How Accurate Is AI in Detecting Breast Cancer on Mammograms?

Rasit Dinc

Rasit Dinc Digital Health & AI Research

Published: February 14, 2018 | AI in Medical Imaging and Diagnostics

DOI: 10.5281/zenodo.17998929

Abstract

Breast cancer remains a significant global health concern, and early detection is paramount to improving patient outcomes. Mammography has long been the corn...

How Accurate Is AI in Detecting Breast Cancer on Mammograms?

By Rasit Dinc

Breast cancer remains a significant global health concern, and early detection is paramount to improving patient outcomes. Mammography has long been the cornerstone of breast cancer screening, but its interpretation can be challenging, leading to both false positives and false negatives. In recent years, artificial intelligence (AI) has emerged as a powerful tool to augment the capabilities of radiologists and enhance the accuracy of breast cancer detection. This article explores the current state of AI in mammography, focusing on its accuracy and potential to revolutionize breast cancer screening.

The Role of AI in Mammography

AI algorithms, particularly deep learning models, are trained on vast datasets of mammograms to recognize patterns associated with breast cancer. These AI systems can be used in various ways, from acting as a second reader to triaging cases and highlighting suspicious areas for radiologists to review. The most common application is computer-aided detection (CAD), where the AI system assists the radiologist in their interpretation of the mammogram.

Improving Detection Rates with AI

A recent prospective multicenter cohort study, the AI-STREAM trial, provided compelling evidence for the benefits of AI-assisted mammography [1]. The study, which included over 24,000 women in South Korea, found that radiologists using an AI-based CAD system had a significantly higher cancer detection rate (CDR) compared to those who did not use AI. Specifically, the

CDR was 13.8% higher with AI assistance, without an increase in the recall rate, which is the rate at which women are called back for further testing.

The study also revealed that AI was particularly effective in detecting smaller tumors and both ductal carcinoma in situ (DCIS) and invasive cancers. This suggests that AI can help detect cancers at an earlier, more treatable stage. The ability of AI to improve detection rates without increasing the number of false positives is a crucial advantage, as it can reduce patient anxiety and unnecessary procedures.

Detecting Interval Cancers

Interval cancers, which are cancers diagnosed between regular screening appointments, represent a significant challenge in breast cancer screening. These cancers are often more aggressive and have a poorer prognosis. A 2024 study published in *Radiology* investigated the accuracy of an AI system in detecting interval cancers on screening mammograms that were initially interpreted as normal [2].

The study found that a standalone AI system was able to correctly identify a significant portion of interval cancers that were missed by two human readers. At a high specificity of 96%, the AI algorithm flagged 23.5% of the interval cancers, correctly localizing the cancer in 76.9% of those cases. The AI system was more effective at detecting higher-grade and node-positive cancers, which are typically more aggressive.

These findings suggest that AI has the potential to act as a safety net, catching cancers that might otherwise be missed during routine screening. By identifying these interval cancers earlier, AI could lead to improved patient outcomes.

Limitations and Future Directions

Despite the promising results, it is important to acknowledge the limitations of current AI technology. The performance of AI algorithms can be affected by the diversity of the training data, and there is a need for more research on how these systems perform in different populations. Additionally, the integration of AI into clinical workflows requires careful consideration and validation.

The future of AI in breast imaging is bright. As algorithms become more sophisticated and are trained on larger and more diverse datasets, their accuracy is likely to improve further. The development of AI systems that can predict a woman's future risk of breast cancer based on her mammogram is also an exciting area of research.

Conclusion

Artificial intelligence is already making a significant impact on breast cancer detection. Studies have shown that AI can improve cancer detection rates, help identify interval cancers, and assist radiologists in their interpretation of mammograms. While challenges remain, the continued development and integration of AI into breast cancer screening programs hold the promise of

earlier detection, improved accuracy, and ultimately, better outcomes for patients.

References

[1] Chang, YW., Ryu, JK., An, JK. et al. Artificial intelligence for breast cancer screening in mammography (AI-STREAM): preliminary analysis of a prospective multicenter cohort study. *Nat Commun* **16**, 2248 (2025). https://doi.org/10.1038/s41467-025-57469-3

[2] Nanaa, M. et al. Accuracy of an Artificial Intelligence System for Interval Breast Cancer Detection at Screening Mammography. *Radiology* **312**, 2 (2024). https://doi.org/10.1148/radiol.232303
