It always amazed me how tiny microbes outplayed human beings time after time. We know about the devastating damage done by small pox and plague epidemic to mankind in the past centuries, taking away thousands of lives. Over time mankind were able to stop those outbreaks by increasing their knowledge and understanding about bacteria and viruses, developing antibiotic to kill the bacteria and viruses, improving sanitation and environmental hygiene to break the vectors that help spreading the germs.

Then came the HIV/ AIDS epidemic in the early eighties, when scientists and doctors around the world have no clues about the virus and the disease, only they were hopelessly watching thousands of people dying of AIDS, Acquired Immunodeficiency Syndrome. But within a span of a decade scientist were able to identify the virus, HIV, its molecular genetics, its pathogenesis and antiviral drugs that efficiently kill the virus and stop its replication and spread. Once HIV was called “passport to death”, that means once you have HIV, you will die, today or tomorrow, regardless of treatment. Today in the developed countries HIV infected patients are living a healthy and productive life. In 2006 with so many effective Antiretroviral drugs available to kill the virus, HIV is able to put its name in the list of other chronic diseases, like diabetes, where once you have the disease you have to take medication rest of your life to be healthy and alive.

Since the beginning of twenty first century the microbe that is making the headline news again and again in the Bird Flu virus or Avian Influenza Virus. Why it is making the headline? Because scientist are predicting that in the near future, it will acquire the ability to spread from human to human more efficiently and since human has no immunity to this new strain of Avian influenza virus, it has the potential to cause the next pandemic, killing millions of people worldwide.

**Avian Influenza (Bird Flu)**

Avian influenza is an infection caused by avian (bird) influenza (flu) viruses. These influenza viruses occur naturally among birds. Wild birds worldwide carry the viruses in their intestines, but usually do not get sick from them. However, avian influenza virus is very contagious among birds and can make some domesticated birds, including chickens, ducks, and turkeys, very sick and kill them.

Infected birds shed influenza virus in their saliva, nasal secretions, and feces. Susceptible birds become infected when they have contact with contaminated secretions or excretions or with surfaces that are contaminated with secretions or excretions from infected birds. Infection with avian influenza viruses in domestic poultry causes two main forms of disease that are distinguished by low and high extremes of virulence. The low pathogenic form may go undetected and usually causes only mild symptoms. However, the highly pathogenic form spreads more rapidly through flocks of poultry. This form may cause disease that affects multiple internal organs and has a mortality rate that can reach 90-100% often within 48 hours.
Human infection with avian influenza viruses

There are many different subtypes of type A influenza viruses. These subtypes differ because of changes in certain proteins on the surface of the influenza A virus (hemagglutinin [HA] and neuraminidase [NA] proteins). Usually avian influenza virus refers to influenza A viruses found chiefly in birds, but infections with these viruses can occur in humans. The risk from avian influenza is generally low to most people, because the viruses do not usually infect humans. However, confirmed cases of human infection from several subtypes of avian influenza infection have been reported since 1997. Most cases of avian influenza infection in humans have resulted from contact with infected poultry (e.g., domesticated chicken, ducks, and turkeys) or surfaces contaminated with secretion/excretions from infected birds. The spread of avian influenza viruses from one ill person to another has been reported very rarely, and transmission has not been observed to continue beyond one person.

Symptoms of avian influenza in humans have ranged from typical human influenza-like symptoms (e.g., fever, cough, sore throat, and muscle aches) to eye infections, pneumonia, severe respiratory diseases (such as acute respiratory distress), and other severe and life-threatening complications. The symptoms of avian influenza may depend on which virus caused the infection.

The avian influenza virus that cause outbreak in poultry and infection from bird to human and human to human is Influenza A (H5N1), (where H stands for hemagglutinin and N- neuraminidase). Most of these cases have resulted from people having direct or close contact with H5N1-infected poultry or H5N1-contaminated surfaces.

Let's look at the devastation already done by the Avian Influenza H5N1 virus: - Although avian influenza virus generally replicate inefficiently in humans, some subtype of avian flu can replicate within the human respiratory tract and cause disease. The first association of avian influenza H1N1 with clinical respiratory disease occurred in Hong Kong in 1997, when 18 human cases occurred during a poultry outbreak of highly pathogenic H5N1 influenza in live bird markets. This outbreak was associated with high mortality rate (33 percent), a high incidence of pneumonia (61%), and a high rate of intensive care (51%).

In 2003, H5N1 reemerged in humans when two culture-confirmed cases occurred in a family group returning to Hong Kong from China. In late 2003 and continuing through 2004 and 2005, H5N1 virus have caused multiple outbreaks among poultry across Asia, including Cambodia, China, Indonesia, Thailand, Vietnam, and Turkey. A total of 130 human cases have been reported with a mortality rate of greater than 50 percent, in these outbreaks.

Also a major concern is that migratory birds are spreading avian flu virus, after isolation of H5N1 strains, related to the 2005 Chinese viruses in wild birds in Romania, Turkey, Croatia and Greece. Avian influenza H9N2- In Hong Kong in 1999 and 2003 influenza H2N2 viruses were isolated from children.

Avian influenza H7 – extensive outbreak of H7N7 occurred among poultry in the Netherlands. Among the workers who were involved in the slaughtering of the poultry, 83 person were infected with the virus. Needless to say that in each of these outbreaks millions of poultry were slaughtered or killed to prevent the outbreak, costing millions of dollars.
What changes are needed for H5N1 or another avian influenza virus to cause a pandemic?

Three conditions must be met for a pandemic to start: 1) a new influenza virus subtype must emerge for which there is little or no human immunity; 2) it must infect humans and causes illness; and 3) it must spread easily and sustainably (continue without interruption) among humans. The H5N1 virus in Asia and Europe meets the first two conditions: it is a new virus for humans (H5N1 viruses have never circulated widely among people), and it has infected more than 190 humans, killing over half of them.

However, the third condition, the establishment of efficient and sustained human-to-human transmission of the virus, has not occurred. For this to take place, the H5N1 virus would need to improve its transmissibility among humans. This could occur either by “reassortment” or adaptive mutation.

Reassortment occurs when genetic material is exchanged between human and avian viruses during co-infection (infection with both viruses at the same time) of a human or another mammal. The result could be a fully transmissible pandemic virus—that is, a virus that can spread easily and directly between humans.

No one can predict when the next pandemic might occur. However, expert from around the world is watching the H5N1 situation in Asia and Europe very closely, for the emergence of a novel virus that will result from the reassortment of avian H5N1 and human influenza virus, that will transmit from human to human and cause a new catastrophe.

Do we have a vaccine against the new virus? Not yet.

Do we have a drug to treat the virus? Currently available oseltamivir, may be of some benefit.

Can we win the battle against the new avian flu virus? Only time can say.

Once an Infectious Diseases Specialist told in his lecture, how can we win against microbe, they came before us in this planet and a healthy human body contains two millions bacteria at any given time!

* Dr. Reza Chowdhury, is currently working as an Internist and Infectious Diseases Specialist at Soundview Health Center. He is working in this organization since 2001.