



AVIAN INFLUENZA (BIRD FLU)

Avian Influenza A Virus Infections of Humans

Although avian influenza A viruses usually do not infect humans, rare cases of human infection with avian influenza A viruses have been reported since 1996. Since November 2003, more than 330 confirmed cases of human infection with highly pathogenic avian influenza A (H5N1) viruses have been reported from 12 countries. The World Health Organization (WHO) maintains situation updates (http://www.who.int/csr/disease/avian_influenza/updates/en/index.html) and cumulative reports of human cases (http://www.who.int/csr/disease/avian_influenza/country/en/index.html) of avian influenza A (H5N1). Most human cases of H5N1 virus infection are thought to have occurred during direct contact with sick or dead infected poultry. Other avian influenza A subtype viruses have infected humans, including low pathogenic and highly pathogenic virus strains. (For more information, see "Low Pathogenic versus Highly Pathogenic Avian Influenza Viruses" on the CDC Influenza Viruses Web page.) Most human infections with other avian influenza A viruses have also been attributed to direct poultry contact. Human clinical illness from infection with avian influenza A viruses has ranged from eye infections (conjunctivitis) to severe respiratory disease (pneumonia) to death.

Because of concerns about the potential for more widespread infection in the human population, public health authorities closely monitor outbreaks of human illness associated with avian influenza. The spread of avian influenza A viruses from one ill person to another has been reported very rarely, and has been limited, inefficient and unsustainable. However, because avian influenza A viruses have the potential to change and gain the ability to spread easily between people, monitoring for human infection and person-to-person transmission is important. See Information about Influenza Pandemics (<http://www.cdc.gov/flu/avian/gen-info/pandemics.htm>) for more information.

Instances of Avian Influenza A Virus Infections of Humans

Confirmed instances of avian influenza viruses infecting humans since 1996 include:

- **H7N7, United Kingdom, 1996:** One adult developed conjunctivitis after a piece of straw contacted her eye while cleaning a duck house. Low pathogenic avian influenza A (H7N7) virus was isolated from a conjunctiva specimen. The person was not hospitalized and recovered.
- **H5N1, Hong Kong, Special Administrative Region, 1997:** Highly pathogenic avian influenza A (H5N1) infections occurred in both poultry and humans. This was the first time an avian influenza A virus transmission directly from birds to humans had been found to cause respiratory illness. During this outbreak, 18 people were hospitalized and six of them died. To control the outbreak, authorities killed about 1.5 million chickens to remove the source of the virus. The most significant risk factor for human H5N1 illness was visiting a live poultry market in the week before illness onset.
- **H9N2, China and Hong Kong, Special Administrative Region, 1999:** Low pathogenic avian influenza A (H9N2) virus infection was confirmed in two hospitalized children and resulted in uncomplicated influenza-like illness. Both patients recovered, and no additional cases were confirmed. The source is unknown. Several additional human H9N2 virus infections were reported from China in 1998-99.
- **H7N2, Virginia, 2002:** Following an outbreak of low pathogenic avian influenza A (H7N2) among poultry in the Shenandoah Valley poultry production area, one person developed uncomplicated

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influenza-like illness and had serologic evidence of infection with H7N2 virus.

- **H5N1, China and Hong Kong, Special Administrative Region, 2003:** Two cases of highly pathogenic avian influenza A (H5N1) virus infection 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.
- **H7N7, Netherlands, 2003:** The Netherlands reported outbreaks of highly pathogenic avian influenza A (H7N7) virus among poultry on multiple farms. Overall, 89 people were confirmed to have H7N7 virus infections associated with poultry outbreaks. Most human cases occurred among poultry workers. H7N7-associated illness was generally mild and included 78 cases of conjunctivitis (eye infections); five cases of conjunctivitis and influenza-like illness with fever, cough, and muscle aches; two cases of influenza-like illness; and four cases that were classified as "other." One death occurred in a veterinarian who visited one of the affected farms and developed complications from H7N7 infection, including acute respiratory distress syndrome. The majority of H7N7 cases occurred through direct contact with infected poultry. However, Dutch authorities reported three possible instances of human-to-human H7N7 virus transmission from poultry workers to family members.
- **H9N2, Hong Kong, Special Administrative Region, 2003:** Low pathogenic avian influenza A (H9N2) virus infection was confirmed in a child in Hong Kong. The child was hospitalized with influenza-like illness and recovered.
- **H7N2, New York, 2003:** In November 2003, a patient with serious underlying medical conditions was admitted to a hospital in New York with respiratory symptoms. The patient recovered and went home after a few weeks. Testing revealed that the patient had been infected with a low pathogenic avian influenza A (H7N2) virus.
- **H7N3, Canada, 2004:** In March 2004, two poultry workers who were assisting in culling operations during a large influenza A (H7N3) poultry outbreak had culture-confirmed conjunctivitis, one of whom also had coryza. Both poultry workers recovered. One worker was infected with low pathogenic H7N3 and the other with high pathogenic H7N3.
- **H5N1, Thailand and Vietnam, 2004:** In late 2003 and early 2004, severe and fatal human infections with highly pathogenic avian influenza A (H5N1) viruses were associated with widespread poultry outbreaks. Most cases had pneumonia and many had respiratory failure. Additional human H5N1 cases were reported during mid-2004, and late 2004. Most cases appeared to be associated with direct contact with sick or dead poultry. One instance of probable, limited, human-to-human spread of H5N1 virus is believed to have occurred in Thailand. Overall, 50 human H5N1 cases with 36 deaths were reported from three countries.
- **H5N1, Cambodia, China, Indonesia, Thailand and Vietnam, 2005:** Severe and fatal human infections with highly pathogenic avian influenza A (H5N1) viruses were associated with the ongoing H5N1 epizootic among poultry in the region. Overall, 98 human H5N1 cases with 43 deaths were reported from five countries.
- **H5N1, Azerbaijan, Cambodia, China, Djibouti, Egypt, Indonesia, Iraq, Thailand, Turkey, 2006:** Severe and fatal human infections with highly pathogenic avian influenza A (H5N1) viruses occurred in association with the ongoing and expanding epizootic. While most of these cases occurred as a result of contact with infected poultry, in Azerbaijan, the most plausible cause of

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exposure to H5N1 in several instances of human infection is thought to be contact with infected dead wild birds (swans). The largest family cluster of H5N1 cases to date occurred in North Sumatra, Indonesia during May 2006, with seven confirmed H5N1 cases and one probable H5N1 case, including seven deaths. Overall, 115 human H5N1 cases with 79 deaths were reported in nine countries.

- **H5N1, Cambodia, China, Egypt, Indonesia, Laos, Nigeria, Vietnam, 2007:** Severe and fatal human infections with highly pathogenic avian influenza A (H5N1) viruses occurred in association with poultry outbreaks. In addition, during 2007, Nigeria (January) and Laos (February) confirmed their first human infections with H5N1.
- **H7N2, United Kingdom, 2007:** Human infection with low pathogenic avian influenza A (H7N2) virus resulting in influenza-like illness and conjunctivitis were identified in four hospitalized cases. The cases were associated with an H7N2 poultry outbreak in Wales.
- **H9N2, China, 2007:** In March 2007, Hong Kong, Special Administrative Region, confirmed low pathogenic avian influenza A (H9N2) virus infection in a 9-month-old girl with mild signs of disease.

A timeline of major avian influenza A (H5N1) events is available at http://www.who.int/csr/disease/avian_influenza/timeline_10_09_2007.pdf.

Symptoms of Avian Influenza in Humans

The reported symptoms of avian influenza in humans have ranged from eye infections (conjunctivitis) to influenza-like illness symptoms (e.g., fever, cough, sore throat, muscle aches) to severe respiratory illness (e.g. pneumonia, acute respiratory distress, viral pneumonia) sometimes accompanied by nausea, vomiting and neurologic changes.

Antiviral Agents for Avian Influenza A Virus Infections of Humans

CDC and WHO recommend oseltamivir, a prescription antiviral medication, for treatment and chemoprophylaxis of human infection with avian influenza A viruses. Analyses of available H5N1 viruses circulating worldwide suggest that most viruses are susceptible to oseltamivir. However, some evidence of resistance to oseltamivir has been reported in H5N1 viruses isolated from some human H5N1 cases. Ongoing monitoring for antiviral resistance among avian influenza A viruses is critical.

Prevention of Avian Influenza A Virus Infections of Humans

Persons exposed to avian influenza A-infected or potentially infected poultry are recommended to follow good infection control practices including careful attention to hand hygiene, and to use personal protective equipment. In addition, they should be vaccinated against seasonal influenza and should take influenza antiviral agents for prophylaxis. Exposed persons should be carefully monitored for symptoms that develop during and in the week after exposure to infected poultry or to potentially avian influenza-contaminated environments.

Additional information regarding CDC and WHO Guidance at:

http://www.who.int/csr/disease/avian_influenza/guidelines/ClinicalManagement07.pdf

http://www.who.int/medicines/publications/WHO_PSM_PAR_2006.6.pdf

<http://www.cdc.gov/flu/avian/professional/pdf/protectionguid.pdf>

For more information, visit <http://www.cdc.gov/flu/avian>,
or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

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