Screening higher than general risk patients – how we do it?

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Breast cancer is the most common cancer among females worldwide, with increasing incidence and mortality.

Mammography is the primary screening tool for breast cancer detection. And the only screening modality proven to reduce breast cancer mortality in long-term. Based on a meta-analysis of randomized controlled trials reporting on population screening, offering mammography screening to women aged 50–70 reduces breast cancer mortality by 20% .

However, mammography sensitivity is limited by breast density and may miss up to 20% of underlying breast cancers. Over the past 2 decades, there has been growing interest in supplemental breast cancer screening to improve the sensitivity of screening mammography alone.

The screening recommendations are biennial screening mammography for average-risk women aged 50–69 years, extension up to 73 or 75 years, biennially, is a second priority, from 40–45 to 49 years, annually.

Breast density is associated with the risk of masking breast cancer. In addition, women with extremely dense breasts have an increased risk of developing breast cancer, 4–6 times as high as in women with almost entirely fatty breasts. Multiple studies aimed at reducing this negative effect by means of supplemental screening tools, such as manual or automated breast ultrasound.

Several studies have investigated supplemental ultrasound performance in women with extremely dense breasts. It has been shown that, on average, cancer detection increases by 2.3/1000 screens with ultrasound.

However, supplemental ultrasound to mammography, can improve the sensitivity of screening at the expense of decreased specificity. The additional ultrasound screening test associated with a substantial risk for false-positive results with increased need for follow-up imaging, and an increased rate of benign breast biopsies.

A large Dutch trial (the DENSE trial) investigating the use of supplemental screening MRI in women with extremely dense breasts demonstrated a reduction in interval cancers over a two-year study period (2.5 versus 5 breast cancers per 1000 screenings). Supplemental MRI detected an additional 16.5 cancers /1,000 screens in the first round.

With the accumulating data that women with dense breasts are underserved by screening with mammography or DBT alone, in 2022 EUSOBI published an update recommendation for this category of women (Breast cancer screening in women with extremely dense breasts - recommendations of the European Society of Breast Imaging (EUSOBI) (European Radiology (2022; 32:4036–4045).

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For women with extremely dense breasts, undergoing a mammogram at least once, at the start of screening, to establish the high breast density, and then contrast-enhanced breast MRI, either as a supplemental or stand-alone screening test, once every 2 to 4 years.

In addition, risk-based screening strategies are investigated. Among the commonly used models to calculate breast cancer risk is the Tyrer-Cuzick Breast Cancer Surveillance Consortium's Risk calculator (IBIS). High risk are considered women with a greater than 20% lifetime risk to develop breast cancer. Intensified screening regimens are recommended.

High-risk women include women who have a personal history of breast, ovarian, peritoneal, or fallopian tube cancer, certain genetic mutations (e.g., BRCA1 or BRCA2, TP53), or a history of previous radiotherapy to the chest between ages 10 and 30 are at high risk for developing breast cancer.

The screening recommendation for BRCA carriers is, from the age of 25, MRI performed yearly, in combination with mammography.

Another modality under investigation for supplemental screening is Contrast-enhanced mammography (CEM), a dual-energy technique that allows for acquisition of a low-energy (LE) image comparable to a mammogram and a high energy image, which combined with LE allows displaying contrast uptake following injection of an intravenous iodinated contrast agent. In the diagnostic setting, the sensitivity has been shown to be equivalent to MRI among women at increased risk of breast cancer, or dense breast.

In our institution, for the high risk BRCA carriers surveillance protocol is from age of 25 and includes semiannual breast imaging, with ultrasound alternating breast MRI up to the age of 30. From the age of 30, semiannual breast imaging is offered, which includes mammography alternating with breast MRI.

For high-risk women due to family history, personal history of breast cancer below 50 and dense breast, and risk assessment according to Tyrer-Cuzick (IBIS) above 20%, screening starts 10 years earlier than the first relative, including mammography and ultrasound alternating with MRI every 2-3 years.

In summary, in the future, screening for breasr cancer will move from one-size-fits-all to strategies more accurate and risk based. The accumulating data on the superiority of functional metabolic imaging over mammography, will be used. The main candidates are contrast-enhanced mammography and MRI.

In addition, combining AI systems will improve risk assessment for interval cancers and long-term cancers and will enable a better identification of women at high risk.