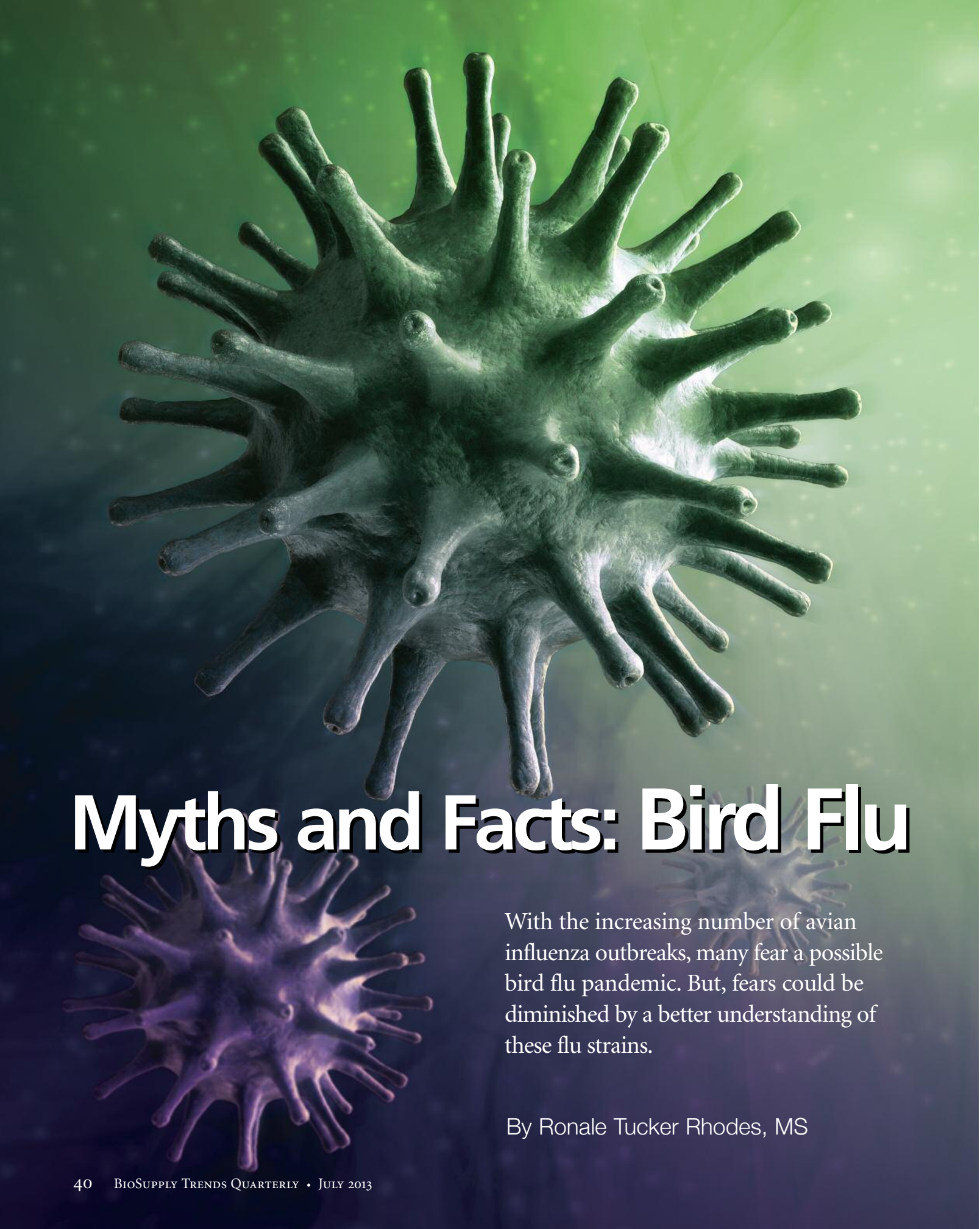

Myths and Facts: Bird Flu

With the increasing number of avian influenza outbreaks, many fear a possible bird flu pandemic. But, fears could be diminished by a better understanding of these flu strains.

By Ronale Tucker Rhodes, MS

The bird flu has struck again, this time in China, with the number of infections and deaths increasing weekly. What's worrisome is that this strain of the bird flu is one that has not previously been detected in humans.[1] Add this strain to the recurring and ever mutating ones that have been reported since 1997 (the year in which a strain was unusually severe), and it's no wonder many fear that this flu virus, also known as avian influenza, could mutate into a deadly pandemic similar to the Spanish flu that occurred in 1918. But, while health officials throughout the world are keeping a close eye on outbreaks and making preparations in the event of a pandemic, most believe that the likelihood of a disastrous pandemic is very small. Indeed, most people's fear could be quelled by clearing up the many misconceptions about the avian influenza virus.

Separating Myth from Fact

Myth: The avian influenza viruses are the same as the human influenza viruses.

Fact: While the avian influenza viruses and most human influenza viruses are type A viruses (human viruses are also types B and C), there are substantial genetic differences between the subtypes that typically infect both people and birds. Influenza viruses are divided into subtypes based on the two proteins, hemagglutinin (H) and neuraminidase (N), that they have on their surfaces. There are 16 recognized H types and nine N types, and these are known to occur in a number of different combinations. Avian influenza virus subtypes are restricted to H5, H7 and H9 viruses, all of which can be partnered with any one of nine N proteins. Therefore, there are potentially nine different forms of each subtype (e.g., H5N1, H5N9, H7N1, H9N9). These combinations of bird flu viruses infect birds.[2,3] And, while it is possible for humans to be infected through contact with birds, the spread from person to person has been very rare to date.[4]

Myth: All bird flu viruses are the same.

Fact: The three avian influenza subtypes — H5, H7 and H9 — vary in several ways. As mentioned, each has potentially nine different subtypes. The viruses also can be distinguished as low pathogenic (LPAI) or high pathogenic (HPAI) strains based on the viruses' genetic features and the severity of the illness they cause in poultry. The H5 and H7 viruses can be distinguished as both LPAI and HPAI, whereas the H9 virus is documented only as an LPAI strain. It is possible for humans to be infected by all three, but the severity of the infections vary. H5 infections have been documented among humans, and they sometimes cause severe illness and death. H7 infections in humans are rare, but they can occur among persons who have direct contact with infected birds, and symptoms typically include conjunctivitis and/or upper-respiratory symptoms. At least three H9 infections in humans have been confirmed.[2]

Myth: The bird flu is relatively rare.

Fact: The bird flu actually dates back to 1918 with the Spanish flu, which was the first major flu pandemic of the 20th century that killed an estimated 20 million to 40 million people. In 2005, researchers at the Armed Forces Institute of Pathology in Rockville, Md., reconstructed the genetic code of the deadly Spanish flu and found that the virus strain developed in birds and was similar to today's bird flu.[5] After that, the Asian flu was a category two flu pandemic outbreak of avian influenza that originated in China in early 1956 lasting until 1958.[6]

Today, avian influenza outbreaks among poultry occur worldwide from time to time. According to the World Organization for Animal Health (OIE) reporting criteria for Notifiable Avian Influenza in commercial poultry, since 1997, the United States has experienced 17 incidents of H5 and H7 LPAI and one incident of HPAI that was restricted to one poultry farm. The first HPAI in the U.S. occurred in 2004. This was an outbreak of avian influenza H5N2 that infected a flock of 7,000 chickens in south-central Texas. However, there was no report of transmission to humans.[7]

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Other countries have experienced much greater avian influenza activity. In 1997, an H5N1 outbreak infected chickens and humans in Hong Kong. It was the first time an avian influenza virus had ever been found to transmit directly from birds to humans. During this outbreak, 18 people were hospitalized, six of them died and 1.5 million chickens were killed to remove the source of the virus. In 1999, two cases of H9N2 in Hong Kong were confirmed in children. In 2003, two cases of H5N1 infections occurred among members of a Hong Kong family that traveled to China. H7N7 infections among poultry workers and their families were confirmed in the Netherlands during an outbreak among poultry, with more than 80 cases reported and one patient dying. Also that year, a child was infected with H9N2 in Hong Kong.[8] In 2004, the H5N1 virus resurfaced, infecting and killing 32 people in Thailand and Vietnam. Another mild virus infected a couple of poultry workers in Canada, and two more mild forms, H5N2 and H5N6, were discovered. In 2005, the bird flu infected 64 in Asia, 42 in Vietnam, 13 in Thailand, five in Indonesia and four in Cambodia. In August of the same year, the bird flu was found in Tibet, Siberia, Russia, Turkey, Romania, Croatia, Canada and Kazakhstan.[9] And, as mentioned, this year, a new

H7N9 strain has infected hundreds and killed dozens.

Myth: Bird flu viruses are highly contagious toward humans.

Fact: Despite the large number of people in the world who have contact with poultry every day, human cases of bird flu remain rare. Since 2003, only approximately 600 people have been infected with an avian influenza virus. Direct contact with poultry poses the highest risk. However, indirect exposure to bird feces also poses a risk. Therefore, contact with unwashed eggs from sick birds or water contaminated by poultry feces poses a potential risk of disease. There also is a theoretical risk that laboratory workers who handle the avian flu virus could become infected. Human-to-human spread of bird flu has occurred only in isolated cases. It is possible that caring for a person infected with bird flu can be a risk factor.[10]

It's difficult for the bird flu virus to infect human cells, but there is a possibility that mutations like antigenic shifts may reduce such difficulties. The concern is that the virus, if given enough opportunities, may change by reassortment with human influenza viruses or by some other mechanism into a form that is highly infectious for humans and spreads easily from person to person. Such a change could mark the start of a pandemic (a global outbreak in humans).[3]

Myth: People can contract the bird flu by eating poultry and eggs.

Fact: Precautions should be taken to eat only animal products from healthy animals. This is true for humans and other animals. However, even in areas experiencing outbreaks of HPAI, poultry and poultry products can be safely consumed if they are properly cooked and handled during food preparation. Avian influenza is not transmitted through cooked food, and to date, there is no evidence to indicate anyone has become infected following the consumption of properly cooked poultry or poultry products.[3]

Myth: The bird flu is a death sentence.

Fact: While the rate of death due to the bird flu is high, not all people who contract the bird flu die. Bird flu causes a very aggressive form of pneumonia (acute respiratory distress syndrome, or ARDS) that is often fatal. Many cases of bird flu occur in people who are poor, live in rural areas in underdeveloped countries, and do not have access to modern intensive care units or antiviral therapy.[10] It is the highly pathogenic form of the avian influenza virus that poses a death threat, and the H5N1 virus is often, but not always, deadly. In the 505 confirmed cases of avian influenza virus from 2003 to 2010, 300 have died, which corresponds to a 60 percent mortality rate.[11]

Myth: There is a vaccine to protect against the bird flu.

Fact: While there is one vaccine approved by the U.S. Food and Drug Administration to prevent infection with the H5N1 influenza virus strain — the one that has caused the largest outbreak of bird flu — the vaccine isn't available to the public.

Instead, the U.S. government is stockpiling it in the Centers for Disease Control and Prevention's (CDC) Strategic National Stockpile and will distribute it in the event of an outbreak. The vaccine is approved for adults ages 18 to 64 and is made from inactivated viruses and does not contain any live viruses. It has been shown to stimulate the immune system to make antibodies against the bird flu virus that could presumably protect a person from the bird flu. But, it is not known if it would be effective against any newly mutated strains.[10,12]

With the recent outbreak of the H7N9 avian influenza virus, experts around the world began talking daily about if and when to start making a vaccine. Shortly thereafter, the CDC announced it had begun making a seed vaccine against H7N9 based on the genetic sequences of the virus that China posted on public databanks.[13]

Myth: Without being vaccinated, there is no way to prevent the bird flu.

Fact: People can prevent the bird flu by avoiding contact with sick poultry originating in countries known to be affected by the virus. As of 2011, Egypt has the most reported cases to date. Prevention also includes poultry safety measures such as destroying flocks when sick birds are identified and vaccinating healthy flocks. Because the bird flu can spread to any area of the world by migrating birds, proper handling and cooking of poultry and eggs is recommended to kill bird flu viruses. For those caring for or in close contact with an infected patient, masks and other respiratory protection should be used. Those individuals also may be prescribed oseltamivir (Tamiflu) in an attempt to prevent infection.[10]

Myth: The same tests to diagnose the human flu are used to diagnose the bird flu.

Fact: While routine tests for human influenza A will be positive in patients with the bird flu, they are not specific for the avian virus. Instead, a specific diagnosis requires specialized tests. Culture and polymerase chain reaction (PCR) tests can detect the virus in sputum. PCR tests detect nucleic acid from the influenza A virus. Both tests are conducted in laboratories that have an appropriate biosafety reference certification. In the U.S., local health departments and the CDC can provide access to specialized testing. Unfortunately, the tests must be conducted during and after infection with the bird flu to detect antibodies against the virus. This means one sample must be taken at the onset of the disease and another sample must be taken several weeks later; therefore, the results are not available until the patient has recovered or died.[10]

Myth: Antivirals aren't effective against the bird flu.

Fact: Antivirals are recommended if they are taken within two days after the appearance of symptoms. However, according to the Mayo Clinic, many influenza viruses have become resistant to the effects of a category of antiviral drugs that includes amantadine and rimantadine. Therefore, health officials recommend the use of oseltamivir (Tamiflu) and possibly zanamivir (Relenza) instead.[14]

Myth: There is a real threat of a bird flu pandemic.

Fact: Many experts believe that the world is overdue for a global influenza pandemic that is as deadly as the Spanish flu. That's why scientists are working to determine which viruses might spark pandemics. Evidence of the 1918 Spanish flu strain mutations in the H5N1 virus suggests the ability of strains to jump directly to humans from other animals without having to first combine with a flu strain already adapted to humans. In addition, the century's other great pandemics of 1957 and 1968 were sparked by hybrid flu viruses (human influenzas that acquired some genes from an avian source), which suggests that pandemics can form in more than one way.[5]

So far, however, the bird flu viruses, including H5N1, have not triggered a pandemic in humans because they don't spread easily among mammals, and some scientists believe they never will. To spread easily from one person to another, a virus would have to become airborne, or develop the ability to spread via tiny droplets that people spray out of their mouths and noses when they cough and sneeze, which is how other flu viruses spread.

This has happened, but it is rare. In 2009, the H1N1 swine flu became airborne and caused a mild pandemic. Viruses like H5N1 and H1N1 are mutating all the time. If H5N1 were by chance to acquire some of the properties of H1N1, then it would spread more easily in mammals. One way it could do this is by accumulating chance mutations; another way is by swapping genes with other viruses, for instance while co-infecting an intermediate host (known as genetic reassortment).[15]

Since 2003, only approximately 600 people have been infected with an avian influenza virus.

One study shows how this might happen. In a new experiment, scientists induced five genetic changes in the H5N1 virus, transforming it into a type capable of airborne transmission between mammals. The scientists first changed three amino acid molecules of H5N1 in a way they believed would boost the virus's affinity for human hosts, and then infected ferrets with the mutated virus. They then swabbed the noses

of the infected ferrets and used virus samples from their bodies to infect another round of ferrets. At each stage, they took tissue samples from the ferrets to see how H5N1 was evolving. After 10 passages, the scientists found the virus had acquired the ability to transmit from animal to animal, which suggests that "in humans, it would take a low number of transmission for the mutations to accumulate," said the study's co-author. Five mutations gave the virus the ability to jump from ferret to ferret: three of the initial amino-acid changes, plus two that emerged through evolutionary selection in the animals' bodies.[4]

Much of the focus of H5N1 research has been to investigate how easy it might be for H5N1 to mutate into a readily transmissible form, and if so, which genes would be involved. This information can help researchers know what changes to look out for in emerging strains when assessing pandemic risk.[15]

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It is impossible to calculate the risk of a human pandemic of bird flu, but for it to emerge naturally, too many circumstances would have to coincide, making it unlikely for it to happen. As scientists from the St. Petersburg Influenza Research Institute point out: For a pandemic bird flu to occur, the epidemics of human and avian influenza must happen simultaneously and at the same place. And, it would be necessary for two related viruses to multiply in one and the same cell, which would have to result in not a weak mutation, but a powerful biotic mutation that would enable it to develop and multiply aggressively.[16]

Myth: In the event of a pandemic, the government won't be ready to respond.

Fact: The World Health Organization (WHO) and governments around the world are working in conjunction to develop pandemic response plans. These plans include monitoring local health conditions, reporting suspected instances of bird flu infection within 24 hours, developing plans for access to healthcare systems, containment of transmission of the bird flu, allocation of medications, and coordination of information with other health authorities. Governments also are coordinating efforts related to monitoring bird populations.

To prepare for an outbreak, the WHO has established a global, rapid deployment stockpile of three million treatment packs of antiviral medications, designated for use as a means of short-term containment in areas experiencing confirmed human-to-human transmission.[17]

Dispelling the Myths Now

Undoubtedly, the frequency of avian influenza outbreaks in the past several years, the way the viruses are mutating to create new strains and the lethality of many of these viruses are concerning. But compared with the human strains of the flu virus that kill thousands of people throughout the world each year, the bird flu is a minor threat. Scientists worldwide are devoted to studying the risks of a potential bird flu pandemic and, in the chance one does occur, they are making preparations to protect the public. ❖

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