International science team paves way for fast and accurate flu diagnosis

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How many times in the past ten years do you believe you've had a dose of the flu? Were you actually tested for evidence of the influenza virus

in your system?

Statistics indicate that, on average, adults over the age of 30 only contract the influenza virus twice in a decade – but far more frequently (self) misdiagnose a cold virus (commonly rhinovirus or coronavirus) as being the flu.

Accurately diagnosing the flu virus through testing is often considered too slow and cumbersome by many primary-care physicians, with current rapid-diagnosis pathology tests requiring up to 48 hours.

To be effective in reducing the severity of the viral infection, anti-viral medications must be started within 48 hours of symptom onset, which is inhibited by the current diagnostic methods and timelines.

Nuclear scientists at ANSTO are working with an international team of university researchers and companies to help develop a new platform capable of rapid diagnosis.

The team have developed a diagnostic platform that is capable of delivering rapid diagnosis of influenza A, B and C strains, in as little as 5 minutes.

The team is led by Professor Jeremy Lakey from the Newcastle University in the UK, together with Orla Protein Technologies Ltd., OJ Bio Ltd., and ANSTO researchers Dr Anton Le Brun and Dr Stephen Holt.

"What we are working towards is a platform that can be coupled to a portable electronic device, to provide a rapid and accurate diagnosis of influenza," said Dr Le Brun, Research Fellow at ANSTO's Bragg Institute.

The rapid diagnosis technology combines specialist protein biomarkers with advanced electronics in the form of a small biochip developed by the UK-based OJ Bio.

When a patient sample is applied to the biochip, the presence of a disease antigen is translated into an electronic signal which is converted into a test result and displayed on a smartphone app or PC.

"If physicians had a tool of this nature available during outbreaks of severe strains, they would have the ability to confidently and quickly prescribe anti-virals to those who need them," said Dr Le Brun.

"Our lab work, which involves using nuclear research instruments, has so far shown us how to assemble the molecular platforms necessary to create such a device, and in principle how it works.

"Our next steps are to convert our laboratory results into an accessible and reusable way for GPs to quickly test patients for evidence of the influenza virus as part of their treatment process.

"GPs have had access to rapid blood sugar testing devices to help in the management of diabetes for many years. Our aim is to make diagnosis and management of influenza just as simple a process."

The development of a portable rapid diagnostics device, will significantly improve the treatment outcomes, and decrease complications suffered by those unlucky enough to contract the virus.

About the flu diagnostics device project:

- Officially titled: 'Engineered Self-Assembling Monolayers for Label Free Detection of Influenza Nucleoprotein'
- The project is lead and developed by Professor Jeremy Lakey at

the Newcastle University (UK) in collaboration with Dr Deepan Shah at Orla Protein Technologies Ltd and ANSTO scientists Dr Anton Le Brun and Stephen Holt.

- The protein science and identification technology behind the project was originally developed by Professor Lakey, and has the potential to be used in the diagnosis of a wide array of infectious diseases.
- The objective of this project is to design a platform that can be coupled to a hand held electronic device, which can provide a rapid and accurate diagnostics for suspected flu suffers. This would enable treating physicians to more easily and accurately diagnose if a patient has contracted influenza, and assess appropriately if anti-virals should be prescribed.
- This device was designed to be an improvement on an earlier platform. The previous platform only bound a narrow range of different antibodies. This new platform is made more versatile because it binds a wider range of antibodies, expanding the scope of molecules that can potentially be detected.
- The platform is designed to be versatile so that it can be easily modified to detect different molecules from clinical, veterinary, or environmental situations, but the target chosen for proof of concept was nucleoprotein from the influenza virus.
- The development of the surface coating technology led to a collaborative development with OJ-Bio Ltd. – a company that develops hand-held electronic biosensors.
- The current gold standard for diagnosis of influenza includes culturing the virus, and carrying out an immunoassay – which can take up to ten days. Whilst there are methodologies with fast result times (as fast as a couple of hours) these require a specially equipped lab and highly trained technicians.
- Australian scientists developed the world's first effective anti-viral influenza treatment, Relenza.
- A course of anti-viral treatment (with Relenza or with other

subsequently developed anti-virals) must be started within 48 hours of the onset of symptoms to be effective in reducing the severity of the viral infection. Prescription of these medications has therefore been limited because of the average time taken to diagnose the virus using current methodologies.

Provided by ANSTO