Annual Mammographic Screening Reduces the Risk of Interval or Higher Stage Invasive Breast Cancers: Lessons for Today and Tomorrow

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The Ontario Breast Screening Program (OBSP) aims to provide breast cancer screening for women ages 50-74 with biennial 2D digital mammography (DM). The target is asymptomatic women with no personal history of breast cancer. However, women with personal history of ovarian cancer, and/or family history of breast or ovarian cancer, are offered annual mammographic screening as they are at higher-than-average risk for developing breast cancer. Women with dense breast tissue (≥75%) are also offered annual screening as they are at higher-than-average risk for developing breast cancer, although a recent study found that sensitivity of mammography for cancer detection was equivalent to those screened biennially.1 Another recent study, which included women ages 40-74 with dense breasts, however, determined that annual screening resulted in significantly reduced interval cancer rate compared to those screened biennially.2 On the other hand, annual screening in women with family history of breast cancer and/or personal/family history of ovarian cancer demonstrated higher sensitivity for cancer detection and fewer interval cancers.3

This current work by Blackmore et al. further compared annual versus biennial screening based on the above-mentioned risk factors with regards to interval versus screen-detected or higher stage invasive breast cancers in post-menopausal women ages 50-74.4 The study evaluated a large cohort of 109 485 women who received annual screening and 457 159 women who received biennial DM screening. Their analysis included 4247 post-menopausal screen-detected and interval invasive cancers. The study found that annual screening for post-menopausal women with the above-mentioned family/personal history, specifically those 60-74 years of age, or for those not using estrogen, causes a statistically significant reduced risk of interval cancer compared to those screened biennially.5 Furthermore, women who are screened annually due to family/personal history, specifically those 60-74 years of age, also had a reduced risk of a stage II-IV versus stage I tumors compared to the cohort screened biennially.6

The findings of this study further reinforce the growing evidence supporting the utilization of risk-based breast cancer screening in post-menopausal women. The main benefits of annual screening include a reduced risk of interval cancers, which have relatively poor prognosis, and lower risk of higher stage (II-IV) cancers. These benefits justify the increased radiation exposure to patients who receive annual rather than biennial mammographic screening. As well, the added cost to the healthcare system can be easily rationalized, especially with the ability to detect more treatable, lower stage cancers.

In addition to addressing screening intervals, patient risk factors and breast density, future studies can further expand and explore the value of more advanced and/or supplemental breast cancer screening techniques, including 3D mammography (digital breast tomosynthesis [DBT]), contrast-enhanced mammography, screening breast ultrasound and breast MRI.4 These adjunct techniques may be helpful, especially in women with dense breast tissue, as increased breast density is associated with a higher risk of developing an interval breast cancer, as well as a higher risk of advanced stage disease, and has been found to decrease the accuracy of screening with standard 2D DM. The utilization of more advanced screening techniques will then assist in reducing the masking effect of increased breast density. The extent to which these advanced techniques are utilized should be stratified based on risk factors and breast density. This would ensure limiting additional radiation exposure and controlling healthcare expenditures.

For instance, a recent systematic review and meta-analysis compared the breast cancer detection rate (CDR), invasive CDR, recall rates and positive predictive value (PPV) of 2D DM alone, combined DBT and DM, combined DBT and synthetic 2D mammography, as well as DBT alone in breast cancer screening.5 The CDR, invasive CDR, and PPV was found to be highest with combined DBT/DM and combined

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DBT/synthetic mammography compared to DM alone. The recall rate was lowest in combined DBT/synthetic mammography. These findings suggest that there is a potential role for DBT with synthetic 2D mammography in breast cancer screening. This could be further studied in the context of stratification by risk-factors, breast density, estrogen use and menopausal status. The improved CDR and reduced recall rates may optimize radiation exposure and cost to the healthcare system.

Of note, while risk-based breast cancer screening can be achieved in a relatively objective manner, through identifying specific patient risk factors as outlined in this study, the utility of stratifying women by mammographic breast density should be further studied. As it stands, patients within the OBSP program are subjectively assigned a breast density ≥ 75% or <75% by the interpreting radiologist, which may confound the results of any study that takes into account mammographic breast density. Inter-observer and even intra-observer agreement of what truly constitutes a density ≥75% needs to be further evaluated. This limitation was acknowledged by the study authors. Alternatively, more automated objective techniques for determining breast density need to be introduced and utilized in order to be able to more accurately assess the true risks associated with higher mammographic breast density.

All in all, this study, with a large cohort of women undergoing DM breast cancer screening further adds to the evidence supporting risk-based stratification when it comes to breast cancer screening. Specifically, post-menopausal women with higher-than-average risk for developing breast cancer due to personal history of ovarian cancer, and/or family history of breast or ovarian cancer, should be offered annual mammographic screening.

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