

Virus: A Friend and Foe

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Introduction

Viruses are smallest, ultramicroscopic, non-cellular, obligate intracellular infectious agents that cannot reproduce outside their host cell. Their genome contains either DNA or RNA as genetic material. Their genome is enclosed in a protein shell known as capsid, which may be surrounded by a lipid containing membrane called envelope. The entire infectious unit is called "Virion"- an extracellular infectious virus particle. Viruses are connecting link between living and non living organisms because it act as non living particle outside the host cell while reproduce inside host cell like living organisms does. Virus was discovered by Dmitri Ivanovsky in 1892. Martinus Beijerinck is known as father of virology.

Virus as a Friend

1. Mammalian viruses can provide immunity against bacterial pathogens.
2. Latent herpes viruses kill both mammalian tumor cells and cells that are infected with pathogenic viruses.
3. Phage typing is used to differentiate bacterial species or genus into their subtypes.
4. Bacteriophages are used as carriers of genes from one bacterium to another in genetic recombination process known as transduction.
5. Phages may confer the property of toxin production in some bacteria.
6. Phages have been extensively used in studying host parasite relationship.
7. Phages are extensively present in Ganga River which may be the reason for their lesser biofilm production by bacteria.
8. Some vaccines contain attenuated, inactivated, dead organisms or some purified products (containing immunogenic properties) derived from viruses.
9. Some of the examples of inactivated vaccines are polio vaccine, hepatitis A vaccine, rabies vaccine, influenza vaccine while examples of attenuated vaccines are mumps, measles, rubella, yellow fever etc.
10. Inactivated toxic compound obtained from viruses can also be used as vaccine such as tetanus toxoid and diphtheria toxoid.
11. Subunit vaccine utilizes only a fragment of virus (immunogen) to create immune response. Some examples of them are hepatitis B vaccine, vaccine against human papilloma virus and influenza virus.
12. Bacteriophages (bacterio=bacteria, phage=eater) are a type of viruses that kills bacteria. Bacteriophages are viruses that infect and parasitize bacteria. These are usually called phages.

Virus as Foe

1. Viruses have the ability to cause many plant diseases such as tobacco mosaic, potato leaf roll, bunchy top of banana, leaf curl of papaya, tomato mosaic disease etc.
2. Tobacco Mosaic Virus (TMV) is the most serious pathogen causing mosaic in tobacco leaves.
3. Cucumber Mosaic Virus (CMV) has the ability to infect cucumber, tomato, potato, carrot, spinach etc.

4. Sugarcane is infected by many viruses which cause different types of diseases in host plant such as Fiji disease, chlorotic streak, mosaic etc.
5. Potato Virus X (PVX) and Potato Virus Y mainly infects plants belongs to Solanaceae family specially potato.
6. Many viruses can infect humans with wide variety of diseases such as Polio, Chicken pox, Small pox, Common cold, Cancer, SARS, AIDS, Chikungunya, HIV, Corona, Measles, Mumps, Rabies, Influenza, HPV, Rubella and Hepatitis etc.
7. Viruses have the ability to cause diseases in animals too. Some examples of them are foot and mouth disease of cattle, rabies of dog, cow pox, encephalomyelitis of horse etc.
8. Ebola virus can infect not only African human but some animals as well such as gorilla, monkey and chimpanzees.
9. Spanish flu is one of the deadliest flu pandemic caused by influenza A/H1N1 virus.
10. COVID-19 is ongoing worldwide pandemic disease caused by new corona virus called SARS-CoV-2. It is an infectious disease which is being mutated to make their different strains with different efficiency of their spread, virulence, pathogenicity and symptoms of disease.
11. Bubonic plague caused black-death disease has the highest death rates in European, Asian and north African population.
12. Bird flu or avian flu is caused by avian influenza type A virus. Bird flu can also infect humans who come in contact with infected birds, contaminated places or infected poultry farms.

Conclusion

List of viral diseases is endless. They are being mutated day by day and produce different lethal strains of them. But as we have abundant scientists, literature and general idea of spread of viral diseases, it is somewhat easier to deal with them, except some viral diseases including HIV and AIDS. Many vaccines have been developed recently including COVID-19 vaccine. Enormous scientific knowledge, laboratories, better medical facilities and human awareness can lead to a healthy life in future. Many milestones are yet to come ahead.

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