Omega-3 hope for cancer patients

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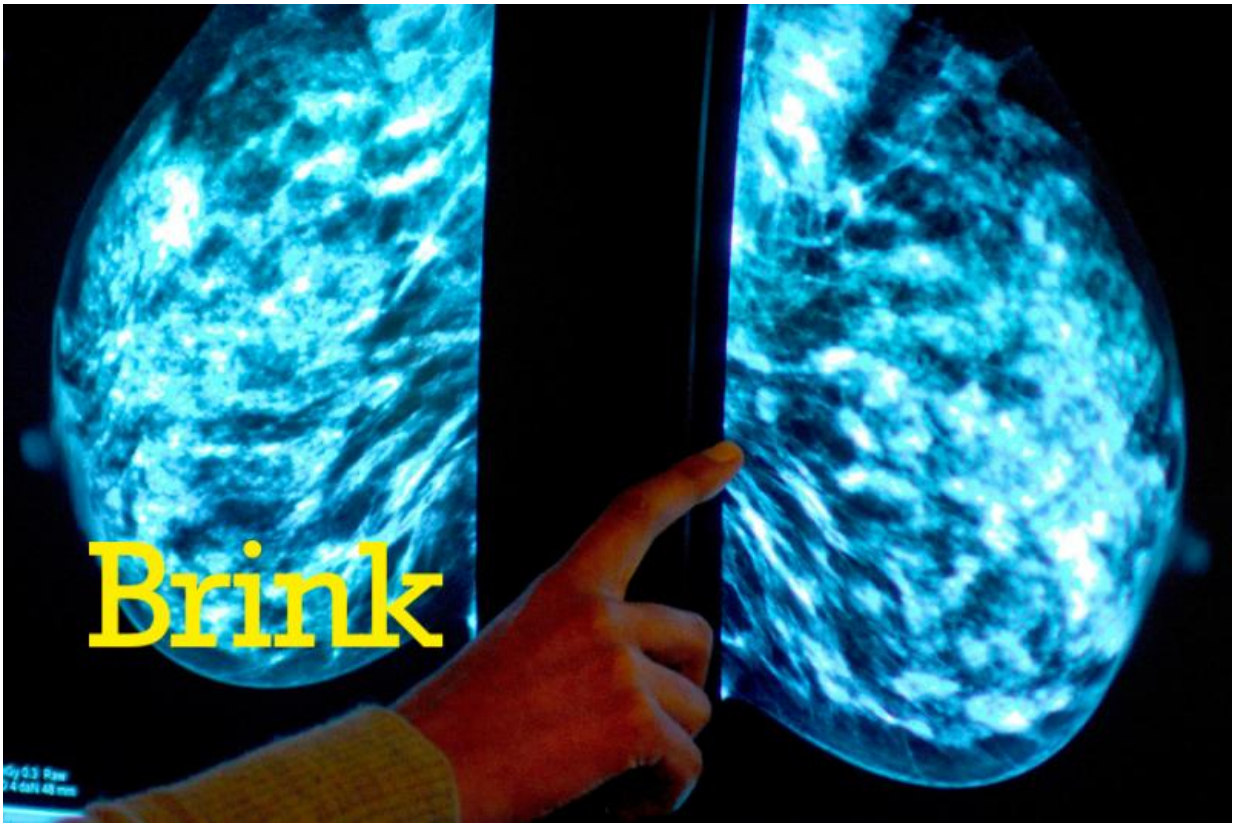

Existing therapies target breast cancer growth rather than metastasis. Credit: Rui Vieira/PA

The chemistry involved in designing drugs with the potential to treat cancer is complex and finicky. The placement of a single atom can be the difference between a cancer killer and a useless bystander. And that's just at the test tube stage.

There follows the challenge of getting the compound to work inside the wet, warm and wild environment of mammalian biology.

Dr Tristan Rawling, a chemist in the Graduate School of Health at the University of Technology, Sydney (UTS), is familiar with these challenges. He is making some mind-bogglingly fine adjustments to a set of new synthetic compounds that kill cancer cells and show great promise as cancer drugs.

"We've got them working in animal models and that's very exciting," Dr Rawling says. "Often you will make chemicals that are promising when you throw them onto cancer cells in a plate, but once they get into a biological system they fall down.

"We've also got these compounds working orally which is another big thing. It means patients wouldn't have to sit in hospital and have injections." The compounds don't seem to be broadly toxic, either. "If successful, it could be a chemotherapy without all the horrible side effects."

The synthetic compounds are similar to substances that form when omega-3 polyunsaturated fatty acids, the fats found in foods such as seafood and walnuts, are metabolised. Omega-3 can reduce inflammation and heart attack risk, and population-based studies have shown an association between higher intake of omega-3 and lower rates of breast cancer.

The idea that omega-3s may have cancer-killing potential is the result of years of thinking and research on the part of Professor Michael Murray from the University of Sydney's School of Medical Sciences. Professor Murray had long been intrigued by the fact that omega-3s and their omega-6 cousins (found abundantly in vegetable oils) are very similar but have vastly different biological effects.

He knew that a particular type of compound produced when omega-6 was metabolised helped cancer cells to grow and spread and wondered if there was an equivalent produced by the more kindly omega-3 and, if so, whether it might discourage cancer cell growth. Like many a fine scientific idea, it sounds unlikely but "it turned out to be the case", says Professor Murray.

Professor Murray and Dr Rawling have since patented their compounds and have funding from the National Health and Medical Research Council to pursue their research. While this is excellent news, they will not be entirely satisfied until they can follow up on a tantalising additional phenomenon that has emerged along the way.

One of their compounds had no effect on the growth of primary tumours in animal models but it completely prevented metastasis. Metastasis is the spread of cancer from the primary site to other parts of the body, and is the most lethal aspect of breast cancer. Existing cancer drugs primarily target cancer growth and have little effect on metastasis.

Associate Professor Mei Krishnasamy, president of the Clinical Oncology Society of Australia, says: "There has been significant progress in treatment for advanced breast cancer which has improved survival and quality of life for many women – and some women live for many years. However, the average overall survival is only two to three years.

"Any research that can prevent progress of early breast cancer or halt progression of advanced disease has the potential to make a significant impact on the lives of the increasing number of women diagnosed with breast cancer."

Dr Rawling and Professor Murray do not know exactly how their compound inhibited metastasis, which is a complex process. They have

no shortage of ideas about how to find the answers – but what they are short of is money.

"Pharmaceutical companies don't like to invest in it because it's seen as risky," says Dr Rawling. "And it's a complicated story to sell to grant funding bodies."

"We need someone to take a punt," says Professor Murray. At least one private enterprise is interested but the negotiation process is long.

"Everyone working in our group, which includes collaborators and students, is working really hard," says Dr Rawling. "We're all motivated by the possibility that our research will have a positive impact on the lives of people with cancer."

Provided by University of Technology, Sydney

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