Researchers create tool to predict avian flu outbreaks

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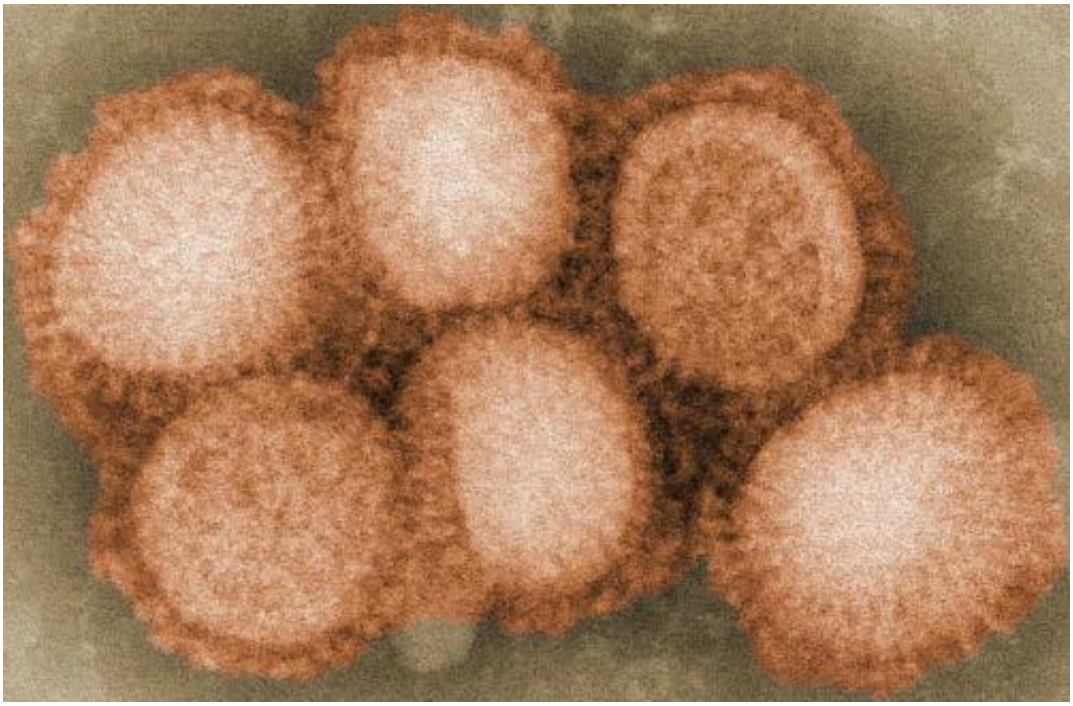

H1N1 virus. Credit: C. S. Goldsmith and A. Balish, CDC

A simple and effective portable tool to predict avian flu outbreaks on farms has been created by University of Guelph researchers.

U of G researchers devised a real-time way to analyze chickens and other farm birds for avian flu. The tool uses a small blood sample and relies on a simple chemical colour change to see not only whether a chicken has avian flu but also what viral strain is involved.

Current tests require samples to be sent to a lab, where it can take eight hours to a couple of days to yield results. That's too long, said Prof. Suresh Neethirajan, School of Engineering.

"Treatment, especially when dealing with humans who have been infected, needs to start as soon as possible," he said.

"This test only needs two to three minutes to incubate, and then you get the results immediately. Not only that, but it is more cost-effective. Conventional techniques are time-consuming and labour-intensive, and require special facilities and expensive laboratory instruments."

A study about the device will appear in an upcoming issue of the scientific journal *Sensors*, published by Molecular Diversity Preservation International (MDPI).

This week, Canadian officials placed eight farms in southern Ontario under quarantine after an avian influenza outbreak caused the sudden deaths of thousands of birds over several days.

Preliminary testing on the strain was conducted at U of G's Animal Health Lab.

An outbreak of avian flu also took place in Canada in January and December of 2014.

Neethirajan and post-doctoral researcher Longyan Chen wanted to create a test that could be used by anyone, even a non-scientist.

"That is why we designed it so that the final colour changes based on what type of influenza it is, and it can differentiate between a human strain and a bird strain," said Neethirajan.

"It's critical to get out front of any outbreaks. There are many strains, and we need to know the source of the flu. The identification of the strain determines what treatment options we should use."

The device uses gold nanoparticles (microscopic particles) and glowing quantum dots. The researchers developed a novel approach for rapid and sensitive detection of surface proteins of viruses from blood samples of turkeys.

The new nanobiosensor can detect the strains of H5N1 and H1N1. The most recent outbreak was from H5N2, which is similar to H5N1, Neethirajan said. With some architecture modifications, the developed biosensing technique has the potential to detect the H5N2 strain as well, he said.

The subtype H1N1 is human adapted while most H5 are avian oriented, Neethirajan added.

"We're creating a rapid animal health diagnostic tool that needs less volume of blood, less chemicals and less time. We will be able to determine, almost immediately, the difference between virus sub-strains from human and avian influenza."

Provided by University of Guelph