B.C. company’s blood tests more accurate, less invasive

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Terry Pearson has led efforts to commercialize the next-generation blood test called Stable Isotope Standard Capture with Anti-peptide Antibodies from his lab at the University of Victoria. Photograph By UVic Photo Services

A B.C.-based biotech company has devised a new test that can check for dozens of illnesses simultaneously using a single drop of blood.

The test developed by SISCAPA Assay Technologies is cheaper and more accurate than traditional tests used to detect disease.

Creator Terry Pearson, a professor emeritus at the University of Victoria, hopes it will usher in a new era in personalized health care. The technology is already in use at two of the world’s top diagnostic facilities, the Mayo Clinic and ARUP Laboratories, which provides diagnostic services to hospitals across the United States.

"People have been looking at blood for many years — it is the primary fluid used to conduct diagnostic tests and with good reason," Pearson said. "Blood bathes every cell in the body and picks up proteins from those cells, liver proteins, heart proteins and brain proteins."

There are thousands of different proteins present in our blood, most produced by healthy cells.

Sick cells produce different and unique proteins, essentially sending up a flare when something is wrong. Traditional tests — called immunoassays — detect proteins known to be associated with particular cancers, diabetes, heart disease or other illnesses.

An immunoassay only looks for a single protein at a time and the organic components are complex and difficult to develop, each requiring years of work and millions of dollars, he said.

And many such tests are prone to interference, which is why the Mayo Clinic switched to Pearson’s test for thyroid cancer last year.

Pathologist Stefan Grebe at the Mayo Clinic said at the time traditional tests were often ineffective, giving a false negative result in some patients where cancer could be present or recurring.

The test developed by SISCAPA provides an accurate result even in cases where interference would have fouled the traditional test, said Grebe.

This next-generation blood test is a collaboration between Pearson and blood plasma researcher Leigh Anderson, who had the idea to search for short, unique codes in blood proteins. The test carries the awkward acronym SISCAPA, for Stable Isotope Standard Capture with Anti-Peptide Antibodies. Pearson has led efforts to commercialize the method for the past 13 years from his lab at UVic.

There are many billions more of the common healthy proteins in the blood than the proteins that are indicators of disease. The search for bad proteins is equivalent to looking for a single person in the human population of Earth, Pearson said. The test is able to detect the specific signature of relatively rare blood-borne proteins based on a short string of amino acids unique to each protein.

Unlike conventional immunoassays, SISCAPA assays don’t interfere with each other, which means the test can simultaneously identify and
measure many proteins in a single sample and greatly reduce testing costs. 

A panel of five or 10 immunoassays, which typically range from 

$50 to several hundred dollars per test, can easily run hundreds or thousands of dollars. 

The SISCAPA test can cost as little as $20 for a single biomarker. 

In the case of multiplexed tests — single-sample tests designed to detect several different relevant proteins — the cost could drop to $10 or less per biomarker, depending on economies of scale. “Our goal is to measure dozens of different biomarkers [proteins associated with illnesses or other conditions] on the same sample and not only that but do it on a much smaller amount of blood,” Pearson said. 

In order to fund the development of commercial applications, Pearson founded SISCAPA as a private company in 2012 and attracted more than $1 million in start-up capital from a group of “angel investors.” A second tranche of investment cash last year is supplemented by the royalty stream flowing from the Mayo Clinic and ARUP Labs. 

“We’ve been making assays for pharmaceutical companies and collaborators and with our royalty income we are in the black,” he said. 

The firm now employs a half dozen scientists, three of whom started with SISCAPA as students. 

A test that can detect biomarkers for a variety of conditions all at once not only speeds diagnosis, but because it requires little blood, it is far less invasive for patients who might otherwise need blood drawn with a needle for every test. 

The test can even be completed on a tiny dried blood sample applied to a filter paper, which opens up a whole world of possibilities for disease surveillance, personalized medicine and even distance medicine. 

“Patients can take a sample every week or every month at home and send it in by mail,” Pearson said. 

A limiting characteristic of the old-style testing is proteins associated with disease may be present in healthy patients in a broad range of concentrations, leading to missed positive results when a protein spike fails to exceed the so-called normal range. 

By taking a baseline — a series of less expensive tests over several months to establish what is normal for an individual — the new method makes it much easier to see when a protein level suddenly jumps. 

A version of the test designed to detect 22 proteins was used to monitor Brazilian athletes attending the 2015 Pan Am Games for markers associated with health, fatigue and injury. 

Pearson believes tools can be built to detect far more biomarkers from a single blood sample. “Theoretically we can place 100 antibodies in the sample to detect 100 biomarkers at once and analyze them all,” he said. “It would be more practical, however, to put together 10 antibodies all associated with cardiovascular health and do them regularly, over time.” 

Similar tests could be devised to monitor people with a predisposition to diabetes or cancer. 

The ability to work with dried samples also holds promise for improving health care and disease protection in remote areas and in the developing world. “The dried blood spot has been used in Africa for many years,” he said. 

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