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A systematic review and meta-analysis of differential detection by breast density for 3D mammography and 2D mammography in population-based breast screening

Tong L

The University of Sydney, Australia

Background and Aims: Detection measures for 3D mammography have been compared with 2D mammography in various population-screening settings, however there is limited evidence on 3D mammography's comparative performance by breast density. We examined whether 3D mammography (versus 2D) is detecting differentially in women with high- or low-density screens. Methods: This systematic review and meta-analysis searched six electronic databases from 2009 to 2020 to identify studies comparing 3D mammography and 2D mammography in women attending population-based screening, and reporting cancer detection rate (CDR; per 1,000 screens) and/or recall rate (percent) by breast density. Random effects meta-analysis was performed to pool incremental CDR and recall rate (3D versus 2D) for high and low density, and within-study absolute differences in incremental estimates between high and low density. Screening interval subgroups (biennial/annual) were compared. Results: We identified 565 studies; 13 studies were included, enrolling 522,846 3D mammography and 715,889 2D mammography participants. Pooled incremental CDR for 3D mammography (versus 2D) was 1.2/1,000 for low-density screens (95%CI: 0.7, 1.6; p<0.001; I2=40%) and 2.2/1,000 for high-density screens (95%CI: 1.4, 2.9; p<0.001; I2=43%). Pooled within-study difference in incremental CDR for high versus low density was 1.0/1000 screens (95%CI: 0.3, 1.6, p=0.003; I2=10%). For incremental recall rate, within-study differences between density strata differed by screening interval (p<0.001). Pooled incremental recall rate for 3D mammography was reduced in high- versus low-density screens (-0.9%; 95%CI: -1.4%, -0.4%; p<0.001; I2=61%) in annual screening, and greater (0.8%; 95%CI: 0.3, 1.3%, p=0.001; I2=9%) in biennial screening. Conclusions and Significance: Increase in CDR from 3D mammography (versus 2D) is greater in high- than low-density screens, whereas differential incremental recall by density depended on screening interval. The finding is timely and pertinent in the evolving landscape of breast screening that includes deliberation regarding adoption of 3D mammography, breast density notification, and large-scale trials of risk-stratified breast screening

Biography

Dr Li is an early career researcher with multidisciplinary background and skills, covering from health information management, medical imaging to public health. She is currently a Research Fellow in the Breast Cancer Clinical and Population Health stream. Dr. Li's past research has focused on improving breast imaging and clinicians' performance through image test set approaches with more than 30 publications. Dr Li is now transitioning her research from the artificial screening context to better quality research methods such as screening studies that reflect real-world populations. Dr Li's research interest covers early detection and screening of cancer, mammographic breast density, digital breast tomosynthesis and digital mammography, and epidemiology of breast cancer

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