

Orthomyxoviruses (Influenza or Flu viruses)

The orthomyxoviruses (influenza viruses) constitute the genus *Orthomyxovirus*, which consists of three types (species): A, B, and C. These viruses cause influenza, an acute respiratory disease with prominent systemic symptoms in human. Pneumonia may develop as a complication and may be fatal, particularly in elderly persons with underlying chronic disease.

Structure

Influenza viruses virion is pleomorphic, single stranded RNA (ssRNA). The viral envelope can occur in spherical and filamentous forms, it is composed of a lipid bilayer membrane in which the glycoprotein spikes are anchored encloses the nucleocapsids. The envelope carries a distinct spike-like surface projections:

- 1. Hemagglutinin (H) spikes:** an attachment proteins that mediate binding of the virus to target cells and entry of the viral genome into the target cell.
- 2. Neuraminidase (N) spikes:** an enzymes involved in the release of progeny virus from infected cells.

The hemagglutinin (H) and neuraminidase (N) proteins are key targets for antibodies and antiviral drugs and they are used to classify the different serotypes of influenza A viruses.

Multiplication

The virus binds to host cells via the hemagglutinin spikes. Transcription and nucleocapsid assembly take place in the nucleus. Progeny virions are assembled in the cytoplasm and bud from the cell membrane, killing the cell.

Viability and disinfection

Influenza viruses tend to be labile, but can survive several hours in mucus, susceptible to bleach, 70% ethanol, oxidizing agents, and quaternary ammonium compounds. They are inactivated by heat of 56 °C for minimum of 60 minutes, as well as by low pH <2.

Pathogenicity

The family *Orthomyxoviridae* are responsible for important respiratory diseases in human, the classic influenza syndrome in which the viruses are multiplies in the respiratory mucosa, causing cellular destruction and inflammation. The classic influenza syndrome is a febrile illness of the upper and lower respiratory tract, characterized by sudden onset of fever, cough, myalgia, malaise, trachitis, headache, chills and other symptoms. Many patients do not exhibit the full syndrome. Sore throat appear suddenly, the fever rapidly climbs from 38 to 40.0°C, sneezing, rhinorrhea, and nasal obstruction are common.

- Both a cell-mediated response and antibodies developed after infection. Antibodies provides long-lasting immunity against the infecting strain.

Transmission

The virus is transmitted in aerosols of respiratory secretions, direct contact with infected persons or their personal things.

Diagnosis

The diagnosis is suggested by the symptoms, particularly if an influenza epidemic is under way. Definitive diagnosis depends on detecting the virus or a rise in antibody titer.

Treatment

Vaccines and **drugs** are available for the prophylaxis and treatment of influenza virus infections. Vaccines are composed of either inactivated or live attenuated virions of the human influenza A viruses, as well as those of influenza B viruses. **Drugs** available for the treatment of influenza include Amantadine and Rimantadine, which inhibit the uncoating of virions.

Oseltamivir, Zanamivir, and Peramivir, which inhibit the release of virions from infected cells by interfering with neuraminidase proteins.

However, escape mutants are often generated for the former drugs and less frequently for the latter drugs.