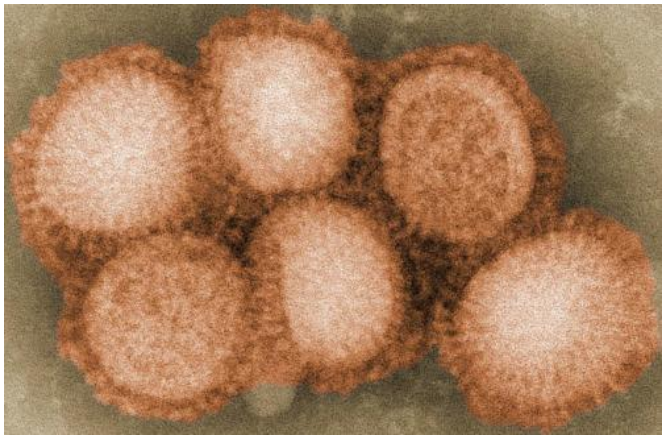
Researchers create tool to predict avian flu outbreaks

10 April 2015



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."

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"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

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Simple Avian Flu Test Designed for Poultry

BY ALAN, ON APRIL 10TH, 201

(Agricultural Research Service, USDA)

10 April 2015. A bioengineering lab at University of Guelph in Ontario, Canada developed a quick, simple test for avian flu virus that infects poultry, including the type of virus now infecting turkeys in the U.S. and Canada. Guelph's **Bionano Lab** led by engineering professor **Suresh Neethirajan** says a description of its device will appear in an upcoming issue of the journal ***Sensors***.

Current testing techniques for avian flu viruses require taking blood samples from birds and sending them to remote labs for analysis. Just the analysis step takes 8 hours, says Neethirajan, and the entire process requires at least 2 days from sample to results.

When testing for avian flu outbreaks, particularly early on, getting results quickly is vital. "It's critical to get out front of any outbreaks," notes Neethirajanin in a **university statement**. "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 Guelph test, returns results on the spot in about 2 to 3 minutes. The device designed by Neethirajanin and Longyan Chen, a postdoctoral researcher in the Bionano Lab, uses less blood from the birds than current techniques. In addition, the device tests the samples for characteristic surface proteins with a process using gold nanoparticles and quantum dots tuned to emit different colors. **Quantum dots** are pieces of semiconductor material that make it possible to measure and manipulate single electronic charges.

Not only can the Guelph test indicate the presence of avian flu virus, it can tell the strain of virus for determining the course of treatment. The researchers say their test can discriminate between H5N1 and H1N1 avian flu strains, and can be extended to indicate H5N2 strain causing the current outbreak. Of the 16 **hemagglutinin subtypes** of influenza — the "H" in virus codes — H5 is associated more with outbreaks in wild and domestic birds, while H1 can also affect humans.

The new avian flu test comes at a critical time for poultry producers in North America. The **New York Times** reports today that the deadly H5N2 virus, believed to originate in migrating wild birds, is causing turkey farmers Minnesota to euthanize some 525,000 birds, with quarantines occurring in the U.S. West and Midwest. That same virus hit **British Columbia** in December 2014 and January 2015, and this week was confirmed on a farm in southwestern Ontario by Guelph's **Animal Health Lab**, which collaborated on the avian flu test.

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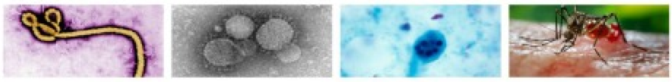

Canadian researchers create tool to predict avian flu outbreaks

Posted by Staff on April 11, 2015 // Leave Your Comment

With reports of avian influenza **spreading across the United States and Canada**, researchers with the University of Guelph in Ontario have developed a simple and effective portable tool to predict avian flu outbreaks on farms.

Image/ Szilas

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.

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"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."

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

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"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.

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

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Source: University of Guelph

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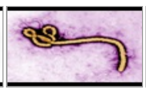
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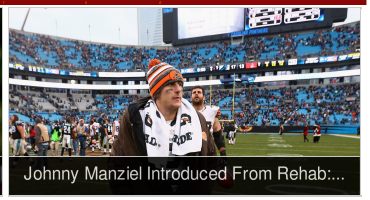
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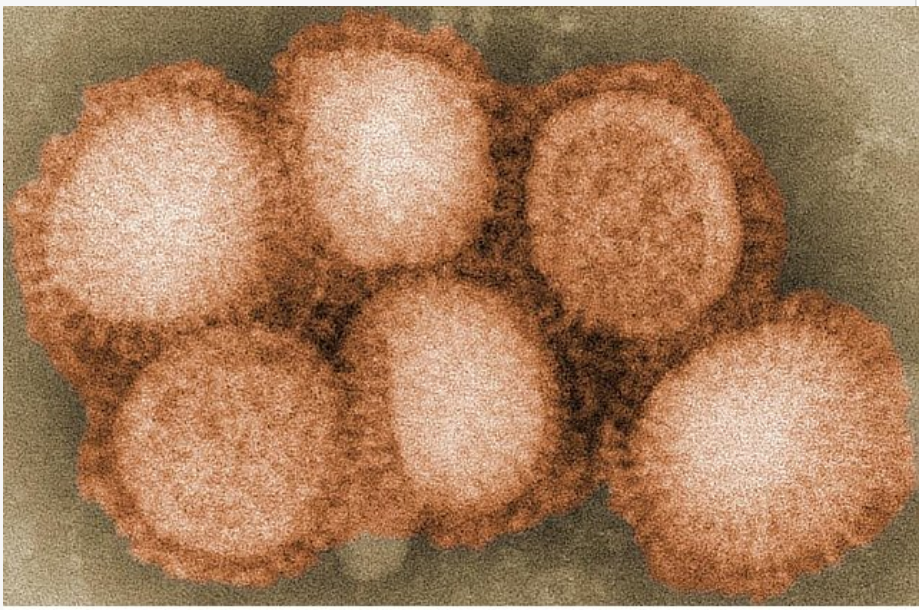

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U of G researchers devised a genuine-time way to analyze chickens and other farm birds for avian flu. The tool makes use of a tiny blood sample and relies on a straightforward chemical colour alter to see not only whether a chicken has avian flu but 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 outcomes. That is also extended, stated Prof. Suresh Neethirajan, College of Engineering.

"Remedy, specifically when dealing with humans who have been infected, needs to begin as quickly as doable," he stated.

"This test only needs two to 3 minutes to incubate, and then you get the results quickly. Not only that, but it is much more expense-effective. Traditional tactics are time-consuming and labour-intensive, and require special facilities and expensive laboratory instruments."

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Preliminary testing on the strain was carried out 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 build a test that could be employed by anyone, even a non-scientist.

"That is why we developed it so that the final colour modifications primarily based on what sort of influenza it is, and it can differentiate between a human strain and a bird strain," stated Neethirajan.

"It's crucial to get out front of any outbreaks. There are numerous strains, and we need to have to know the source of the flu. The identification of the strain determines what remedy selections we should really use."

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Published on: **Apr 10, 2015**

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The subtype H1N1 is adapted to people, in most cases, while most H5 are avian oriented, Neethirajan added.

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