

# Artificial Intelligence Mammography: What Role Does It Play in Breast Cancer?

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## Commentary

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### ABOUT THE STUDY

Mammography also known as mastography is a diagnostic and screening procedure that involves employing low-energy X-rays (typically approximately 30 kVp) to inspect the human breast. Mammography is a technique for identifying and diagnosing breast cancer in its early stages. Mammograms, like other X-rays, employ ionizing radiation to make images. The photos are then examined for any abnormalities. X-rays of a lower energy, such as Mo (K-shell X-ray energies of 17.5 and 19.6 keV) and Rh (20.2 and 22.7 keV), are commonly utilized instead of those used for bone radiography. Mammography is supplemented with ultrasound, ductography, Positron Emission Mammography (PEM), and Magnetic Resonance Imaging (MRI). Ultrasound is commonly used to evaluate masses discovered on mammography or palpable tumour that are not seen on mammograms.

When the mammography is non-diagnostic, some institutions still utilize ductograms to evaluate bloody nipple discharge. MRI can be used to confirm suspicious results, as well as for pre-surgical screening in patients with established breast cancer to detect new lesions that could modify the surgical approach, such as from breast-conserving lumpectomy to mastectomy.

The US Preventive Services Task Force advises mammography every two years between the ages of 50 and 74 for the average woman, stating that "the benefit of screening mammography outweighs the hazards by at least a moderate amount from age 50 to 74 years, and is greatest for women in their 60s." Starting at the age of 40, the American College of Radiology and the American Cancer Society suggest yearly screening mammography. Between the ages of 50 and 69, the Canadian Task Force on Preventive Health Care and the European Cancer Observatory recommend mammography every 2 to 3 years. In addition to unneeded surgery and worry, the hazards of more

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frequent mammograms, according to these task force recommendations, include a tiny but considerable increase in breast cancer caused by radiation.

Furthermore, mammograms should not be done more frequently in individuals who are having breast surgery, such as breast enlargement, mastopexy, or breast reduction. After 10 years of research, the Cochrane Collaboration determined that mammography screening had no effect on overall cancer mortality, including breast cancer, in studies with proper randomization.

Furthermore, due to false positive findings, more than 200 women will face significant psychological anguish, including anxiety and uncertainty, for years." The authors conclude that it is time to reconsider whether universal mammography screening for women of all ages should be recommended. They claim that universal screening is unlikely to be feasible. Mammography screening is no longer useful, according to the Nordic Cochrane Collection, which updated data in 2012 and stated that breakthroughs in diagnosis and therapy make it less effective today.

A ten percent false-negative rate is common in mammography. This is mainly because dense tissue conceals the malignancy and the appearance of cancer on mammography overlaps significantly with the appearance of normal tissue. According to a meta-analysis of programmes in nations with structured screening, 52 percent of patients are over diagnosed.

### Method

Using a specialist mammography unit, the breast is squeezed during the operation. By minimizing the thickness of tissue that X-rays must penetrate, decreasing the quantity of scattered radiation (scatter reduces image quality), lowering the needed radiation dose, and maintaining the breast motionless, parallel-plate compression improves image quality (preventing motion blur). Both head-to-foot (Craniocaudal, CC) and angled side-view (Mediolateral Oblique, MLO) pictures of the breast are taken during screening mammography. These and other views, such as geometrically magnified and spot-compressed views of the specific area of concern, may be included in diagnostic mammography. Deodorant, talcum powder, and lotion might appear as calcium spots on an X-ray; therefore women should avoid using these on the day of their checkup.

Screening mammograms and diagnostic mammograms are the two types of mammograms. Patients who appear with no symptoms are given a screening mammography, which consists of four routine X-ray pictures. Patients who have breast complaints, changes, or abnormal results on their screening mammograms should get a diagnostic mammography. Patients with breast implants, breast reductions, and personal and/or family histories of breast cancer are all given diagnostic mammography.

Mammography was traditionally done with screen-film cassettes until a few years ago. Digital mammography, also known as Full Field Digital Mammography, is a type of mammography that uses digital detectors (FFDM). In the United States, the FDA approved the first FFDM system in 2000. This advancement is a few years behind that of general radiology. This is attributable to a number of variables, including:

- (i) Mammography necessitates a better spatial resolution.
- (ii) The cost of the equipment has significantly increased.

The FDA is concerned that digital mammography equipment can detect breast cancers at least as well as screen-film mammography without raising the dose or the number of women recalled for further evaluation.

One (single reading) or two (double reading) qualified experts examine mammograms: these film readers are usually radiologists, although they could also be radiographers, radiotherapists, or breast clinicians (non-radiologist

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physicians specializing in breast disease). Double reading, which is popular in the UK but less so in the US, boosts the procedure's sensitivity and specificity greatly. Although clinical decision support systems can be employed with digital mammography (or digitized pictures from analogue mammography), research show that they do not increase performance much or only slightly.