Cancer trap grabs wandering tumour cells to warn of early spread

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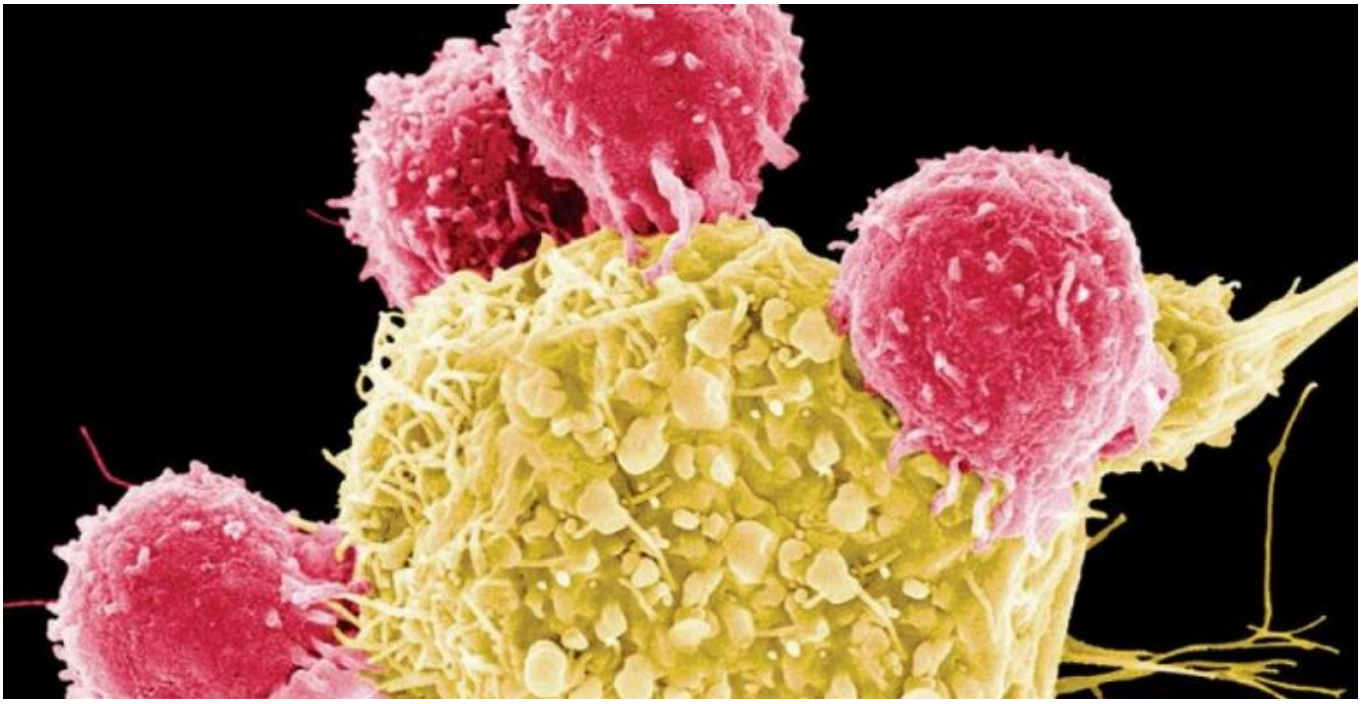

“This could be the canary in the coal mine,” says Lonnie Shea of the University of Michigan at Ann Arbor, one of the developers.

So far the idea has been tested in mice. If it translates to people, then once it is in place the implant could be scanned for cancer cells while inside the body – either by doctors, or one day perhaps just with a smartphone. “That’s the fantasy,” says Shea.

Shea devised the approach along with Jacqueline Jeruss, a breast cancer surgeon. Jeruss had noticed how common it was for her patients’ first symptom to be breathlessness – as the cancer had already spread to their lungs.

They and their colleagues devised an implant made from an inert porous material already used in medical devices, and loaded it with a signalling molecule called CCL22. This attracts certain immune cells, which encourages cancer cells to follow suit.

They implanted the device under the skin of mice with a version of breast cancer – and found tumour cells in it after two weeks.

In experiments on other mice, the team showed that cancer cells could be detected in the implant while it was still in place, via a new scanning system called optical coherence tomography (OCT).

This technique, which can penetrate living tissue by a few millimetres, involves measuring the

way light is scattered off large molecules and structures inside cells. Cancer cells can be detected because they are denser internally. Various firms are developing devices that would let OCT be done with a smartphone.

In mice, the implants cut the number of tumour cells that migrated to secondary sites like the lungs. They probably wouldn't trap enough cells to work as an anti-cancer therapy, says Shea, but the implant could boost people's chances of survival by identifying early on that cancer cells are on the move – allowing the patient to begin chemotherapy right away.

The main challenge, says Shea, will be getting the OCT scanner to penetrate human skin, which is thicker than rodent skin.

Other groups are investigating tumour traps that attract certain types of cancer cells via different, more specific, chemical signals. The new implant should in theory attract a wide range of cancer cells – although so far the team have only shown it works for one tumour type other than breast cancer, in unpublished work.

They envisage first using the trap in women at a high risk of breast cancer, such as those who have already had surgery to remove a tumour and might experience a recurrence. If a scan reveals that cancer cells are present, the implant could even be removed and the cells analysed to see which cancer drugs they are most susceptible to.

Gerhardt Attard of the Institute of Cancer Research in London says there is growing interest in personalising cancer treatments by testing cancer cells in the blood. "This could be a very powerful way of risk stratifying patients for treatment," he says.