Influenza Background Information

Viruses are among the most important causes of human disease and are of increasing concern as agents for bioterrorism. The highly pathogenic Avian Influenza A (H5N1), also known as the bird flu, has drawn a great deal of concern and the attention of the United States government. The U.S. government began monitoring the outbreak of the viruses as early as 1997 when H5N1 was isolated from a farmed goose in Guangdong Province, China. Hong Kong reported the first known instance of human infection, which was believed to have been transmitted directly from birds to humans, although rare person-to-person infection was noted.

Since then, several strands of the virus have been reported. There are many different subtypes of type A influenza viruses. These subtypes differ because of changes in certain proteins (hemagglutinin [HA] and neuraminidase [NA] proteins) on the surface of the influenza A virus. There are 16 known HA subtypes and 9 known NA subtypes of influenza A viruses. Many different combinations of HA and NA proteins are possible. Each combination represents a different subtype. All known subtypes of influenza A viruses can be found in birds.

In 1999, a low pathogenic avian influenza (H9N2) virus infection was confirmed in two children from China and resulted in an uncomplicated influenza-like illness. The source is unknown, but the evidence suggested that poultry was the source of infection and the main mode of transmission was from bird to human. However, the possibility of person-to-person transmission could not be ruled out. Several additional human H9N2 infections were reported in China from 1998 to 1999.

In 2002, one person in the United States was found to have serologic evidence of infection with H7N2, following an outbreak of H7N2 among poultry in the Shenandoah Valley poultry production area of Virginia.

In 2003, China and Hong Kong reported two cases of highly pathogenic avian influenza A (H5N1) infection that occurred among members of a Hong Kong family that had traveled to China. One person recovered; the other died. How or where these two family members were infected was not determined. Another family member died of a respiratory illness in China, but no testing was done. Also, the Netherlands reported outbreaks of influenza A (H7N7) in poultry on several farms. Later, infections were reported among pigs and humans. In total, 89 people were confirmed to have H7N7 influenza virus infection associated with this poultry outbreak. These cases occurred mostly among poultry workers. H7N7-associated illness included 78 cases of conjunctivitis (eye infections) only; 5 cases of conjunctivitis and influenza-like illnesses with cough, fever, and muscle aches; 2 cases of influenza-like illness only; and 4 cases that were classified as “other.” There was one death among the 89 cases — a veterinarian
who visited one of the affected farms and developed acute respiratory distress syndrome and complications related to H7N7 infection. The majority of these cases occurred as a result of direct contact with infected poultry; however, Dutch authorities reported three possible instances of transmission from poultry workers to family members. Since then, no other instances of H7N7 infection among humans have been reported.

Other reports of the avian influenza during 2003 include a low pathogenic avian influenza A (H9N2) infection in a child in Hong Kong. The child was hospitalized and recovered. In November, a patient with serious underlying medical conditions was admitted to a hospital in New York with respiratory symptoms. One of the initial laboratory tests identified influenza A virus that was thought to be H1N1. The patient recovered and went home after a few weeks. Subsequent tests conducted in March 2004 showed that the patient had been infected with avian influenza A (H7N2) virus.

In January 2004, outbreaks of highly pathogenic influenza A (H5N1) in Asia were first reported by the World Health Organization. For more information and updates, visit the Avian Influenza section of the World Health Organization and the Center for Disease Control websites at http://www.who.int/en and http://www.cdc.gov, respectively.

In February 2004, human infections of highly pathogenic avian influenza A (H7N3) among poultry workers in Canada were associated with an H7N3 outbreak among poultry. The H7N3-associated mild illnesses consisted of eye infections.

Since the outbreak in 1997, there have been over 150 confirmed cases of human infection with avian influenza A viruses. Although a human pandemic has NOT begun, there is concern about the H5N1 influenza virus, which has spread throughout bird populations in Asia, Europe, and Africa. History has shown that influenza pandemics happen from time to time, and that the viruses that cause these pandemics can be linked to influenza viruses in birds. If the bird virus undergoes certain genetic changes, it could develop the ability to be transmitted between humans. If that occurs, it could spread across the globe in what is known as a pandemic.

Given this concern, the U.S. President released the National Strategy for Pandemic Influenza in November 2005. On May 4, 2006, the White House reportedly released an Implementation Plan for that strategy. The Implementation Plan is essentially a roadmap for the U.S. Government's pandemic planning efforts.

In order to address the influenza threat most effectively, it is critically important that the federal government work with the scientific community and industry to develop new vaccines, antiviral technologies, and detective devices. This has been going on for some time, but has been accelerated since Congress
appropriated $3.8 billion for pandemic preparedness at the end of last year. We are looking at new antiviral agents at various stages of development and expanding our research efforts to identify new ways to target the influenza virus.

Currently, numerous universities and the scientific industry have been researching the development of a miniature device sensitive enough to detect a single virus particle. This technology could have many applications, including better disease detection, environmental monitoring, and bioterrorism defense. The technology to detect airborne viruses in real time with a small, easy-to-use device would be a major breakthrough in the confinement and management of viral epidemics. Although there have been major technological advancements in this area, scientists estimate that the commercial availability of real-time biosensor devices will not occur for two to five years. With the impending pandemic and escalating biological warfare terrorist threats, we cannot wait for this new technology to be incorporated into a viable end product.

Here are some video news clips and articles about the bird flu that might interest you.

Bird Flu Crisis, November 1, 2005
http://abcnews.go.com/Video/playerIndex?id=1269356

National Strategy for Pandemic Influenza, November 2005
http://www.whitehouse.gov/homeland/pandemic-influenza.html

Bird Flu Danger Zone, December 5, 2005
http://abcnews.go.com/Video/playerIndex?id=1375554

Bird Flu Preparedness, March 6, 2006
http://abcnews.go.com/Video/playerIndex?id=1694796

Nightline: Prepare for a Pandemic, May 9, 2006
http://abcnews.go.com/Video/playerIndex?id=1941775

http://abcnews.go.com/Video/playerIndex?id=2178100

Urgent bird flu summit in Rome, February 3, 2004

Official: World not ready for flu, October 6, 2005
Bird flu: What you need to know, October 14, 2005

Bird flu may kill 150m, warns U.N., September 30, 2005