

One test for all infections

April 20 2015

If you're returning from abroad with a fever, your doctor will likely test you for malaria. You'll give multiple blood samples at the lab, and if the results are inconclusive, you'll face yet another round of tests.

Researchers from the University of Toronto are fast-tracking this process with [new technology](#). With one sample, they can quickly and accurately diagnose a patient and recommend targeted treatment against any [bacteria](#) or virus.

News of this technology is particularly timely because of National Medical Laboratory Week (April 19 to 25), an awareness campaign to educate Canadians about the importance of diagnostics.

"With this new technology we can streamline ordering 30 different tests. We can just order the one test and identify the pathogen—whether it's dengue fever, West Nile virus, Chikungunya virus, or a new bacteria or virus," said Samir Patel, a professor at U of T's Department of Laboratory Medicine and Pathobiology.

Using this technology—called Next Generation Sequencing—Patel takes a patient's sample and analyzes its genetic code. His team then matches the code to a database of thousands of bacteria and viruses, interprets the complex data and provides a diagnosis.

"Our current tests can be expensive, time consuming and aren't always accurate," said Patel. "Next Generation Sequencing will revolutionize the microbiology field. With the information it provides we can fine-tune

patient treatment."

This technology also removes the need for lengthy guesswork. For example, if an Ontario patient has a fever and a severe headache during the summer, doctors would normally test for West Nile virus. But those [test results](#) are frequently negative.

Instead of speculating, doctors can now let high-powered computers discover what's in the sample.

"Dr. Patel's work in pathogen discovery aims to deliver a one-stop-shop that can definitely determine the causative organisms in severe infections such as meningitis and encephalitis," said Vanessa Allen, Chief of Medical Microbiology at Public Health Ontario. "This has the potential to revolutionize the way we deliver microbiology diagnostics for improved patient care."

Patel, a clinical microbiologist, began using this technology for the Pathogen Discovery Program at Public Health Ontario in 2012. The goal of the program is to diagnose difficult cases and to quickly and accurately identify bacteria and viruses that could cause an outbreak.

During an outbreak, Patel could also track where the bugs come from and how they are evolving. Others have used Next Generation Sequencing to identify and track specific strains of Ebola in West Africa.

"Should any outbreak occur in Ontario, we could test samples, identify the bacteria or virus that is causing the outbreak and track the spread using a systematic process," said Patel. "We can also see how infectious a virus or bacteria is, and if similar strains are circulating through other parts of the world."

Patel predicts that the technology will be ready for clinicians to use for routine testing in about a year.

"The program will help diagnose patients who have inconclusive routine test results, and will also enhance the [public health](#) response to an outbreak in Ontario. A lot of times we're in a reactive mode, but this is an area where we're getting ahead of the game."

Provided by University of Toronto

Citation: One test for all infections (2015, April 20) retrieved 4 May 2024 from <https://medicalxpress.com/news/2015-04-infections.html>

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