

Design graduate invents device that makes mammogram less painful



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For some women, mammograms are such a painful, dreaded experience that they avoid doing it.

But these screenings remain the most reliable way to detect breast cancer early, so Mr Luke Goh, 25, spent about one year looking into

how the procedure can be made more comfortable.

And the industrial design graduate's invention might just encourage more women to make a mammogram appointment when it is eventually adopted by hospitals and clinics.

Currently, radiographers in the screening room will typically ask the patient to stand still while a compression plate presses down on each breast to flatten it on a special X-ray machine.

This is repeated several times as each breast is repositioned in turn,

in order to capture X-ray images from various angles. The radiographers rely on their experience to estimate the compression force needed on the breast, often resulting in over- or under-compression.

Mr Goh developed Mammosense as a tool to guide radiographers conducting personalised breast compressions, and thus reduce women's discomfort during mammograms.

Early trials have shown that his prototype is able to reduce force exertion by 34 per cent, says Mr



The Singapore winner of the 2024 James Dyson Award, Mr Luke Goh, showing his mum Jessica Chua how his invention can improve one's mammogram experience. PHOTO: JAMES DYSON AWARD

Goh, who worked closely with healthcare professionals from National University Hospital (NUH). He has co-patented the technology with NUH and National University of Singapore.

He conceived the idea as his final-year project in 2023 when pursuing a degree in industrial design at NUS. Mr Goh, who topped his course, submitted the design for the 2024 James Dyson Award and was recently named the Singapore winner.

The international design competition, given out yearly since 2005 by the eponymous renowned British engineer-inventor, supports budding design engineers. Mr Goh stands a chance to win the global prize in November.

He received \$8,400 in prize money to develop his invention further. In the next two years, he is planning larger pilot tests to evaluate the device's effectiveness.

He also aims to partner a medical technology company to make Mammosense commercially viable.

As with all inventions, it takes time to bring the product to market, but Mr Goh is confident that it will offer relief to women, including his 55-year-old mother, who shun mammograms because of their fear of pain.

He says: "By reducing the discomfort associated with breast compression, Mammosense can encourage more women to participate in regular screenings, leading to earlier detection of breast cancer and, ultimately, save lives."

When he was doing research for his project, he had many conversations with NUH's Dr Serene Goh, an associate consultant from the department of surgery.

"She was very concerned about the low breast-cancer screening rates in Singapore," he says, add-

ing that the breast surgical oncologist shared that many patients' treatment plans could have been pared down if their cancer had been detected at a less advanced stage.

According to the Singapore Cancer Registry, breast cancer is the most common cancer in Singaporean women, forming nearly 30 per cent of all cancer diagnoses. Each year, about 2,000 women are diagnosed with breast cancer and about 400 die from the disease.

Nonetheless, the chances of surviving breast cancer increases with early detection, and a mammogram is still the most effective screening method.

The Health Promotion Board recommends that women aged 40 to 49 go for a mammogram annually. Those aged 50 and above should have their screening every two years, or as advised by their doctors.

Yet, despite publicity and subsidies, the screening uptake rate in Singapore has remained low – at about 40 per cent.

Mr Goh says his mother, Madam Jessica Chua, an administrative executive, also avoids routine checks. She went for her first mammogram almost 10 years ago, but has not returned for another.

"She kept telling me that the experience was very bad," says Mr Goh. Madam Chua raised him and his 24-year-old brother, a freelance graphic designer, as a single mum.

Mr Goh adds: "That set me thinking. Should I look at improving the mammogram experience? While it is a very critical screening for breast cancer, it is often an uncomfortable procedure for women."

As he spoke to women who had gone for mammograms, he found out that their experience depend-

ed on various factors, mainly the radiographer behind the machine.

To fully understand the problem, he went through a mammogram himself. What he discovered was, "it is never the radiographers' fault".

He says: "The mammogram machine was not designed to help them do their work. It doesn't provide any prompts on how much they have to compress."

This is why some radiographers would rather apply a little more force on the breasts to capture clearer X-ray images. Otherwise, they might need to repeat the procedure and subject the patients to another round of compression and radiation, he says.

With Mr Goh's Mammosense device, powered by a light detection and ranging system called Lidar, radiographers get a customised reading of how much compression force they should use on

each person. They can carry out their job more confidently and not worry about hurting patients unnecessarily.

"This also means women stand to get a more consistent, comfortable procedure when they go for mammograms," Mr Goh says.

Another factor that affects the experience is the timing of the screening. "Everyone has a different pain threshold, but I've learnt from radiographers that it can be more uncomfortable if women go for mammograms the week before or during their menstruation. That is when the breasts become more tender or sore due to hormonal fluctuations," says Mr Goh.

He is now at ease chatting about breast care, but he almost did not take up the project out of sheer awkwardness.

"I was very self-conscious initially. I'm a guy – why am I talking to people about breasts and mam-

mograms? How do I approach these topics with sensitivity?"

Thankfully, the NUH healthcare professionals made him feel relaxed about the topics and shared their insights openly.

It is his long-term goal for Mammosense to "become the standard" equipment in screening rooms worldwide.

"It is designed to be adapted to existing mammogram machines, which means there are no costly upgrades for hospitals and clinics," says Mr Goh, who wants to build a career in industrial design.

He says he never dreamt that his final-year project would make such an impact on healthcare and change lives.

Ultimately, he wants to see his mother smile, not grimace, after her next mammogram.

"She has been following my project from day one," he says. "She's just very proud that I have done it."