Viruses

Many of us are naturally concerned by the alarming spread of viruses in recent years; the bird flu virus was a huge threat to Europe and most parts of the world. The H5N1 bird flu virus was fist shown to have passed from birds to humans in 1997. Even more recently, swine flu is increasingly becoming a huge threat with its ability to mutate and change form. The first case of swine flu was reported in Mexico; however, it has since spread to over 66 countries with over 203 confirmed cases reported in Britain. The very young, the elderly and those with weakened immune systems are particularly at risk from these viruses.

Avian Flu

For more than a century, bird flu has circulated among birds, particularly domesticated fowl, but the new subtype A (H5N1) first appeared in 1997, the strain which can infect humans. The virus has strengthened and mutated, resulting in a contagion that can move from bird to human- but not yet from human to human. There is concern that if the virus infects someone who is already infected with a human flu virus, then a new highly virulent strain could result, that can be transmitted human to human.

Human cases of bird flu have caused infections and death across the globe as scientists struggle to identify the dangerous strains and prevent a fatal pandemic. About 20 million birds have been slaughtered in an attempt to stop the spread of the virus, which spreads by air, water, and soil. So far the virus can be caught only by people who are working with infected fowl, or in contact with infected rivers, poultry processing plants, etc. About 100 cases of the disease have been reported, resulting in about 50 deaths.

The symptoms range from fever, cough, sore throat, and muscle aches to eye infections (conjunctivitis), pneumonia, acute respiratory distress, viral pneumonia, and other severe and life-threatening complications.

Most health experts researching and fighting the incidence of human bird flu do not have an optimistic outlook. It is especially dangerous to humans as our immune system does not have the antibodies to handle something that used to be relegated to animals.

So far, doctors have been ineffective at treating the resultant respiratory infection, which can lead to fatalities as it takes hold with unprecedented force, settles in the lungs, and resists anti-viral and anti-bacterial medication.

Swine Flu

First detected in Mexico, Novel influenza A (H1N1) is a new flu virus of swine origin. The H1N1 strain is the same strain which causes seasonal outbreaks of flu in humans; however, the swine flu H1N1 strain is different as it contains genetic materials typically found in strains of virus, which affect birds, swine and humans. When flu viruses come into close contact with the same host, they have the ability to swap genetic components with each other. The virus is thought to spread through coughs and sneezes of people who have been infected.

In humans, swine flu symptoms are similar to those manifested for seasonal flu, i.e., sudden onset of fever, cough, sore throat, shortness of breath, headache, tiredness, aching muscles, chills, sneezing, runny nose and loss of appetite.

It is now expected that a swine flu pandemic is likely to strike the UK in September or October as the virus is gathering strength as it spreads. The World Health Organisation is preparing to declare a swine flu pandemic and the world is in phase 5 of WHO's pandemic alert scale with 6 being the highest. Phase 5 of the pandemic alert scale "is characterized by human-to-human spread of a virus into at least two countries in on WHO region. The declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalise the organisation, commincation, and implementation of the planned mitigation measures is short" (W.H.O). According to the W.H.O, 74 countries have reported 27, 737 cases of swine flu, and 141 deaths since its outbreak in April 2009.

The treatment of swine flu mainly involves antiviral drugs and antibiotics to treat any complications which may arise. A number of air purifiers can also be used for preventative measures; these have been tested and found to be effective in denaturing the proteins which make viruses active.

Virus characteristics and heat instability.

Viruses aren't considered living organisms, but they are very dependent on living cells to replicate. The structure of the virus includes the envelope which is constituted by proteins and the genetic material which can be DNA or RNA. All these components are thermosensible. The genetic material and the proteins have complex structures that are involved in their function and the change of their arrangements may result in lost of function. This process is called denaturation. There are two basic ways to do that: changing pH and temperature.

The avian virus, H5N1, is a negative-sense, single-stranded RNA virus[5], which has two types of proteins in its surface: hemagglutinin (HA) and neuraminidase (NA)[6]. It is known from the literature that the virus can be inactivated by 56^{o}C in 3 hours and 60^{o}C in 30 minutes[1]. Thus, only four degrees of temperature elevation reduced the time of inactivation exposure about 85%.

About Viruses

What They Are

A virus is basically a tiny bundle of genetic material—either DNA or RNA—carried in a shell called the viral coat, or capsid, which is made up of bits of protein called capsomeres. Some viruses have an additional layer around this coat called an envelope. That's basically all there is to viruses. Viruses are strange things that straddle the fence between living and non-living. On the one hand, if they're floating around in the air or sitting on a doorknob, they're inert. They're about as alive as a rock. But if they come into contact with a suitable plant, animal or bacterial cell, they spring into action. They infect and take over the cell like pirates hijacking a ship.

What They Look Like

There are thousands of different viruses that come in a variety of shapes. Many are polyhedral, or multi-sided, a bit like a cut gem. Other viruses are shaped like spiky ovals or bricks with rounded corners. Some are like skinny sticks while others look like bits of looped string. Some are more complex and shaped like little lunar landing pods.

Where They're Found

Viruses are found on or in just about every material and environment on Earth from soil to water to air. They're basically found anywhere there are cells to infect. Viruses have evolved to infect

every form of life, from animal to plant and from fungi to bacteria. However, viruses tend to be somewhat picky about what type of cells they infect. Plant viruses are not equipped to infect animal cells, for example, though a certain plant virus could infect a number of related plants. Sometimes, a virus may infect one creature and do no harm, but cause havoc when it gets into a different but closely enough related creature. For example, the Hantavirus is carried by deer mice without much noticeable effect on the rodents. But if Hantavirus gets into a person, it causes a dramatic and frequently deadly disease marked by excessive bleeding.

Single-Minded Mission

Viruses exist for one purpose only: to reproduce. To do that, they have to take over the reproductive machinery of suitable host cells.

Upon landing on an appropriate host cell, a virus gets its genetic material inside the cell either by tricking the host cell to pull it inside, like it would a nutrient molecule, or by fusing its viral coat with the host cell wall or membrane and releasing its genes inside. Some viruses inject their genes into the host cell, leaving their empty viral coats sitting outside.

If a virus is a DNA virus, its genetic material then inserts itself into the host cell's DNA. If the virus is an RNA virus, it must first turn its RNA into DNA using the host cell's machinery before inserting into the host DNA. The viral genes are then copied many, many times, using the machinery the host cell would normally use to reproduce its own DNA. The virus uses the host cell's enzymes to build new viral capsids and other viral proteins. The new viral genes and proteins then come together and assemble into whole new viruses. The new viruses are either released from the host cell without destroying the cell or eventually build up to a large enough number that they burst the host cell like an overfilled water balloon.

How to destroy Viruses

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The swine flu H1N1 virus is a new strain of the H1N1 virus subtype of influenza A. All influenza A viruses contain hemagglutinin and neuraminidase, although the structure of these proteins differ from strain to strain due to rapid genetic mutation in the viral genome. Influenza A virus strains are assigned an H number and an N number based on which forms of these two proteins the strain contains. There are 16 H and 9 N subtypes known in birds, but only H 1, 2 and 3, and N 1 and 2 are commonly found in humans.