

## Reproduction of Bacterial Viruses

1. Infection: virus attaches itself to cell and phage DNA enters into cell.
2. Dark Period: (next 8-10 minutes) the virus DNA stimulates the production of protein shells for new viruses.
3. Rise Period: (next 10-15 minutes) virus shells become filled with new viral DNA.
4. Final Stage: (~30 minutes) the bacterial cell becomes filled with new virus particles (virions). The cell ruptures (lysis), releasing a new generation of viruses into the medium.

## Viruses:

Consists of a nucleic acid molecule (DNA or RNA) inside a protein capsid, which is sometimes enclosed in a membrane envelope.

1. Viruses with DNA genomes
  - a. *Poxviruses* – smallpox, cowpox
  - b. *Herpes viruses* – oral and genital herpes
2. Viruses with RNA genomes
  - a. *Myxoviruses* – influenza
  - b. *Retroviruses* – feline leukemia, AIDS
  - c. *Picornaviruses* – polio, colds

## Viral Reproduction Cycles:

1. **Lytic Cycle** – takes over cell, viral enzymes cause cell to break open or lyse (colds, polio)
2. **Lysogenic Cycle** – may enter a dormant phase (go underground) in which their nucleic acid is joined with the host cell's DNA. Viruses that can carry DNA from one cell to another are used to study bacterial genetics in a process called *transduction*.
3. **Continuous Production of Viruses** – viruses produce capsids, viral DNA or RNA, and the finished virion buds off from the plasma membrane of the cell.

## A.I.D.S. (Acquired Immune Deficiency Syndrome)

Caused by Human Immunodeficiency Virus (HIV) transmitted almost exclusively via semen or blood.

No immediate symptoms, depending upon the state of the immune system. Young and healthy individuals may take up to ten years to develop AIDS.

The virus will not cross intact mucous membranes. Attacks nerves cells in brain. T-helper cells (lymphocytes) attack virus and kill any infected cells.

Retroviruses: virus with RNA as its genome

Produce *reverse transcriptase* (enzyme), which uses viral RNA as a template to make a complementary DNA strand. The DNA acts a template to make double stranded DNA, which becomes a part of the host cell's genome, where it is transcribed into many new viral RNA molecules.

One of three things may happen next:

1. The virus may quickly direct the cell to produce a flood of new viruses and lysis of the cell will occur
2. The virus may enter a latent period lasting up to 10 years.
3. The virus may generate a persistent infection where few host cells are killed.

AIDS patients have normal numbers of macrophages and B-lymphocytes, but the numbers of T-helper lymphocytes are greatly reduced. AIDS occurs when so many T-helper cells have been destroyed that the body's immune system cannot fight off disease.

Antibiotics have no effect on AIDS. Hard to produce a vaccine because the virus mutates and evolves rapidly and changes its antigens frequently.

Some people infected with HIV never develop AIDS (natural selection?).

AIDS was first identified in 1981. It was probably passed from a monkey host into humans in Africa sometime during the 1960's.