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Opinion Article

Diseases Caused by Influenza Virus and its Variants

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DESCRIPTION

Viruses from the orthomyxovirus and paramyxovirus families cause a variety of minor illnesses and serious respiratory diseases in humans and lower animals. They are found in all human populations around the world, and most adults have antibodies to the aspectrum of these viruses, indicating previous exposure. Because their fundamental growth characteristics in cells are similar, these two families are introduced together in this preliminary section.

The orthomyxoviruses include the three human-important influenza types (A, B and C), whereas types B and C are only human pathogens. The paramyxovirus family consists of three genera:

Parainfluenza viruses

Serotypes 1-4 infect humans and occasionally animals; other serotypes appear to be animal pathogens.

Mumps virus

An exclusive human parasite.

Pneumovirus

Respiratory syncytial viruses types 1 and 2 infect humans.

Morbilliviruses

This group includes several animal pathogens that have infected a few humans on rare occasions under unusual circumstances, as well as one important human pathogen, the measles virus.

The viruses of the parainfluenza family are discussed in detail in the following chapters. Viruses from the orthomyxovirus and paramyxovirus families share a spike-shaped surface glycoprotein called hemagglutinin, which binds to the sialic acid receptor on the plasma membrane of susceptible cells. The resulting interaction influences viral uptake and subsequent fusion of the viral envelope with the cellplasma membrane, determining pathogenicity and organ tropism. These myxoviruses also possess neuraminidases the function of which is uncertain receptor sites or facilitate virus penetration through the mucins that cover the membranes of the respiratory mucosa. Because influenza virus hemagglutinin and neuraminidase are highly mutable, the current influenza virus classification scheme is based on antigenic characterization. In contrast, the membrane viral glycoproteins of paramyxovirus members are antigenically stable, with no clinically significant changes in their antigenic makeup. Thus, protection against influenza virus infection is relatively short because "shifts" in the antigenic makeup of epidemic strains occur over time. This is not true of Para influenza viruses.

Following attachment and penetration, the virion nucleoprotein is incorporated into the cell and transported to the nucleus, where mRNA transcription takes place. The virion's structural proteins and RNA are then translated, the former in the cytoplasm and the latter in the nucleus. The spike-shaped hemagglutinin and neuraminidase molecules protrude through the bilayer to form virions beneath the plasma membrane.

This altered cellular membrane eventually forms the virion's lipoprotein envelope, imparting cell characteristics to the virus as it buds from the cell surface. The resulting viral particles are pleomorphic (spherical and filamentous) and range in size from 120 to 150 nm. They have a genome made up of ribonucleoprotein that is either linear or helical within the nucleocapsid. Depending on the virus, these replicative events occur over a period of several hours. Influenza viruses are classified into three types based on the antigenic makeup of their nuclear and matrix proteins.

Types A and B influenza viruses are significant human pathogens, whereas type C infections are rare, occurring mostly in infants and young children. As previously stated, type A viruses have significant genetic heterogeneity and infect a wide range of animal species; type Band Care viruses are only infectious in humans. Type A viruses cause major pandemics and widespread outbreaks, whereas type B viruses cause outbreaks with a narrower scope and severity. These viruses are found all over the world, regardless of geographic, climatic, or socioeconomic factors. However, depending on the season, their activity predominates in one of the two hemispheres.

Type A influenza virus is responsible for the majority of influenza-related deaths and accounts for the majority of morbidity. There have been numerous epidemics of respiratory disease since the Middle Ages that, in retrospect. The world was

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once again hit by a pandemic of a new antigenically distinct hemagglutin in influenza that originated in the Orient in 1957. The virus in question possessed a neuraminidase antigen against which the general population lacked antibodies. During this epidemic, we learned a lot about influenza and its pathogenicity thanks to studies done with modern virological tools.The emergence of a new influenza A virus in Hong Kong in 1998, which is closely related to avian viruses circulating on the Chinese mainland, raised the ominous prospect of a pandemic in the final years of the twentieth century. public health measures appeared to have eliminated this new threat, but the virus may not have the potential to spread easily in human populations or is relatively pathogenic.