

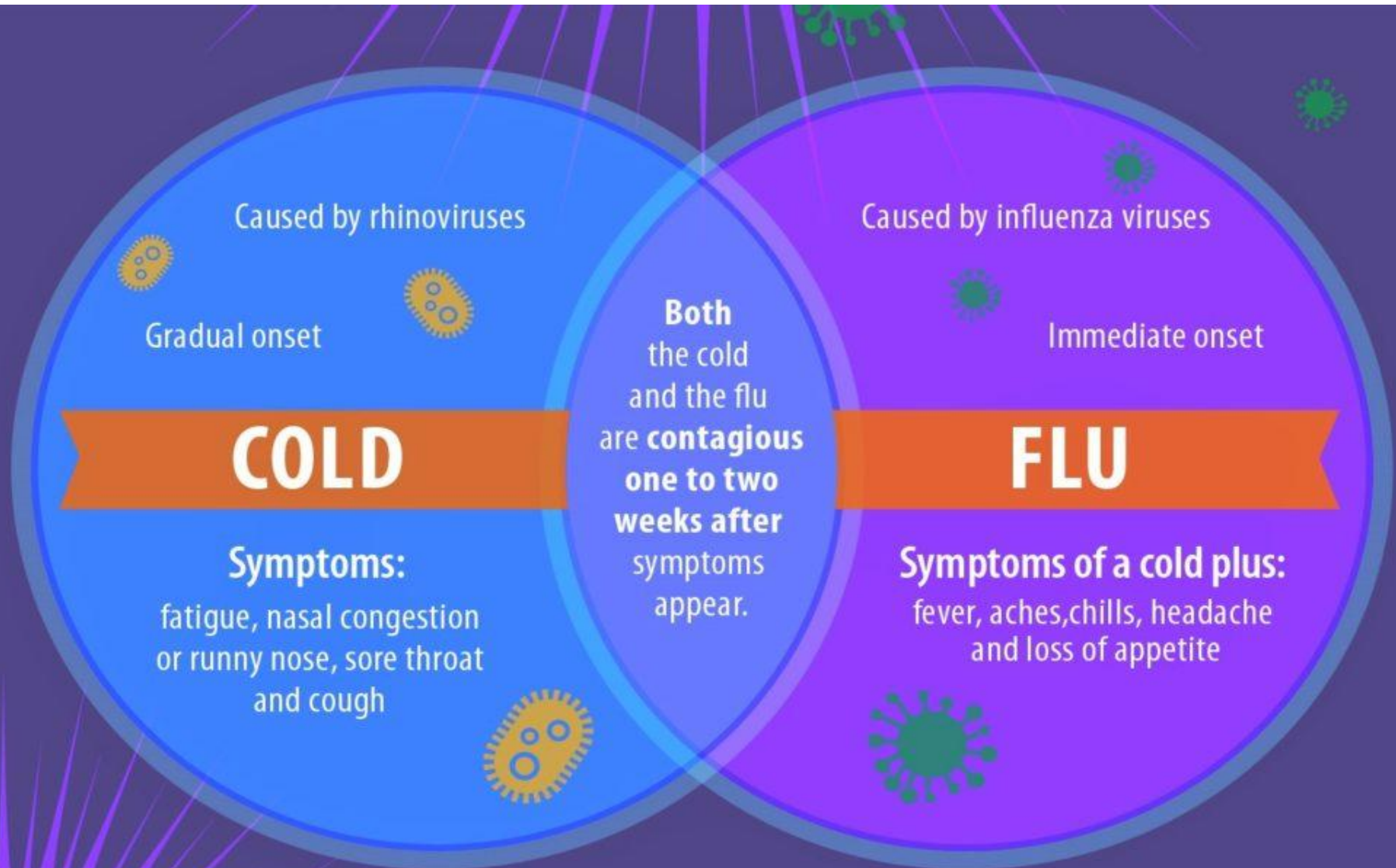
Medical Microbiology

Influenza-I



Dr. Dharmesh Harwani
Department of Microbiology

Cold vs Flu



CORONAVIRUS, FLU, COLD?

As the number of coronavirus cases rise, some key differences set coronavirus apart from the seasonal flu and the common cold — mainly the intensity of the symptoms and the recovery period. A guide at identifying the differences in the three conditions
All three, however, are spread by air-borne respiratory droplets and contaminated surfaces

CORONAVIRUS

Onset: Sudden

Symptoms

- Fever
- Dry cough
- Muscle ache
- Fatigue

Less common symptoms

- Headache
- Coughing up blood (haemoptysis)
- Diarrhoea

Incubation:
1-14 days,
 may go up to 24 days

Complications:
5% cases
 (acute pneumonia, respiratory failure, septic shock, multiple organ failure)

Recovery:
2 weeks
 (mild cases); 2-6 weeks (severe cases)

Treatment or vaccine
 No vaccines or anti-viral drugs available; only symptoms can be treated

SEASONAL FLU

Onset: Abrupt

Symptoms

- Fever
- Dry cough
- Muscle ache
- Headache
- Sore throat
- Runny or stuffy nose

Less common symptoms

- Diarrhoea
- Vomiting

WHAT THIS MEANS

If you have a stuffy/runny nose or are sneezing, you likely **DO NOT** to have coronavirus

Incubation:
1-4 days

Complications:
1% cases
 (including pneumonia)

Recovery:
1 week
 (mild cases);
 2 weeks (severe cases)

Treatment/vaccine
 An annual seasonal flu vaccine is available

COMMON COLD

Onset: Gradual

Symptoms

- Runny or stuffy nose
- Sneezing
- Sore throat

Less common symptoms

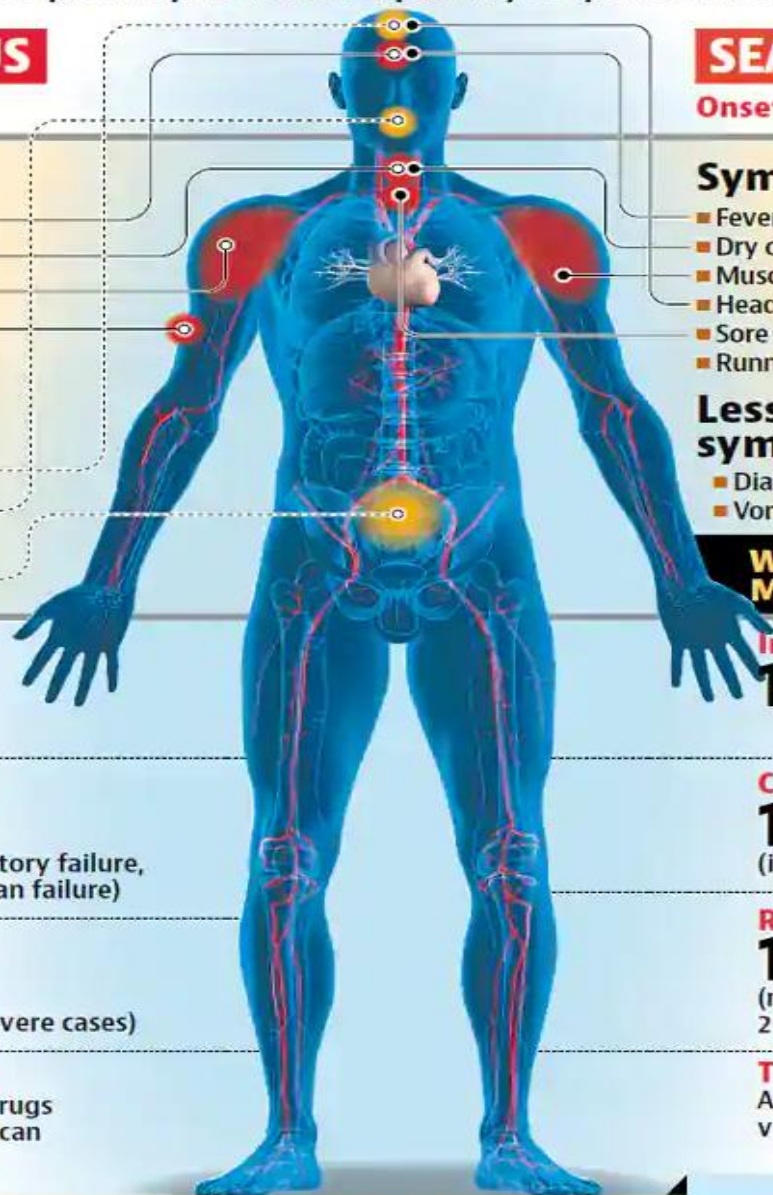
- Low grade fever
- Muscle or body ache
- Headache
- Fatigue

Incubation:
2-3 days

Complications:
Extremely rare

Recovery:
1 week
 for most cases; may last as long as 10 days

Treatment/vaccine
 No treatment, but doctors advise treating symptoms



Influenza

Influenza [Italian, **to be influenced by the stars**—*un'influenza di freddo*], or the flu, is a respiratory system disease caused by orthomyxoviruses

Orthomyxoviridae is a family of negative-sense RNA viruses. It includes seven genera. The first four genera contain viruses that cause influenza in vertebrates, including humans, birds.

- ***Alphainfluenzavirus* infects humans, other mammals, and birds, and causes all flu pandemics**

(H1N1, H1N2, H2N2, H3N1, H3N2, H3N8, H5N1, H5N2, H5N3, H5N8, H5N9, H7N1, H7N2, H7N3, H7N4, H7N7, H7N9, H9N2, H10N7)

- *Betainfluenzavirus* (humans and seals)

- *Gammainfluenzavirus* (humans, pigs, and dogs)

- *Deltainfluenzavirus* (pigs and cattle)

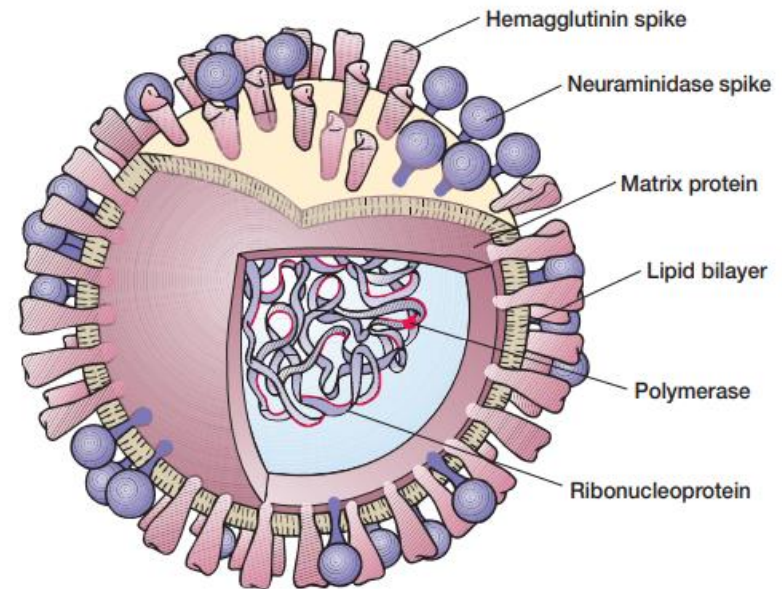
- **Influenza can be transmitted by aerosols, saliva, nasal secretions, feces and blood**
- **Flu viruses can remain infectious for about one week at human body temperature, over 30 days at 0 °C (32 °F), or more at very low temperatures.**

Structure

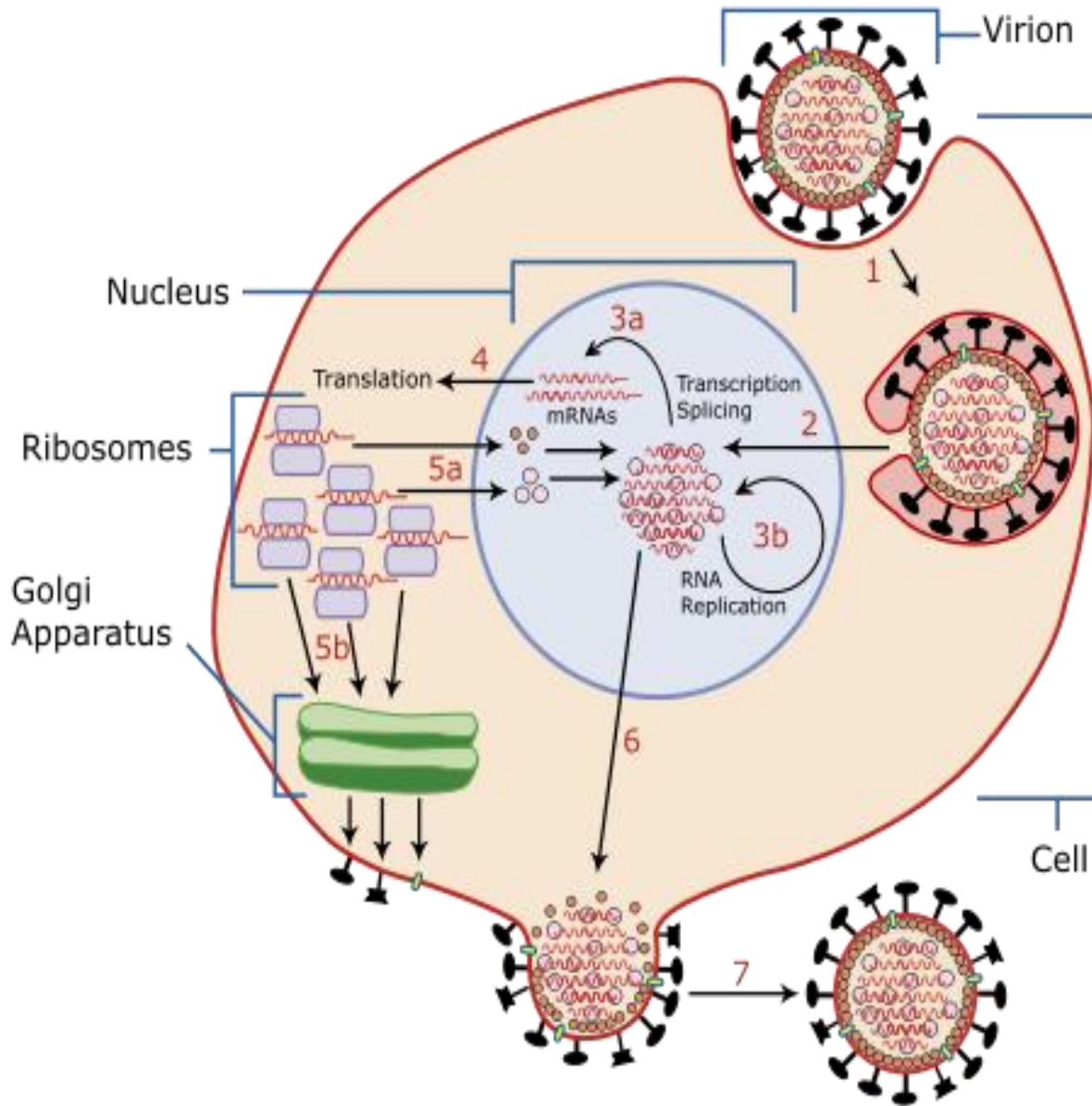
- The influenzavirus virion is pleomorphic.
- There are some 500 distinct spike-like surface projections of glycoprotein; hemagglutinin (HA) and neuraminidase (NA) spikes, with a ratio of HA to NA of about 4.5 to 1.

Genome

- *Orthomyxoviridae* contain six to eight segments of linear negative-sense single stranded RNA. Genome length that is 10,000–14,600 nucleotides.
- Neuraminidase: release of progeny virus from infected cells
- Hemagglutinin is a lectin that mediates binding of the virus to target cells and entry of the viral genome
- The hemagglutinin (H) and neuraminidase (N) proteins are targets for antiviral drugs.
- These proteins are also recognised by antibodies, i.e. they are antigens.



Replication cycle



Influenza viruses replicate in the nucleus. They use cellular RNAs as primers for initiating the viral mRNA synthesis in a process known as **cap snatching**.

RNA proofreading enzymes are absent, the RdRp makes a single nucleotide insertion error roughly every 10 thousand nucleotides.

Nearly every newly manufactured influenza virus will contain a mutation in its genome.

The separation of the genome into eight separate segments of vRNA allows mixing (reassortment) of the genes if more than one variety of influenza virus has infected the same cell (superinfection)

The 1918 Flu Epidemic

*"I had a little bird and his name was Enza
I opened up the window and in flew Enza"*

Children's rhyme, 1918

The 1918 influenza pandemic:

<https://www.marist.edu/documents/20182/649276/19W+Influenza+Epidemic+2.pdf/932ab814-23aa-4281-b4a4-d5827fb2deae>