Viral Components

- All viruses have capsids - protein coats that enclose & protect their nucleic acid
- Viruses may have a membrane envelope
- Nucleic acid genome: may be dsDNA, ssDNA, ssRNA, dsRNA

Size Comparison of Viruses

Viral Taxonomy

- Main criteria presently used are structure, chemical composition, and genetic makeup
- Currently recognized: 3 orders, 63 families, and 263 genera of viruses
- Family name ends in -viridae, i.e., Herpesviridae
- Genus name ends in -virus, Simplexvirus
- Herpes simplex virus 1 (HSV-1)

Host range

- Spectrum of cells a virus can infect
  - cell must have a specific structure (receptor) on its surface for viral attachment
  - cell must contain all of the enzymes and materials needed to produce new virions
- May be one species or many
- May be one tissue or many within a host
Animal Virus Replication

1. Adsorption
2. Penetration/uncoating of genome
3. Duplication/synthesis
4. Assembly
5. Release

Medical Importance of Viruses

- Viruses are the most common cause of acute infections
- Several billion viral infections per year
- Some viruses have high mortality rates
- Possible connection of viruses to chronic afflictions of unknown cause

Cytopathic effects: virus-induced damage to cells

1. Changes in size & shape
2. Cytoplasmic inclusion bodies
3. Nuclear inclusion bodies
4. Cells fuse to form multinucleated cells
5. Cell lysis
6. Alter DNA
7. Transform cells into cancerous cells
Other noncellular infectious agents

1. Prions - misfolded proteins, contain no nucleic acid
   - cause spongiform encephalopathies – holes in the brain
   - common in animals
     - scrapie in sheep & goats
     - bovine spongiform encephalopathy (BSE), aka “mad cow disease”
     - humans – Creutzfeldt-Jakob Disease
2. Viroids - short pieces of RNA, no protein coat
   - only identified in plants, so far

Diagnosis of viral diseases

- More difficult than other agents
- Consider overall clinical picture
- Take appropriate sample
  - Infect cell culture - look for characteristic cytopathic effects
  - Screen for parts of the virus
  - Screen for immune response to virus (antibodies)
  - PCR to detect presence of viral genome