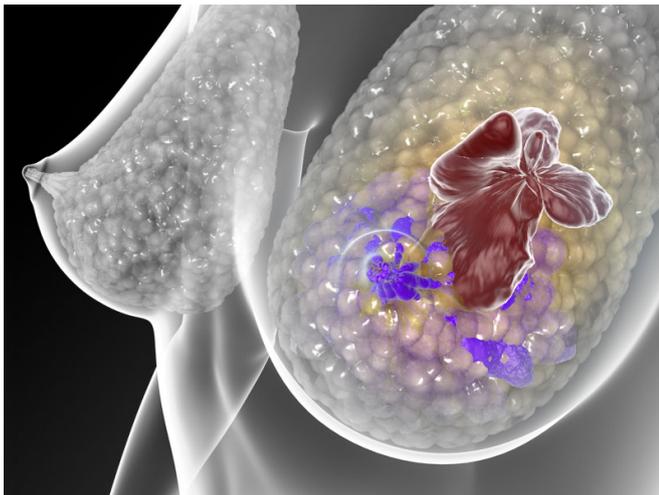


# New 'mutation-tracking' blood test could predict breast cancer relapse months in advance

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Researchers report that circulating tumor DNA in patients' blood can be used to predict the likelihood of early-stage breast cancer recurring after apparently curative treatment. Credit: C. Bickel / Science Translational Medicine

Scientists have developed a blood test for breast cancer able to identify which patients will suffer a relapse after treatment, months before tumours are visible on hospital scans.

The test can uncover small numbers of residual [cancer](#) cells that have resisted therapy by detecting cancer DNA in the bloodstream.

Researchers at The Institute of Cancer Research, London, and The Royal Marsden NHS Foundation Trust were able to track key mutations that cancer accumulates as it develops and spreads, without the need for invasive biopsy procedures.

They hope that by deciphering the DNA code found in blood samples, it should be possible to

identify the particularly mutations likely to prove lethal to that patient - and tailor treatment accordingly.

The study, published in the journal *Science Translational Medicine*, is an important step towards use of 'liquid biopsies' to revolutionise [breast cancer](#) care - by changing the way cancer is monitored in the clinic and informing treatment decisions.

The research received funding from a number of organisations including the NIHR Biomedical Research Centre at The Royal Marsden and The Institute of Cancer Research (ICR), Breast Cancer Now and Cancer Research UK.

Researchers took tumour and blood samples from 55 breast cancer patients with early-stage disease who had received chemotherapy followed by surgery, and who had potentially been cured of their disease.

By monitoring patients with blood tests taken after surgery and then every six months in follow-up, the researchers were able to predict very accurately who would suffer a relapse.

Women who tested positive for circulating tumour DNA were at 12 times the risk of relapse of those who tested negative, and the return of their cancer was detected an average of 7.9 months before any visible signs emerged.

The researchers used a technique called 'mutation tracking' - developing a digital PCR test that was personalised to the mutations found in an individual patient's cancer - to identify tumour DNA in the bloodstream.

Because the researchers at the ICR and The Royal

Marsden were looking for mutations common to many types of breast cancers, they found the test could be applied to all breast cancer subtypes.

The research also showed how genetic mutations build up in the cancer as it develops over time, as the leftover cancer cells grow and spread.

This reinforces the importance of detecting recurrence early so patients can have treatment before the extra mutations emerge and make the disease harder to treat.

Study leader Dr Nicholas Turner, Team Leader in Molecular Oncology at The Institute of Cancer Research, London, and Consultant Medical Oncologist at The Royal Marsden NHS Foundation Trust, said:

"We have shown how a simple [blood test](#) has the potential to accurately predict which patients will relapse from breast cancer, much earlier than we can currently. We also used blood tests to build a picture of how the cancer was evolving over time, and this information could be invaluable to help doctors select the correct drugs to treat the cancer."

"Ours in the first study to show that these blood tests could be used to predict relapse. It will be some years before the test could potentially be available in hospitals, but we hope to bring this date closer by conducting much larger clinical trials starting next year. There are still challenges in implementing this technology, but digital PCR is relatively cost-effective and the information that it provides could make a real difference to [breast cancer patients](#)."

Professor Paul Workman, Chief Executive of The Institute of Cancer Research, London, said:

"We are moving into an era of personalised medicine for cancer patients. This test could help us stay a step ahead of cancer by monitoring the way it is changing and picking treatments that exploit the weakness of the particular tumour. It is really fantastic that we can get such a comprehensive insight about what is going on in the cancer all over the body, without the need for invasive biopsies.

"Studies like this also give us a better understanding of how cancer changes to evade treatments - knowledge we can use when we are designing the new cancer drugs of the future."

**More information:** Mutation tracking in circulating tumor DNA predicts relapse in early breast cancer, *Science Translational Medicine*, [stm.sciencemag.org/lookup/doi/10.1126/scitranslmed.aab0021](http://stm.sciencemag.org/lookup/doi/10.1126/scitranslmed.aab0021)

Provided by Institute of Cancer Research

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