Food additive may prevent spread of deadly new avian flu

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A common food additive can block a deadly new strain of avian influenza virus from infecting healthy cells, report researchers at the University of Illinois at Chicago College of Medicine in the online journal, *PLOS ONE*.

The compound, in wide use as a preservative, binds to a part of the flu virus that has never been targeted by any existing antiviral drug, raising hopes for its effectiveness against multi-drug-resistant flu viruses.

"The recent H7N9 outbreak in China this past March had a mortality rate of more than 20 percent," says Michael Caffrey, associate professor of biochemistry and molecular genetics at UIC. That strain, which is new, is already showing resistance to the majority of existing drugs used to treat it, Caffrey said. Preventing an outbreak that could lead to mass casualties would be difficult with the current arsenal.

"The need to develop new antiviral therapeutics now is crucial," he said.

Flu viruses enter host cells using a special protein called hemagglutinin, which acts as a "key" that opens receptors on the cell surface. If hemagglutinin is disabled, the virus is locked out and can't infect cells.

UIC researchers, led by Caffrey, found that the FDA-approved food additive tert-butyl hydroquinone sticks to a specific region on the hemagglutinin molecule. The additive, he said, "attaches to the Achilles' heel of the virus—a loop-shaped portion of hemagglutinin necessary for binding to cells, making cell infection impossible."

The loop on the hemagglutinin molecule represents a new therapeutic target, since existing drugs don't go after it, Caffrey said.

"Any drugs that focus on the hemagglutinin loop would be totally novel to flu viruses, and so resistance, if developed, would still be a long way off."

Caffrey and his colleagues were looking at a different class of viruses when the first outbreak of the H7N9 virus was reported in China last spring.

"Tert-butyl hydroquinone was known to have virus-blocking effects for H3 viruses," he said. "So when the H7N9 outbreak occurred, we thought we'd see if it had any effect on H7 viruses."

Using a novel technique, the researchers fused the hemagglutinin of the H7N9 virus to a less dangerous virus in order to study it safely. They found that tert-butyl hydroquinone was able to prevent the virus from infecting human lung cells in the lab.

The researchers are now looking for ways to enhance tert-butyl hydroquinone's ability to prevent infection. One way might be to add it to poultry feed. Keeping the virus from spreading in chickens could reduce the likelihood of it jumping to humans, Caffrey said. While the compound is used in a variety of foods as a preservative and stabilizer, questions remain regarding its safety if consumed in very high doses.

Provided by University of Illinois at Chicago

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