers maintain their commitment to equity in healthcare technology, actively testing the algorithm on a variety of racial and ethnic backgrounds, including Asian and Native American populations. Work is ongoing with WashU's Office of Technology Management to secure patents and licensing for this method, with aspirations to make it universally available wherever mammogram screenings are conducted. Colditz and Jiang are also exploring the potential to establish a start-up focused on this technology, holding patents pending concerning the predictive capability of this innovative approach.

Source: [Noah Wire Services](https://www.noahwire.com)

## References

* <https://medicine.washu.edu/news/analyzing-multiple-mammograms-improves-breast-cancer-risk-prediction/> - Corroborates the development of a new method for analyzing mammograms to predict breast cancer risk, the involvement of Graham A. Colditz and Shu (Joy) Jiang, and the improved accuracy over traditional methods.
* <https://medicine.washu.edu/news/analyzing-multiple-mammograms-improves-breast-cancer-risk-prediction/> - Details the use of data from up to three years of previous mammogram screenings, the analysis of breast density, texture, calcification, and asymmetry, and the training of the machine-learning model.
* <https://medicine.washu.edu/news/analyzing-multiple-mammograms-improves-breast-cancer-risk-prediction/> - Provides information on the training and validation cohorts, including the number of women and breast cancer diagnoses, and the predictive power of the algorithm.
* <https://medicine.washu.edu/news/analyzing-multiple-mammograms-improves-breast-cancer-risk-prediction/> - Explains the findings on the high-risk group's likelihood of developing breast cancer and the comparison with the questionnaire-based method.
* <https://medicine.washu.edu/news/analyzing-multiple-mammograms-improves-breast-cancer-risk-prediction/> - Discusses the algorithm's predictive accuracy across diverse demographic groups and the representation of underrepresented populations.
* <https://medicine.washu.edu/news/analyzing-multiple-mammograms-improves-breast-cancer-risk-prediction/> - Mentions the ongoing work to ensure equity in healthcare technology and the plans for patenting and licensing the method.
* <https://www.rsna.org/news/2023/august/models-improve-breast-cancer-risk-assessment> - Supports the concept of using AI for breast cancer risk assessment, including the analysis of mammographic texture and the combination of AI models for improved accuracy.
* <https://www.rsna.org/news/2023/august/models-improve-breast-cancer-risk-assessment> - Corroborates the idea that AI can improve early detection and reduce the workload in screening clinics by assessing risk quickly and accurately.
* <https://pubmed.ncbi.nlm.nih.gov/38124111/> - Provides additional context on the accuracy and feasibility of AI in breast cancer detection, including sensitivity, specificity, and the detection of interval cancers.
* <https://medicine.washu.edu/news/ai-assisted-breast-cancer-screening-may-reduce-unnecessary-testing/> - Supports the use of AI in breast cancer screening to reduce unnecessary testing and improve the efficiency of radiologists' evaluations.
* <https://oncology.wustl.edu/patient-care/cancer-programs/breast-cancer-program/> - Provides background on Washington University's Breast Cancer Program and its focus on innovative treatments and personalized care, which aligns with the broader context of the research.
* <https://medicalxpress.com/news/2024-12-algorithm-multiple-mammograms-breast-cancer.html> - Please view link - unable to able to access data