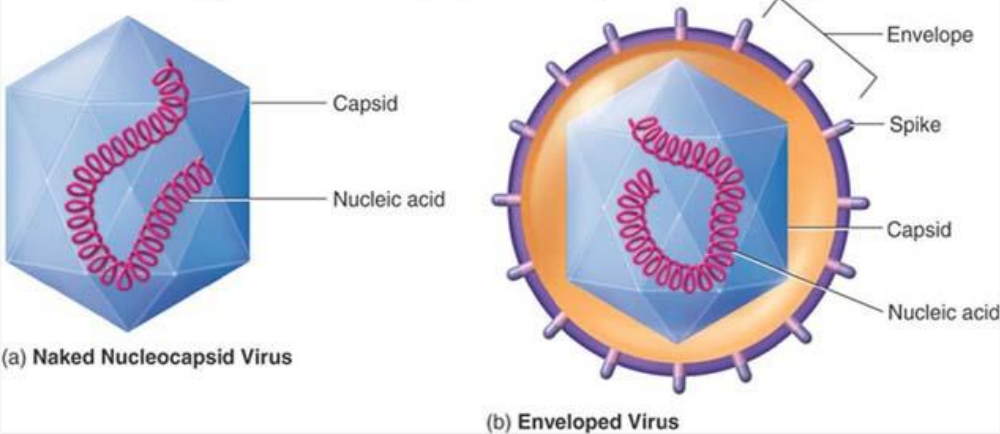




Immunity to viruses

Immunity to viruses

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



Antigenic Structure of Viruses

Nucleic acid; DNA or RNA capsid

- Capsomer; protein nucleocapsid

Envelope; lipoprotein, glycoprotein, phospholipid

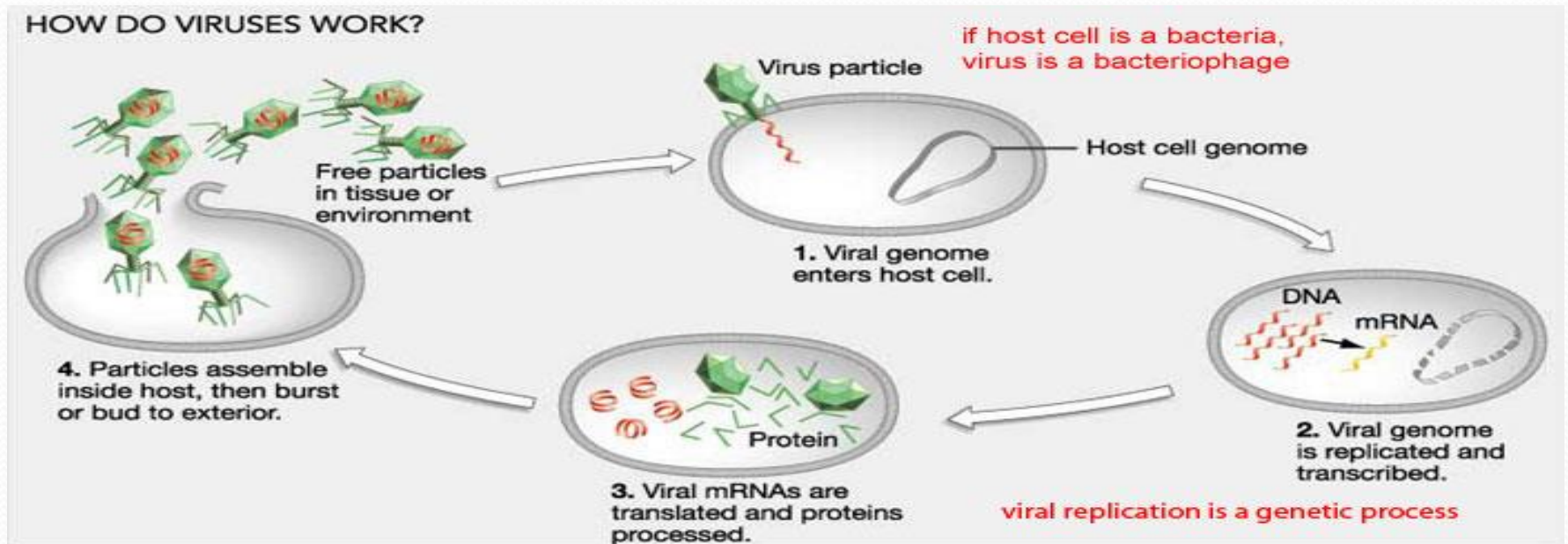
- Peplomer; glycoprotein (hemagglutinin-neuraminidase activity)

Antigenic Structure of Viruses

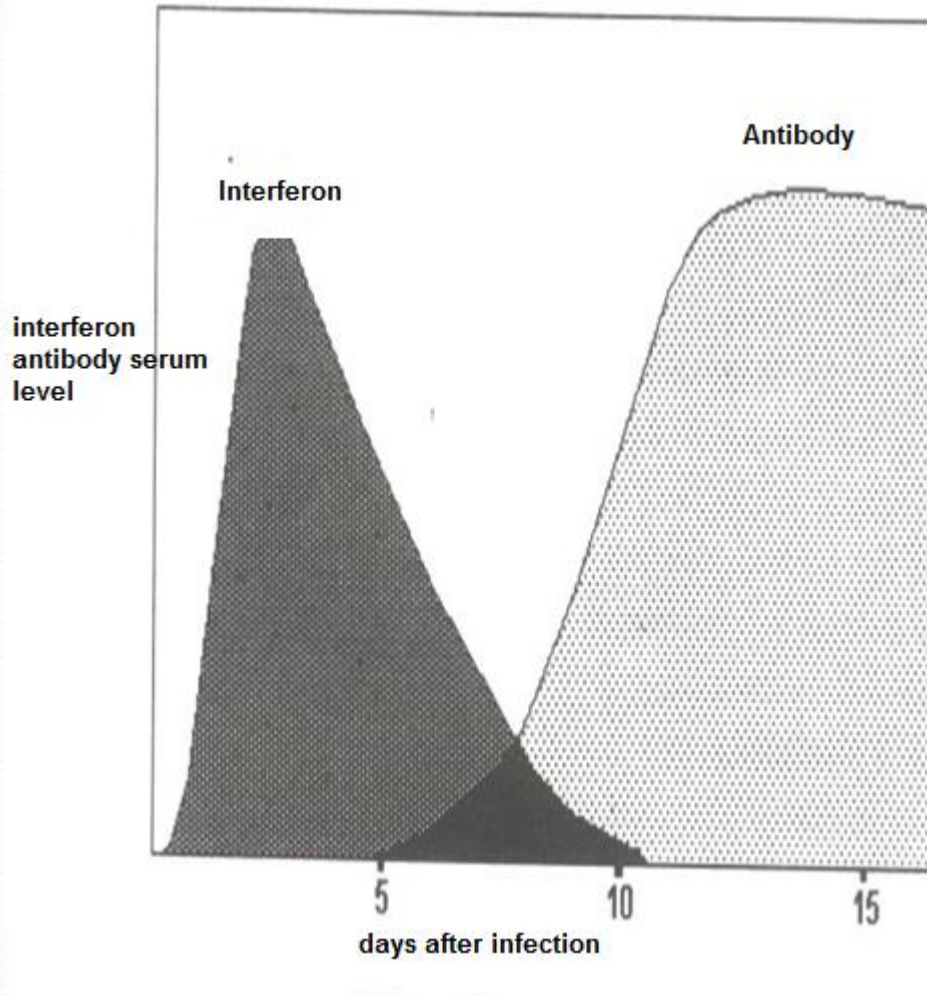
- Viruses are mandatory intracellular microorganisms.
- They are simple and have few antigens.
- Once viruses enter the cell, they synthesize new virus proteins to the host cell and are displayed on the cell surface. These are also antigenic and are called endogenous antigens.

Pathogenesis of Viral Infections

- Introduction of viral genome into host cell
- Replication of viral genome
- Synthesis of viral proteins
- Formation of virus particle and host cell abandonment
- Changes in the host cell;
Cell death (cytopathic effect)
Cell apoptosis (immune response)
Synthesis of new viral antigens (latent infection)
Tumor cell formation (neoplastic transformation)
Infection of immune system cells (immunosuppression)

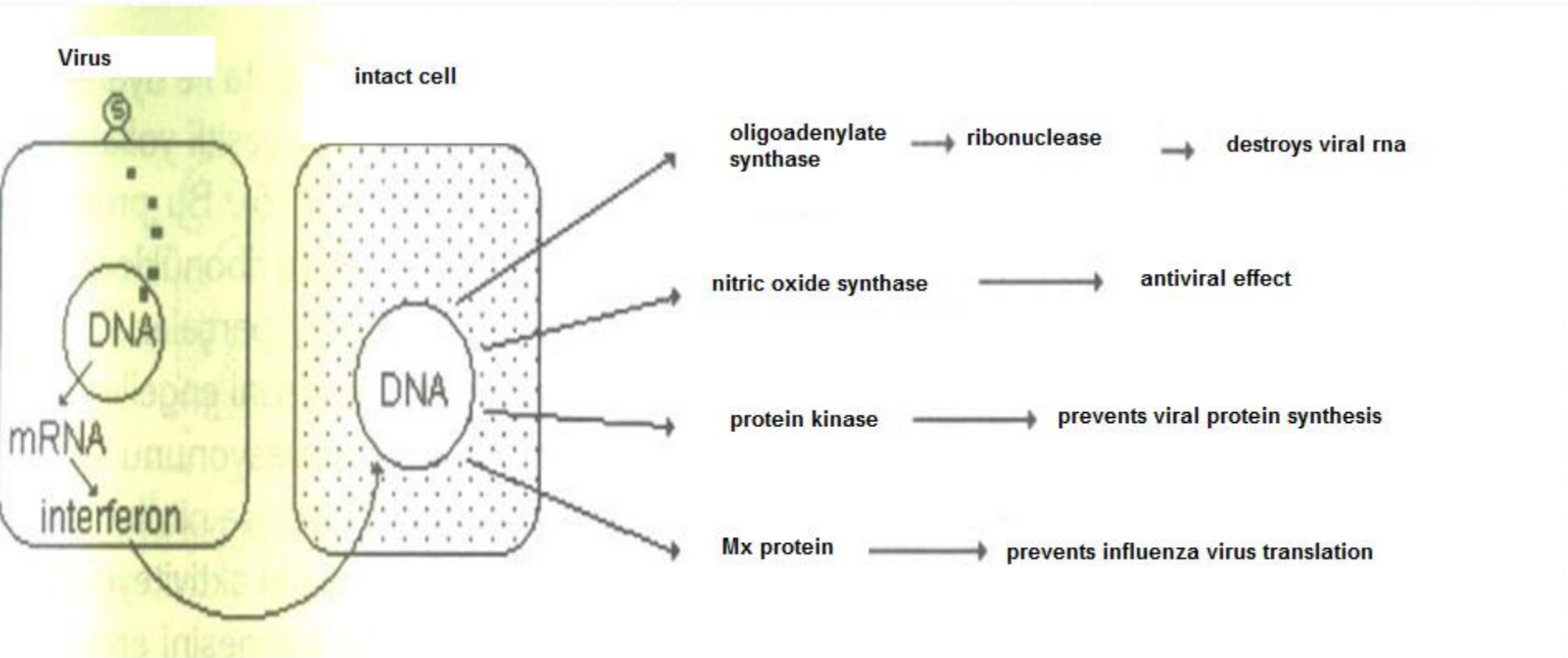


Natural Defense Mechanisms

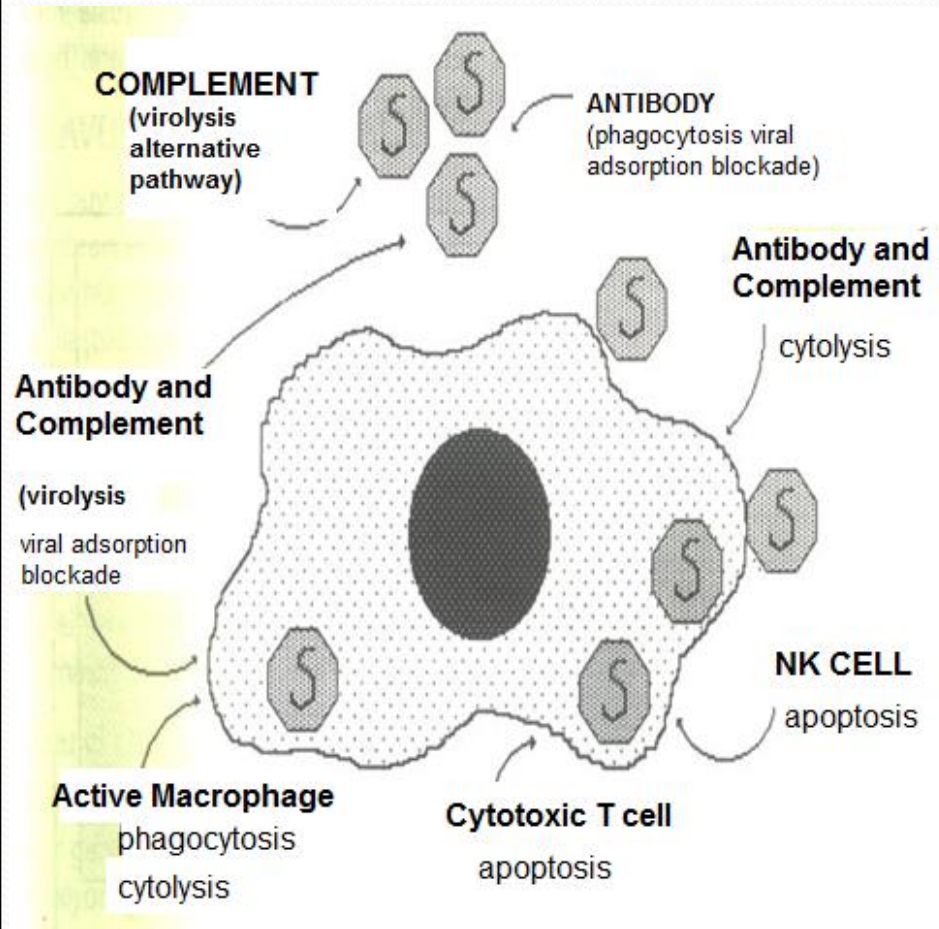


- Genetic Factors; Host cell receptor compatibility
- Interferons;
 - alpha, beta, gammainterferon
 - synthesized by virus-infected cells,
 - act on neighboring cells,
 - are effective earlier than the antibody response,

Antiviral mechanisms of interferons



Immunological Defense Mechanisms



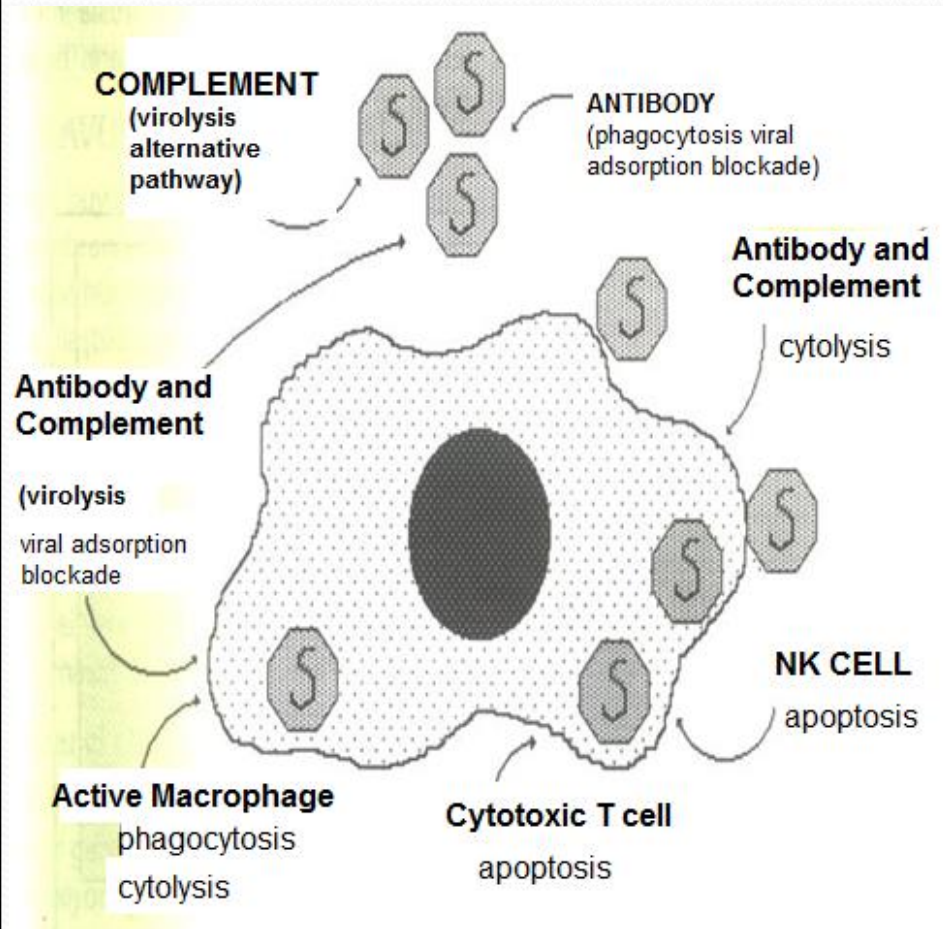
Humoral Immune Response
Extracellular viruses and
Against inactive viral vaccines

Cytosolic processing, presented to Th2 cells with MHC class II molecule, B cell activation occurs

Antibody synthesis (IgG, IgM, IgA)

- neutralization
- opsonization
- complement activation (virolysis and cytolysis)
- Antibody-dependent cellular cytotoxicity

Immunological Defense Mechanisms



- Cellular Immune Response
- Against viruses in the cell
- Endosomally processed, presented to T-cytotoxic cells with MHC class I molecule, apoptosis occurs,
- T-cytotoxic cells express macrophage activation by synthesizing IFN gamma,
- Virus-infected cells stimulate NK cells by expressing IFN-alpha and IFN-beta (antibody-dependent and direct stimulation)
- The duration of the immunological memory is variable

Ways of Viruses to Eliminate Immune Response

- Antigenic changes;
 - antigenic variation
 - antigenic transition (point mutation every 2-3 years)
 - antigenic change (genetic recombination)
- Immunosuppression
 - herpes viruses. Necrosis of the mouse thymus
 - IBD virus. Necrosis in Bursa Fabricius
 - HIV virus. CD₄ cell infection
 - Bovine pox virus IL ..IL-1 inhibitor synthesis (virokine)