

# Influenza

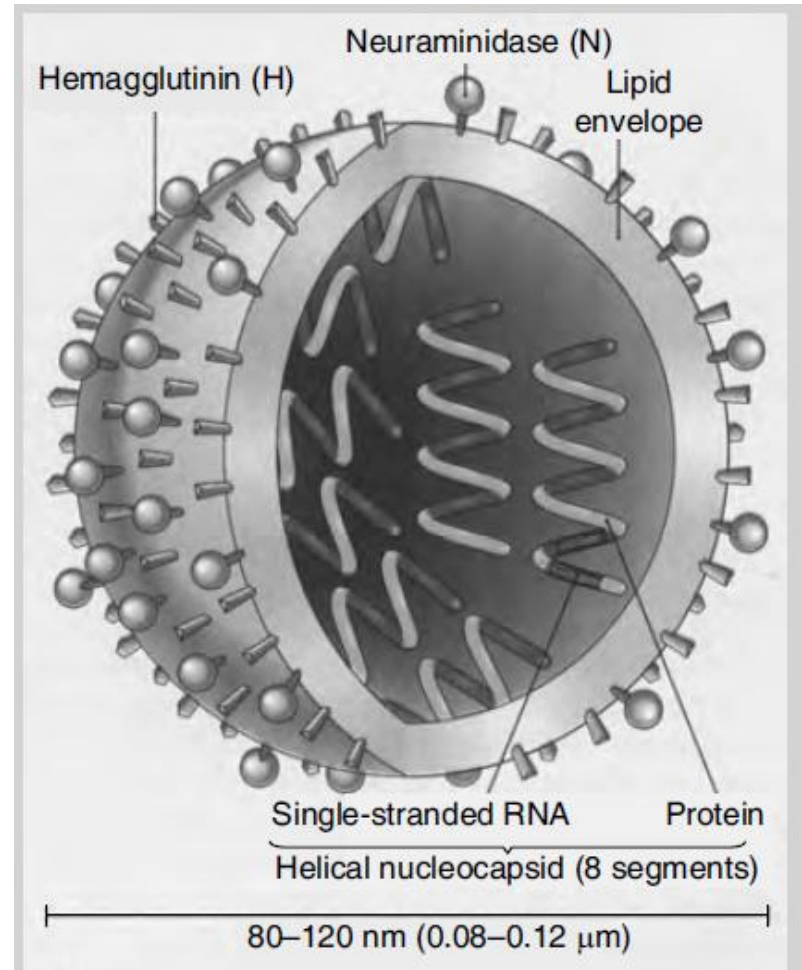
Microbiology III

# Influenza

- Influenza or commonly known as “**flu**” is an airborne infection.
- It is common for influenza to occur as an epidemic. it can occur in pandemics.
- **Influenza virus** has three antigenic types A, B, and C.
- Type A influenza virus strains: 2- to 3-year cycle
- Type B strains: have a 4- to 6-year cycle.

# Influenza Viruses

- Core of **ss RNA** – inside **helical** capsid.
- Capsid is enclosed by round mass covered by lipid envelope with 2 protein spikes projections.
- **Hemagglutinins** (H proteins) - attach virus to red blood cells & host cells
- **Neuraminidase** (N proteins): mushroom-shaped protrusions. It degrades mucous membrane & attach virus to the underlying tissue cells.
- **Influenza A viruses** – subtypes
- H protein and N protein
- 13 major types - H proteins (H1 to H13)
- 9 types - N proteins (N1 to N9)
- Isolated - humans, animals, and birds.



- Influenza A viruses isolated from humans
- Three H proteins - H1, H2, and H3
- Two N proteins –N1 and N2
- H and N proteins – combinations → subtypes
- “Asian flu” epidemic in 1957 - A(H2N2) subtype
- “Hong Kong flu” epidemic in 1968 was of the-A(H3N2) subtype.
- **Antibodies** against H and N proteins are affective only for specific subtypes.

# Transmission

- Large amounts of influenza virus are present in the **respiratory secretions** of patients
- Transmitted to uninfected individuals by **aerosols** and fomites (inanimate objects).
- A single infected person can transmit **large** number of virus to susceptible persons
- Accounts for “**explosive**” nature of epidemics.

# Pathogenicity

- Virus multiplication is usually restricted to tissue in the **upper respiratory tract**.
- The death and sloughing off of the cells lining these **mucous membranes** leads to symptoms like **congestion** and **increased secretion**.

## **Influenza symptoms:**

- Clear nasal discharge, fever, chills, headache, muscle pains, sore throat, coughing, and a marked weakness and exhaustion.

- Body temperature rises rapidly to 100 to 104°F, 106°F - within 12 hours before onset of symptoms.
- **Fever** lasts for 3 days, persists – upto 8 days.
- Complete convalescence may require one or more weeks.
- Influenza causes a **decreased resistance** to infection by other microbial pathogens.
- Develop a **secondary pneumonia** – bacteria:
- *Streptococcus pneumoniae*, *S. pyogenes*, *Staphylococcus aureus*, and *Haemophilus influenzae*.

# Laboratory Diagnosis

- **Specimens:** sputum & nose and throat swabs – inoculated into - canine kidney cells (cell cultures).
- **Incubation:** influenza virus detected by its ability to agglutinate **red blood cells** added to the culture
- Its ability to alter the surface of the infected cells like red blood cells will bind to this surface.
- Presence of **viral antigens** in the host cells is detected by using specific **fluorescent antibodies**.



# Treatment and Prevention

- Bed rest for uncomplicated influenza.
- No chemo therapeutic agent can cure influenza.
- **Amantadine** - shorten disease duration by about 50 %.
- **Side effects:** insomnia, dizziness, or difficulty in concentrating.
- **Active immunization:** vaccine made by formaldehyde-inactivated strains is the most effective means of prevention.
- A mixture of the various antigenic subtypes that cause infection is used to prepare the inactivated vaccine
- Immunity is subtype-specific.
- Maximum protection requires annual immunization
- Protective immunity lasts only 3 to 6 months.