

The Viruses

General Characteristics of Viruses

- Non-cellular “entities”
- Obligate intracellular parasites
- Contain a single type of nucleic acid (DNA or RNA)
- Protected by a protein coat, sometimes covered by an envelope

Viral Structure

- *Virion* = a complete viral particle
- Composed of a nucleic acid enclosed in a protein coat
- May or may not be surrounded by an envelope

A. Nucleic Acid:

- Contain either DNA or RNA, never both
- May be single stranded or double stranded
- Linear or circular or many separate molecules

B. Capsid and Envelope

- Capsid = the protein coat surrounding the nucleic acid
- Capsid composed of subunits called capsomeres
- Capsomeres may be a single type of protein or many types
- Some viral capsids are enclosed by an envelope composed of lipids, proteins, and carbohydrates
- Some may have glycoprotein *spikes*

Viral Structural Types

Helical viruses

Polyhedral viruses

Enveloped viruses
Complex viruses

Viral Multiplication

- Use host enzymes for energy production and protein synthesis
- Two alternative mechanisms:
 1. The **Lytic Cycle** = ends with lysis and host cell death
 2. The **Lysogenic Cycle** = host cell remains alive

Basic Steps:

- 1) Attachment
- 2) Penetration and un-coating
- 3) Biosynthesis or provirus
- 4) Maturation
- 5) Release

Terms:

Host Range

Bacteriophages

Retrovirus

Lysis

Plagues

Prophage

Examples of DNA viruses:

Hepatitis, chicken pox, herpes

Examples of RNA viruses:

Flu, cold, measles, mumps, HIV, polio

Plant viruses:

Tobacco mosaic virus

Viruses and Cancer

Latent Viral Infections

Slow Viral Infections

Viruses and Genetic Engineering

Prions

- Proposed in 1982
- Infectious protein, pure protein molecule (no DNA)
- Self-replicating, slow, long incubation time
- *Proteinaceous infectious particle*
- May be a genetic cause
- Gene found in normal host DNA
- Actual cause of death unknown
- 9 animal diseases, all neurological diseases:

1996:

Bovine spongiform encephalopathy (BSE) "mad cow disease"

Creutzfeldt-Jakob disease (CJD)

Sheep scrapie

Kuru