Using education to inform breast density conversations

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Introduction
Breast cancer remains the most common malignancy among women worldwide with more than 523,000 newly diagnosed cancers in Europe each year (after excluding skin cancers). According to the GLOBOCAN 2018 statistics, 137,707 deaths due to breast cancer have been recorded in Europe.

Mammography has been in use for over half a century and it remains the gold standard imaging modality for the early detection of breast cancer. According to randomised trials, a reduction in breast cancer mortality rate by 20% has been attributed to mammography screening. However, the performance of mammography is adversely affected by breast density and the reduction in mortality mediated by mammography is considerably lower in women with dense breasts compared to those with fatty breasts. X-ray attenuation is very similar between the dense tissue and non-calcified cancers that both appear white on mammography and therefore dense breast tissue can hide cancer.

Implications of breast density

The more epithelial (glandular) and stromal (fibrous) tissue relative to fatty tissue in the breast, the greater the breast density. The latest American College of Radiologists (ACR) Breast Imaging – Reporting and Data System (BI-RADS) lexicon includes description of the visual estimation of fibroglandular density performed by radiologists as one of the four categories (figure 1). Although having dense breasts is a normal condition that is seen in almost half of women aged 40-74 years, it is associated with a two to six-fold higher likelihood of developing breast cancer, with the risk increasing with increasing breast density.

About half of breast cancers contain calcifications and those are well seen in any breast density. However, in women with dense breasts, non-calcified cancers may be hidden by the dense tissue, a fact that significantly reduces the sensitivity of mammography. This ‘masking’ (figure 2) increases the likelihood of interval cancers. Interval cancers are those cancers diagnosed after a negative/normal screening mammogram and before the next recommended screen, i.e between recommended screening rounds (every three years in the UK). Interval cancers usually present as a palpable lump and tend to present with lymph node involvement and overall worse outcomes.

Understanding breast density implications is important to a woman’s breast health. Most women are unaware of their own breast density and its associated risks. Women are often disappointed to learn that a “negative”, “benign” or “normal” mammogram result does not necessarily exclude presence of a cancer, nor that mammograms miss approximately 40% of cancers present in extremely dense breasts.

Additionally, important knowledge gaps exist about breast density, breast cancer risk assessment and screening among technologists and radiologists. In various screening programmes, including the UK, radiographers/technologists perform the mammogram, and sometimes have only limited knowledge about breast density. If a woman wishes to ask questions, there may not be access to a radiologist, and technologists might not be ‘density-informed’ enough to be able to respond.

Figure 1
Examples of the four categories of breast composition. (A) The breast is entirely fatty. (B) Scattered areas of fibroglandular density. (C) The breast is heterogeneously dense, which may obscure small masses. (D) The breast is extremely dense, which lowers the sensitivity of mammography. Heterogeneously dense or extremely dense breasts are considered ‘dense’.
Supplemental screening beyond mammography in women with dense breasts

In a recent review, Dr Athina Vourtsis and Dr Wendie Berg highlighted the implications of breast density and the positive impact of supplemental screening. Supplemental screening with other modalities beyond standard mammography, such as digital breast tomosynthesis (DBT), hand-held ultrasound (HHUS), automated breast ultrasound (AUS), MRI, contrast-enhanced spectral mammography (CESM), and molecular breast imaging (MBI), have been shown to improve detection of invasive breast cancer at an early stage before it has spread to lymph nodes.

DBT is a mammographic modality that was Food and Drug Administration approved in 2011. During DBT image acquisition, the x-ray tube rotates over the compressed breast in an arc, producing a set of low dose images from various angles, and a reconstruction algorithm combines these images into thin (usually 1mm) slices. While DBT improves detection of non-calcified masses and cancerous distortions, there is little benefit (if any) in women with extremely dense breasts, and cancers can remain hidden even when breasts are less dense.

HHUS is a supplemental breast cancer screening modality that uses ultrasound waves to form images of the breast. Recent technological advancements provide high quality, low cost examinations, without the requirement of intravenous contrast or exposure to ionising radiation. Various prospective studies have shown that addition of ultrasound to mammography in women with dense breasts increases breast cancer detection rates by 1.8-4.6 cancers per 1,000 women screened. More importantly, cancers detected only with HHUS were >85% node negative, with a significant decrease in interval cancer rates in women with dense breasts. AUS is a newer ultrasound system that addresses some of the limitations of HHUS, by providing reproducible examinations with performance comparable to HHUS, operator independence and large field of view images.

There is a continuous discussion on false positive results with HHUS and AUS; recall rates equal to 7.6%, 7.5% and 10.6% have been reported in physician-performed HHUS, technologist-performed HHUS and AUS, respectively. Recalls from AUS are usually evaluated with HHUS and interpretation of AUS entails assessment of numerous images. Computer-aided detection and diagnosis software has been developed that has been FDA approved for AUS, with the aim to reduce interpretation time.

Contrast-enhanced MRI does not use ionising radiation and cancer detection is not affected by breast tissue composition. However, MRI requires intravenous injection of gadolinium-based contrast as cancers are seen mostly because of contrast enhancement (due to increased and leaky blood supply compared to normal tissues). Gadolinium has been shown to accumulate in regions of the brain but with out adverse effects. However, further research is ongoing in this issue. Breast MRI has been endorsed by various scientific societies globally in guidelines for screening women at high risk of breast cancer (lifetime risk of developing the disease 20-25% or higher).

In the Netherlands, a randomised, multicentre controlled study, the Dutch Dense Tissue and Early Breast Neoplasm Screening (DENSE) trial, recruited women with extremely dense breasts and showed that biennial supplemental MRI versus mammography alone was associated with an increase in cancer detection rate of 16.5 per 1,000 screens, with a significant reduction in interval cancers during a two-year screening period and a false positive rate of 79.8 per 1,000 screenings.

MBI requires intravenous administration of the radio-tracer 99mTc-sestamibi. Currently, it has been considered a supplemental screening option for women at high risk and for women with dense breasts when MRI is not available or contraindicated. Enthusiasm for use of MBI is reduced due to whole body radiation exposure and the minimum 40-minute examination time as well as limited direct biopsy capability.

CESM could be a potential alternative for screening high risk women and potentially women with dense breasts, when MRI cannot be performed for various reasons. CESM uses intravenous injection of iodinated contrast as is used in CT scans and the examination approximately doubles the radiation exposure of a standard mammogram.

Current screening approach in Europe and the USA

In Europe, there are diverse screening approaches across various countries. Currently, as per the UK national screening guidelines, asymptomatic women with dense breasts are screened solely with mammography. Information on breast density is not included in the standard mammography report nor in the results letter sent to women. Breast density is, however, among other factors included in the risk stratification Predicting the Risk of Cancer at Screening (PROCAS) studies.

France and Austria, uniquely, have different screening approaches from other population-based programmes in Europe. Since 2011 in Austria, and for many years in France, breast ultrasound has been offered routinely in addition to mammography in women with dense breasts (category C/D, see figure 1). In a four-year audit published in...
In the USA, 38 states and the District of Columbia have passed legislation that requires the woman to receive some information about breast density implications and some require inclusion of a woman’s own breast density in the results letter after a screening mammogram. To address the increased need for medically sourced information in the context of USA ‘density-inform’ laws, DenseBreast-Info.org (DB-I) has been established to provide related information for both healthcare professionals and patients. The website (figure 3) is recognised as the most up-to-date, comprehensive online educational resource on the topic of breast density.

In 2018, DenseBreast-Info/Europe and the European Breast Density Educational Coalition was launched and attracted international media coverage. Europe-specific content has been developed to meet the needs of European healthcare providers through the collaborative input of European breast imaging experts.

DB-I’s European liaison Dr Vourtsis leads the coalition and serves as one of the 19 breast imaging radiologist ambassadors from 15 countries. Cheryl Cruwys, a patient-advocate instrumental in breast density education in the UK, serves as the European education coordinator. The recently expanded website provides a dense breast primer, a map (figure 4) featuring a comparative analysis of country-specific European national breast screening guidelines, comprehensive FAQs with citations, explanation of screening technologies, a risk model tutorial, an easy-to-follow screening flowchart and, for patients, fact sheets available in multiple languages. On a regular basis, the DB-I team reaches out to a growing list of breast experts in Europe who provide information on density-related research, studies, articles and new website content/tools.

Continuous education of clinical providers and improvement of their communication skills are essential in enabling women to make informed decisions about breast density and the potential beneficial effects of supplemental screening. A CME programme has been developed (with credit designation through the European Accreditation Council for CME): Breast Density Matters, Why It Matters. Organisations linking to DenseBreast-info.org resources include The Royal Society and College of Radiographers (UK), the European Society of Radiology Radiographer Societies, the Society and College of Radiographers (UK), the European Society of Radiology (Patient Advisory Group, Vienna), ecancer.org and leading research charity Prevent Breast Cancer.

Conclusions

Overall, supplemental breast cancer screening tools have the potential to improve breast cancer detection in women with dense breasts. Currently there is a lack of consistent screening guidelines and approach to incorporating breast density into screening considerations among European countries. In order to advance informed conversations, educational resources on the screening and risk implications of dense breast tissue are important. Educational resources can provide assistance to cover knowledge gaps about breast density, breast cancer risk assessment and screening among radiologists and healthcare providers. Continued development and refinement of targeted, medically sourced educational resources directed to radiologists may help patients receive accurate information. This should facilitate well-informed shared decision-making between patients and healthcare providers.

Dr Vourtsis comments: “In Greece, there is a lack of a national screening programme. Despite that, we feel that it is important to provide personalised breast assessment, which is tailored based on a woman’s needs. In recent years there has been an improvement in the knowledge of breast cancer risk factors, and it is obvious that one size does not fit all. I discuss with my patients the issue of breast density and the potential benefits of supplemental screening, because I believe it is important that they are aware of their breast composition and related options. Furthermore, patients should have access to this information, to make informed conversations and shared decisions.”

References

17. Nelson H D, O’Meara R S, Kerlikowske K et al. Factors associated with...