NEW ZEALAND

Volpara Solutions uses AI to improve breast cancer assessments

Artificial intelligence (AI) is having a major impact on New Zealand. It is transforming the economy by improving efficiency and productivity across organizations, and it is helping shape an intelligent society in which technology contributes to curb inequalities.[i]

Healthcare is one of several key sectors the government is prioritizing in its approach to AI, as the ageing population is increasing demand for medical services – straining resources, stressing infrastructure, and pushing costs upwards.[ii]

In this context, AI is poised to improve the way healthcare is managed and delivered in New Zealand. From data-driven diagnostics to automated administrative processes, AI can make healthcare faster, more precise, and less expensive.

Volpara Solutions, for example, is reducing the human and financial costs of breast cancer by providing clinically validated AI software that underpins effective, high-quality screening processes.

Timing and accuracy are key to reducing mortality

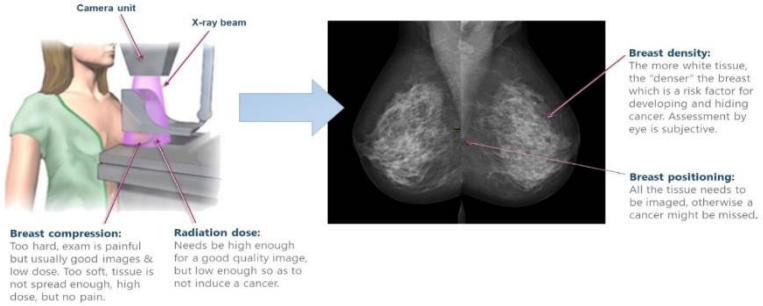
According to the World health Organization (WHO), 627,000 women died from breast cancer globally in 2018 – or approximately 15% of all cancer deaths among women.[iii] Breast screening using X-rays (mammograms) is proven to reduce breast cancer mortality – by up to 41% according to some studies.[iv]

But two complex factors come into play in ensuring screenings effectively reduce mortality: timing (the earlier breast cancer is detected, the higher the chances of survival) and accuracy (the more precise an assessment is, the better an effective diagnosis can be prepared).

On timing, mammograms are more widely available than just a decade ago, though many women – especially in emerging economies – are still diagnosed at an advanced stage of disease.[v] On accuracy, mammograms are vital for finding breast cancer, but 1 in 5 cases can be missed.[vi]

A key challenge is breast tissue density. Breast tissue that is particularly ‘dense’ makes it difficult to see cancer, as both cancer and dense breast tissue appear white on X-rays.

Visualizing breast density



Source: Volpara Solutions

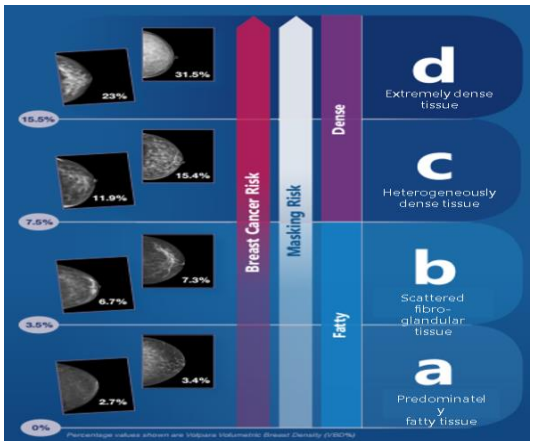
Assessing tissue density with AI-assisted computer vision

VolparaDensity applies a mix of computer vision and deep learning to analyze mammograms, automatically estimating breast composition and assessing breast density. Breast density is indeed indicative of risk of developing breast cancer – a risk that can be missed if an X-ray is only observed with the naked eye, regardless of how trained or experienced that eye may be.

According to Dr. Daniel Kopans, Professor of Radiology at Harvard Medical School, "Radiologists can guestimate the percentage of breast tissue that is dense, but they are still using 2D information to assess a 3D phenomenon, and they cannot possibly be accurate in any absolute sense."[vii]

Supported by Volpara Solutions' suite of imaging software, VolparaDensity provides a repeatable, consistent, and objective means of scoring breast density – a 'scorecard' that accurately identifies which women may benefit from supplemental imaging, such as ultrasounds.

Automated breast density scorecard



Source: Volpara Solutions

According to Dr. Ralph Highnam, Managing Director of Volpara Solutions, "Our aim is to ensure that women get the right imaging according to their breast composition so that screening can detect any cancers as early as possible and thus reduce mortality risk and cost of treatment".

Training AI to go beyond diagnostics

VolparaDensity is used in clinics in 39 markets, including Australia, Malaysia, New Zealand, Singapore, the Republic of Korea, Chinese Taipei, and the United States. The imaging data gathered by VolparaDensity is anonymized and stored in the cloud. From radiation doses to image quality, a wide range of X-ray data is available for AI researchers looking to improve breast cancer screening processes.

As Dr. Ralph Highnam notes: "With over 20 million breast images now stored, we have one of the world's biggest breast cancer datasets available to train AI systems in ways that were unimaginable just a few years ago. There is an opportunity to better understand the way different types of cancer affect different people, communities, and territories."

He adds: "The system could, of course, also be trained to enhance lung cancer screening. It would have to be calibrated and adjusted accordingly, but the core infrastructure is there – and it is highly adaptable."

Expanding human capabilities

VolparaDensity demonstrates how helpful AI can be if it is used as more than just a cost-cutting measure.

Dr. Ralph Highnam highlights that "AI systems such as VolparaDensity help medical professionals build on their existing abilities. It is not about replacing radiologists or their years of experience with a more affordable alternative. It is about drawing from their knowledge and skills to go even further; detect what is otherwise undetectable, trace what is otherwise untraceable."

"In this sense," he adds, "AI cannot be reduced to a simple productivity tool. To fully benefit from AI, we must see it as the catalyst for humans to expand their knowledge and augment their abilities."

[i] AI Forum, https://aiforum.org.nz/towards-our-intelligent-future
[ii] AI Forum, https://aiforum.org.nz/reports/artificial-intelligence-for-health-in-new-zealand
[iii] World Health Organization (WHO), www.who.int/cancer/prevention/diagnosis-screening/breast-cancer/en
[iv] Duffy S.W. et al., www.healio.com/hematology-oncology/breast-cancer/news/online/%7Bf2c4a1c6-fd43-4326-a282-d31a64e9f774%7D/mammography-screening-substantially-decreases-risk-for-fatal-breast-cancer
[v] World Health Organization (WHO), www.who.int/cancer/publications/mammography_screening/en
[vi] American Cancer Society, www.cancer.org/cancer/breast-cancer/screening-tests-and-early-detection/mammograms/limitations-of-mammograms.html
[vii] Volpara Solutions, https://volparasolutions.com/our-products/volparadensity