



News from Volpara Science

Volume 4: January/February 2022

Research Brief

Volpara Health's Research Brief is a regular update about the latest from Volpara Science and other industry leaders around the world.

This edition features a review of Volpara's first peer-reviewed studies of the new year.

Highlighted in this edition is Volpara's long-held belief that visual assessment of breast density is too subjective. We've long advocated a more quantitative approach to breast density assessment, where the Artificial Intelligence (AI) measurement is compared to physical measures of the breast, notably volume of the breast, volume of fibroglandular tissue, and their ratio. So, we're delighted to see further independent studies coming out this year showing how well the Volpara® TruDensity™ clinical function compares to ground truth in the form of comparisons to phantoms (fake, but realistic breasts). That quantitative approach is also apparent in the latest patent, Volpara's 99th, which covers quantification of breast arterial calcifications (BACs), a potential indicator of cardiac risk.

MEET A MEMBER OF OUR TEAM



Jade Yip, MSc
Product Manager (Wellington, NZ)

Jade found her passion for science at the University of Otago, where she completed a Master of Science in Biochemistry investigating the function and structure of a protein involved in Batten disease, a childhood neurodegenerative disorder. When the opportunity to work with Volpara came up, she was ecstatic to see how science could be translated into clinical software to optimize mammography screening and prevent advanced-stage breast cancer. Jade has now been with Volpara for nearly three years.

SPOTLIGHT STUDY

Family history of breast cancer and mammographic breast density in premenopausal women

Researchers at the Washington University School of Medicine in St. Louis looked at whether family history of breast cancer (FHBC) was associated with breast density in two groups of premenopausal women: 1) a "Discovery set," comprising 383 women who underwent routine screening in 2016, with Volpara® Density™ measures available; and 2) a "Validation set," comprising 14,040 women who underwent screening and diagnostic exams between 2010 and 2015, with visual BI-RADS® density scores.

After accounting for confounders, women with FHBC were found to have 25% higher volumetric breast density (%) and 16% higher dense volume (cm³) in the Discovery set, and 30% higher odds of having dense breasts (BI-RADS c or d) in the Validation set. The increased breast density was observed for women with only one affected relative but was not significantly higher in women with two or more affected relatives. The results were similar for both non-Hispanic white women and Black or African American women and highlight the heritable component to both FHBC and breast density.



 DENSITY

Han, Y., et al. JAMA Netw Open. 2022. 5:e2148983. doi:10.1001/jamanetworkopen.2021.48983.

BITE-SIZED STUDY SUMMARIES

Mammographic density assessment by artificial intelligence-based computer-assisted diagnosis – A comparison with automated volumetric assessment

This single-center, retrospective reader study compared BI-RADS 5th Edition breast density scores from a commercial vendor's deep learning breast density solution, radiologists' consensus reads, and Volpara's TruDensity over digital GE mammograms from 488 South Korean women. This study was entirely independent of Volpara, and despite the deep learning solution being, apparently, trained on a similar population, the weighted Kappas (a measure of agreement) with the South Korean radiologists were similar for the two systems at about 0.5 ("fair agreement"). Interestingly, though, the deep learning system called just 59.6% of the women dense, compared to Volpara at 69.9% and the radiologists at 81.4%. As the authors noted, their results "seem to indicate that AI-CAD [deep learning] does not sufficiently overcome the inevitable variability of density assessment in an independent set."

 DENSITY

Lee S.E., et al. J Digit Imaging. 2022. doi:10.1007/s10278-021-00555-x. Epub ahead of print.

Artificial Intelligence (AI) for screening mammography, from the AI special series on AI applications


This review article investigated commercial AI algorithms for screening mammography that are currently available for clinical practice. Rather than focusing on multi-reader studies using cancer-enriched datasets, the reviewers highlighted the need for rigorous clinical evaluation supporting the applications' intended use. Several products from the Volpara® Breast Health Platform™ were discussed, including Volpara® Scorecard™ (incorporating Volpara Imaging Software), which automatically assesses breast density; Volpara® Live™, which provides timely, on-the-job image quality feedback; and Volpara® Analytics™ which provides automated analytics reporting of breast positioning and compression quality for every exam. The article concluded that the success of AI tools in breast cancer screening settings will depend on the validation of the algorithms in a clinical environment, as well as ensuring that the AI can be easily integrated into existing workflows and can demonstrate improvements to patient outcomes, efficiency, and cost-benefit ratios.

 DENSITY  POSITIONING  PRESSURE

Lamb, L.R., et al. AJR Am J Roentgenol. 2022. doi:10.2214/AJR.21.27071. Epub ahead of print.

Breast density distribution among the Saudi screening population and correlation between radiologist visual assessment and two automated methods

This retrospective study looked at the distribution of breast density for patients in the Saudi National Breast Cancer Screening Programme, and the relationships between visual and automated breast density methods. Mammograms from 2905 cancer-free women were assessed visually by 11 radiologists using BI-RADS 5th Edition breast density guidelines, VolparaDensity, and academic density scoring systems. VolparaDensity results showed that almost one-third of Saudi women had dense breasts, with 29.0% categorized as c or d using Volpara® Density Grade™ (VDG®). Agreement was fair comparing the BI-RADS and VDG categories. The relatively low percentage of dense breasts in Saudi women was probably linked to the increased BMI reported in Saudi women.

 DENSITY

Aloufi, A., et al. SPIE Medical Imaging 2022: Image Perception, Observer Performance, and Technology Assessment. Paper 12035-23.

Validation of a breast density quantization software with 3D printed breast phantoms

This study was presented at SPIE Medical Imaging 2022 and aimed to evaluate the accuracy of Volpara's commercial density assessment software. Volpara's software was used to derive density maps from mammograms of five 3D-printed breast-equivalent phantoms for comparison against the x-ray attenuation predicted from the true phantom material thickness. The estimated difference was found to be accurate to within an intra-phantom mean of 10% (standard deviation <4.4%), with negligible bias. This is yet another powerful validation of Volpara's TruDensity

 DENSITY

Solis, N., et al. SPIE Medical Imaging 2022: Physics of Medical Imaging, Paper 12031-52.

INNOVATION CORNER

Volpara receives new patent related to breast arterial calcification (BAC) detection

Volpara Health has been granted a patent on a new method for the detection and quantification of BACs by the US Patent and Trademark Office (patent number 11,246550). The method described in the patent demonstrates Volpara's commitment to improving women's health through science and innovation and expands Volpara's global patent portfolio to 99.

Volpara CEO Ralph Highnam said: "This patent is an important advancement in patient care. Being able to quantify breast arterial calcifications has the potential to take what are often considered incidental, insignificant findings on a mammogram, and triage patients to cardiac care and interventions."

OTHER SCIENCE-RELATED NEWS

[US White House reignites the Cancer Moonshot](#)

[Lung cancer screening is essential for high-risk patients](#)

If you would like to discuss using Volpara's software for your personalized breast care or early detection research, please contact research@volparahealth.com and we'll be in touch!