FluGen Founder in the News Again

UW-Madison virologist part of international research team studying virus

By Karen Herzog of the Journal Sentinel. Original article here.

A new bird flu virus responsible for at least 37 deaths in China since March — more than a fourth of those it infected — has the potential to spark a global outbreak, a team of researchers led by virologist Yoshihiro Kawaoka of the University of Wisconsin-Madison and the University of Tokyo concludes in findings published Wednesday.

Once live poultry markets in China reopen this winter, after being shut down in recent months to stop the spread of the H7N9 virus, scientists expect more illnesses and more deaths, Kawaoka, one of the world's leading experts on avian flu, said in a telephone interview.

Scientists don't know whether the virus will have the ability to spread beyond China. They also don't know whether H7N9 will re-emerge in strains already seen, or whether new strains will appear. Viruses circulate and naturally mutate in nature.

"It almost certainly will come back in the winter," Kawaoka said, "and very similar viruses to this one are also there in China. This is not the only virus that will transmit to humans."

Scientists elsewhere are working on developing a vaccine to provide some protection against H7N9.

Most human cases have been linked to contact with chickens, though the World Health Organization and others have warned that the virus could be spread among humans, possibly triggering a global pandemic.

The new research published Wednesday in the journal Nature is a comprehensive analysis of two of the first human isolates of the H7N9 virus from patients in China.

Kawaoka noted that the H7N9 virus is "quite different" from the 2009 H1N1 "swine flu" virus that most severely affected those ages 25 and younger worldwide. H7N9 in China has disproportionately hit those over age 60, and males in particular, Kawaoka said.

Scientists in Madison and Tokyo researched the H7N9 virus' pandemic potential by studying how it infects various mammals, how it replicates in cells, and whether it could be spread by respiratory droplets through coughing and sneezing.

Scientists laid the groundwork for the research and analyzed the results in Madison. In Toyko, they transmitted the virus to mice, ferrets, macaque monkeys, miniature pigs, chickens and quail to see how each responded, and whether the animals became infected.

Ferrets are considered a standard model for studying influenza in mammals because they spread viruses like humans, through coughing and sneezing. The research found that H7N9 has the ability to infect and replicate in the cells of both ferrets and monkeys.

One of the concerns about this virus' potential is that one of the two strains of H7N9 could be transmitted in ferrets through respiratory droplets, though not as efficiently as human influenza viruses, Kawaoka said. Avian flu viruses typically lack the ability to be passed through respiratory droplets.

Humans are especially vulnerable to avian influenza because they lack immunity.

And while other avian viruses are easily detected and monitored because infected birds become visibly ill or die, H7N9 is a stealth virus — it doesn't kill the chickens it infects. So scientists have to randomly test poultry to find the virus.

Can pass to humans

The H7N9 virus has spread to at least 132 humans in China. Authorities believe the virus has genetically evolved so that it can be passed from human to human, based on several cases of suspected human-to-human transmission.

The influenza virus depends on host cells, which it hijacks to make new virus particles and sustain the chain of infection. The research found that H7N9 possessed several characteristics of human influenza viruses, such as efficient binding to human-type receptors, efficient replication in mammalian cells and respiratory droplet transmission in ferrets.

The research suggests that just a few amino acid changes in the genetic sequence of the H7N9 virus allowed it to infect and replicate in human cells, which Kawaoka says is necessary, though not sufficient alone to cause a pandemic.

Another troubling feature of the H7N9 virus is how efficiently it infected cells in both the upper and lower respiratory tracts of monkeys in the study, which could make it more deadly, Kawaoka said. Conventional human flu viruses typically are restricted to the upper airway in infected monkeys.

There is some good news in the research.

The H7N9 strains tested were somewhat sensitive to anti-viral drugs that are effective against the seasonal flu

virus, though one isolate seemed to resist Tamiflu. That isolate appeared to be a mix of two variants of the H7N9 virus, according to the study.

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