

Bird Flu is for the Birds!

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Human influenza is a highly contagious disease. Most of us have had the flu multiple times in our lives. In the United States, influenza epidemics occur nearly every winter and are responsible for a substantial amount of illness and deaths. Approximately 114,000 hospitalizations and 20,000-50,000 deaths occur in the U.S. on an annual basis as a result of the flu according to the CDC web site: (<http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5107a1.htm>).

If influenza is so easily transmissible, why aren't more people catching the bird flu directly from birds? The reason is that birds and humans are different. The qualities that allow the virus to easily infect birds don't work well on humans.

Although it's true that avian flu viruses can become human flu viruses, the typical way a flu virus makes the jump from birds to humans is by infecting a pig that just happens to have a concurrent infection of human flu virus - 2 different viruses in the same animal at the same time. Pigs are more easily infected by both types of viruses and they serve as a sort of mixing pot. Different types of influenza viruses can exchange genetic material when they are exposed to each other in the same host. This is called antigenic shift.

Antigenic shift allows for large amounts of new genetic information to be acquired by the avian flu from the human flu virus when they are exposed to each other. If the avian flu virus acquires the genetic factors that allow it to easily pass from human to human, then it is possible for the avian virus to make the jump to become a human influenza.

Because birds and humans are very different, there are generally multiple factors that must be acquired in order for the virus to make the transition from avian to human flu. The actual factors that allow an avian flu virus to easily infect birds may prevent it from easily infecting humans. Additionally, the factors that allow the avian flu viruses to easily infect humans are likely to alter more than just the viruses' ability to infect humans. It is also likely to alter the virus's impact on the human body. In the case of H5N1, this means it is just as likely to become nothing more than the standard flu, as opposed to the killer flu, if it makes the jump to human influenza.

One of the reasons Asia is a breeding ground for influenza is the animal husbandry practices that are used there. Poultry can be brought to markets where they are exposed to poultry from other farms, and live birds are brought back home if unsold. Ducks, poultry and pigs are allowed to commingle on the farms where there is very little biosecurity. Poultry are allowed to free-range and domestic ducks are allowed to graze in open wetlands where wild waterfowl visit. This increases the likelihood that avian flu viruses which are common in wild waterfowl can mix with human flu viruses which are common in pigs. This allows for a shuffling of genetic traits between the different strains of viruses which creates new strains as a result. If the new strains have the ability to infect humans easily, then the farmer, or

other people around the livestock, will catch it and the virus spreads through the human population from there.

Animal husbandry practices in the United States are not conducive to the mingling of avian flu strains with human flu strains. If H5N1 arrives in the United States via migrating waterfowl, it is not going to have the opportunity to acquire the traits necessary to become a human flu virus here.

Influenza viruses also change their genetic properties by simple random mutations. This process is called antigenic drift, in contrast to antigenic shift. Antigenic drift is responsible for small changes in the genetic properties of the virus. All influenza viruses mutate regularly and thereby undergo antigenic drift constantly. This is the reason we can't carry immunity to the flu from one year to the next. This year's flu will be different enough from last year's flu so that our immune system will not recognize it or have the proper antibodies to fight it off. Although antigenic drift can result in changes in pathogenicity in avian flu virus strains, it rarely, if ever, results in the significant genetic changes required to allow an avian flu virus to make the jump to becoming a human flu virus.

It is theoretically possible for an avian flu virus to accumulate enough mutations through antigenic drift to gain the ability to infect humans easily, without antigenic shift or an intermediate host involved, but this generally requires a specific series of mutations to happen. Because more than a single mutation is involved, the odds of this happening are very small. Any single mutation in the direction that may lead to an avian flu becoming a human flu is likely to cause that avian flu strain to be less capable of infecting birds and thereby surviving long enough to gain the additional mutations necessary to complete the jump. Even if an avian virus strain was capable of accumulating the correct series of mutations to become a human influenza, those genetic changes are also just as likely to reduce the impact the virus has on the human body.

In order for an influenza virus to be easily spread throughout the human population and result in a pandemic, it must be mild enough for people to be able to go out and spread the virus once they are infected. If the virus kills its victims quickly, as is the case with the current strain of H5N1, there will be dramatically less opportunities for the virus to be transmitted from the victim to a new host. The infection becomes what epidemiologists call "self-limiting". Because a victim quickly becomes too sick to get out in public, the virus does not have the chance to spread to a large number of people. This further illustrates why the genetic changes required for H5N1 to become a human flu virus are unlikely to cause it to become the deadly killer that the media is playing it up to be.

The current pattern displayed by H5N1 illustrates how difficult it is for avian flu viruses to infect humans. Despite the fact that there have been millions of H5N1 infected poultry in Asia in the past few years, only a little over one hundred human H5N1 cases have been reported. This is a very small number in comparison to the probability of numerous human exposures resulting from the husbandry practices there. Keep in mind that in Asia poultry are frequently sold live to the consumer who must butcher and prepare the bird themselves.

Since 1997, more than 16 outbreaks of H5 and H7 influenza have occurred in poultry within the United States. The virus strains in each of these outbreaks were just as likely as H5N1 to become human influenza viruses, yet none of them made the jump from avian virus to human virus. Of all the people exposed to the avian flu during these 16 outbreaks, according to the CDC (<http://www.cdc.gov/flu/avian/>), only 2 mild cases of human infection in the U.S. resulted.

Despite the media attention to Bird Flu, there is no increased risk of catching the flu from exposure to birds, other than poultry in Asia. There have been no documented cases of humans catching Avian Flu from pet birds such as parrots, finches and other commonly kept species (<http://www.cdc.gov/flu/avian/gen-info/avian-flu-humans.htm>).

All birds imported into the United States have been routinely tested for pathogenic Avian Influenza since 1974. Of the many millions of birds imported during this 30 year period, pathogenic Avian Influenza was only found in 1 shipment of birds from China. Exotic birds being legally imported into the United States represent virtually NO risk of introducing pathogenic Avian Influenza virus as they are ALL tested during quarantine.

Exotic birds being bred for sale in the United States represent virtually NO risk for Pathogenic Avian Influenza unless they are co-mingled with infected poultry and at this time pathogenic Avian Influenza (H5 or H7 strains) are not known to exist in the United States. USDA is continually monitoring for the presence of Influenza and New Castles Disease in domestic "backyard" and commercial flocks.

It is important to understand that Bird Flu or Avian Influenza is a disease of birds (mostly poultry), and it is not readily transmitted to humans. For many millennia, Avian Influenza has existed in North America. It is found in migrating waterfowl on an annual basis. H5N1 is no more likely to infect humans than the Avian Flu strains that arrive every year yet do not infect humans.

If H5N1 gains the ability for human to human transmission, it will be humans spreading the disease to humans, not bird to human transmission. A human version of the virus will most likely enter the US by infected persons arriving from outside the US on airplanes. The virus will not arrive by imported birds which are quarantined, and not by migrating birds. An example of this type of disease transmission was the spread of SARS into Canada. This disease introduction was quickly recognized and brought under control due to vigilance of medical and regulatory personnel.

The fear of contracting bird flu from pet, companion, or zoo birds in the United States is totally unfounded. The chance of contracting bird flu from native birds is also extremely remote. Attention needs to be appropriately placed on surveillance of incoming international travelers if and when the virus shifts sufficiently to maintain virulent human to human transmission.

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