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1121 – Advances in breast cancer screening: the role of artificial intelligence

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Breast cancer is the most common malignancy among women worldwide, and imaging screening is the main method for early detection. Despite technological advances, limitations such as interobserver variability and high false-positive rates remain. In this context, artificial intelligence (AI) and computer-aided analysis have emerged as promising tools to improve the diagnosis of breast lesions. This systematic review followed PRISMA 2020. A PubMed search was conducted using MeSH terms related to breast cancer screening and artificial intelligence. Thirty-three studies were identified, and 21 were included after screening. Original available studies assessing the diagnostic performance of AI were included, and the data were analyzed descriptively. Previous research showed that a neural network trained on 3,029 MRI scans from high-risk patients predicted cancer up to one year before diagnosis, with an AUC-ROC of 0.72 (95%CI). Prior studies also compared visual assessment, manual region of interest, and computer-aided detection in MRI across 469 lesions and found equivalent accuracy, indicating no diagnostic loss with automated systems. In mammography, another study reported that a simplified neural network applied to 1,288 cases achieved an AUC-ROC of 0.89, significantly outperforming the clinical impression, with a false-negative rate of only 0.5% among benign cases. At the population level, a cohort of more than 109,000 mammograms showed that an algorithm outperformed five expert radiologists, with a 14.2% increase in sensitivity. The analyzed studies demonstrated that AI can achieve diagnostic accuracy comparable or superior to that of radiologists in breast cancer screening. Its potential for early detection and as a tool for double reading is notable. However, the studies also had limitations, including single- or few-center samples and the lack of real-world testing.

Ethics: Public data – Literature review.

Keywords: breast neoplasms; diagnosis; early detection of cancer; artificial intelligence.