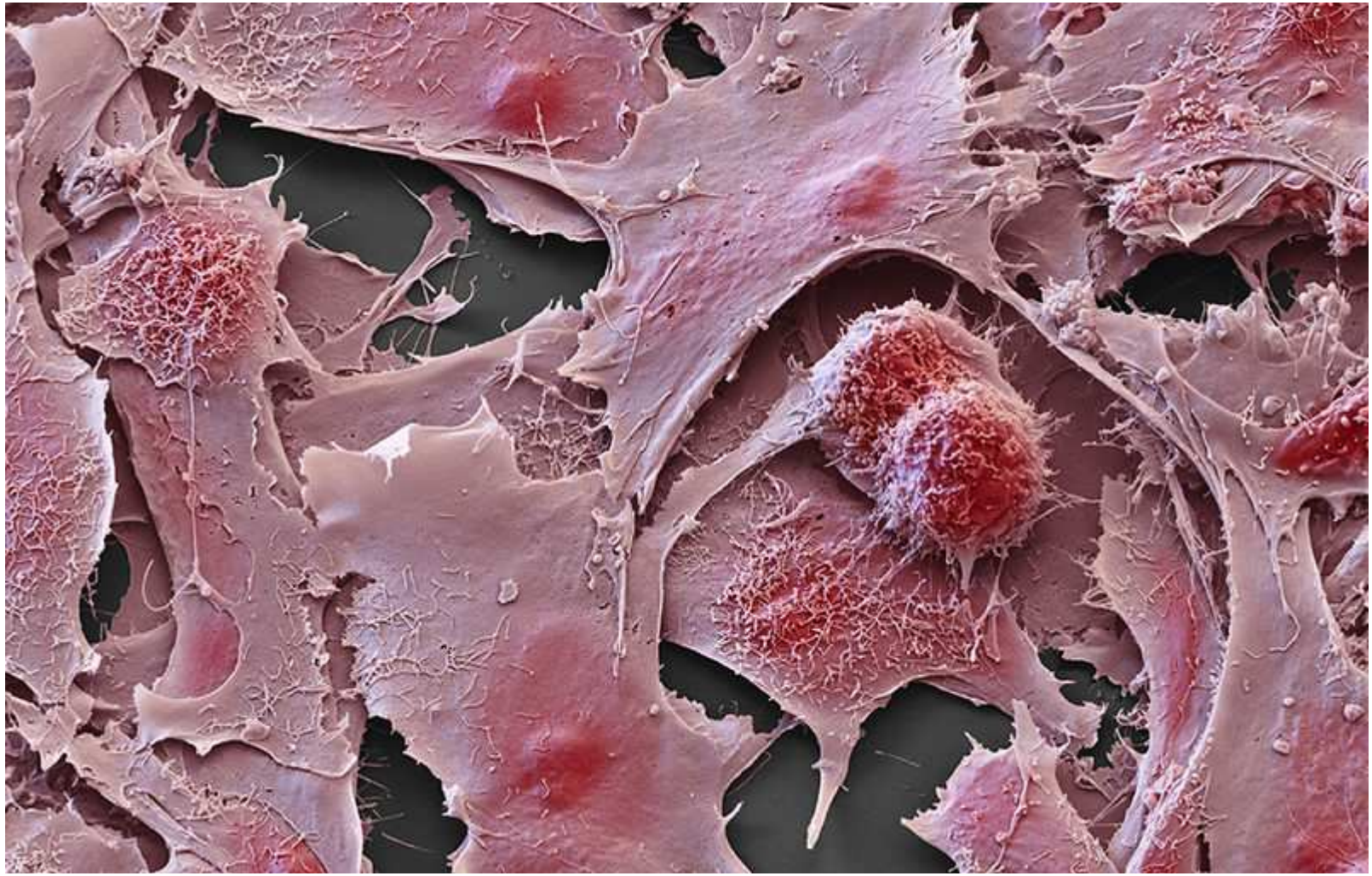
Simple blood test detects eight different kinds of cancer

Heidi Ledford



A more sensitive blood test could one day detect early stages of cancers including ovarian cancer (pictured).Credit: Eye of Science/SPL

A single blood test could one day be used to detect a variety of cancers, results from a preliminary trial suggest.

The past few years have seen a bevy of experimental tests called liquid biopsies that hold the promise of detecting and tracking tumours from a simple blood draw. Many of these tests are designed to detect a single kind of cancer by spotting tumour-associated mutations in DNA sequences found floating freely in the blood.

The latest study, published on 18 January in *Science*[1], is unusual in that it tests not only for these DNA mutations, but also for aberrant levels of certain proteins, in an effort to detect eight different cancers. The test was able to detect disease in about 70% of more than 1,000 people who had already been diagnosed with cancer.

The researchers hope that their work could eventually lead to a test that is simpler and cheaper than the intensive sequencing involved in some other liquid biopsies. “They end up with performance that is similar to other approaches, but with what looks to be a much more cost-effective approach,” says Nitzan Rosenfeld, a cancer researcher at the University of Cambridge, UK.

Needle in a haystack

Many groups in academia and industry have focused on using liquid biopsies to track cancer progression and to guide physicians as they formulate a treatment plan.

But oncologist Nickolas Papadopoulos at the Johns Hopkins Kimmel Cancer Center in Baltimore, Maryland, and his colleagues wanted to develop a test that could detect cancers early, when they are easier to treat.

Such tests are particularly challenging: small tumours don’t usually release as much DNA into the bloodstream as larger tumours. And false positives are a concern for tests that are intended to be administered to large populations of healthy individuals — an incorrect result can cause people undue stress and lead to unnecessary and potentially harmful treatments.

The researchers looked for ways to make their liquid biopsy more sensitive without also raising the risk of a false-positive result. The test they developed — dubbed CancerSEEK — examines the levels of 8 proteins and the presence of mutations in 16 genes.

The team tested the liquid biopsy on people who had already been diagnosed with one of eight cancers: ovarian, liver, stomach, pancreatic, esophageal, colorectal, lung or breast. And they excluded individuals whose cancer had spread to other parts of the body, so they could focus on early stages of the disease.

The effectiveness of CancerSEEK varied widely depending on the cancer: it detected 98% of ovarian cancers, but only 33% of breast cancer cases[1]. It was able to pinpoint the organ in which the disease had taken root in about 63% of patients. But the test performed better on later-stage cancers than on earlier ones, finding 78% of stage III disease versus 43% of stage I tumours.

Seeking sensitivity

Even so, those numbers are high enough to warrant further studies, says Rosenfeld, who is also chief scientific officer at the liquid-biopsy company Inivata in Cambridge. “Even if you only catch half of the cancers, that’s great.” What’s unclear, however, is whether CancerSEEK is able to detect undiagnosed cancers, Rosenfeld adds.

Another concern is whether the false-positive rate might be higher in the general population, says Catherine Alix-Panabières, a cancer researcher at the University of Montpellier in France. Some seemingly healthy people could harbour inflammatory diseases that alter the levels of the proteins targeted by the test, she says.

It could take years to address those concerns. But researchers have already begun a study that will test CancerSEEK in at least 10,000 healthy individuals, says Papadopoulos, who has served as an adviser to a liquid-biopsy company called Personal Genome Diagnostics in Baltimore. Researchers plan to follow those participants for five years.

In the meantime, expect to see other teams refine their liquid biopsies by combining DNA sequencing with other blood tests, says Alberto Bardelli, a cancer researcher at the Candiolo Cancer Institute in Turin, Italy. “This paper is provocative,” he says. “It points to the fact that we should stop looking at a little part of the picture. Instead, we need to see all of the sources of information in the blood.”

Sign up for the daily Nature Briefing email newsletter

Stay up to date with what matters in science and why, handpicked from Nature and other publications worldwide.

Sign Up