The threat of highly pathogenic avian influenza H5: Will H5N2 infections occur in humans?

To the Editor,

In early March 2012, animal health and quarantine officials culled and then destroyed more than 54,000 chickens and sterilized a farm in Changhua (in central Taiwan) due to an outbreak of the highly pathogenic strain of avian influenza (HPAI) H5N2.1 Because all of the news that has any connection to avian influenza remains of great interest to the public, this event caught the attention of the media and the general population. Ultimately, the director of Taiwan’s Bureau of Animal and Plant Health Inspection and Quarantine resigned because of accusations of a cover-up.

The first case of avian influenza in humans was diagnosed in Hong Kong in 1997.2 A total of 18 human cases and 6 deaths were reported, and all of the birds in the area markets were destroyed.3 Before this outbreak in Hong Kong, the direct transmission of avian influenza to humans had never been reported. It was believed that a barrier existed that prevented the transmission of avian influenza to humans due to differences between receptors. However, subsequent episodes of avian influenza infecting the human population has been reported with subtypes H7N7, H9N2, and H5N1.4 In 2003, H5N1 avian influenza reemerged in humans and spread throughout Southeast Asia, parts of Europe, and northern Africa, sparing North and South America. The mortality rate was estimated to be as high as 50–60%, vastly different from that of seasonal influenza (estimated mortality rate of 0.1%). However, the transmission efficacy of the H5N1 avian influenza was poor and only a few cases of human-to-human transmission were reported. The major route of transmission was through direct contact between humans and birds instead of via aerosol. However, recent studies have indicated that the mortality rate of H5N1 avian influenza may have been overestimated, arising from a higher seroprevalence among subclinical cases determined using meta-analysis.5 Nevertheless, avian influenza poses a continuing threat to the human population.

Regarding the evolution of H5N1 avian influenza, the initial H5N1 progenitor reassortant (H5N1-PR1, A/Goose/Guangdong/1/1996) was not a human pathogen.6 Only reassortants H5N1-PR2 (1997) and H5N1-PR7 (since 2003) have been associated with confirmed human cases. Having a firm grasp of the evolutionary patterns of H5N1 HPAIVs can help to estimate the speed of emergence of avian influenza in human cases.

In addition to the direct transmission of avian influenza to humans, it is possible that the avian influenza genes incorporate and mix with the influenza genes from other species, such as swine and human, resulting in genetic recombination. We had already experienced the emergence of reassortant novel H1N1 influenza in 2009.7 Although the initial 2009 wave of influenza in Taiwan was mild,8 transmission was not completely blocked by routine infectious disease control procedures, and some atypical presentations could occur in the future.9,10 Because there are not presently any reported human cases of H5N2, the likely biological behavior of this HPAI in humans is unclear and subject to speculation. Based on the existence of multiple basic amino acids in hemagglutinin, it is very likely that the H5N2 virus will act more like the H5N1 virus. This is notwithstanding the fact that the H5N2 virus will probably require some time to evolve, so an imminent outbreak in humans is only a remote possibility.

Nevertheless, several important steps should be initiated, including the monitoring of personnel, animals on farms, and migratory birds. In addition, an effective preparedness plan is crucial, which should include an ongoing search for an effective vaccine and the stockpiling of antiviral drugs and personal protective devices. With accurate information and ample preparedness, the status quo should be vigilance, not panic.

References


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