

Body Defenses

I. Pathogens - Disease-causing agents

II. Innate (Nonspecific) Defenses

- A. Species Resistance – each species has a unique environment that fails to provide the conditions for pathogens of another species.
- B. Mechanical Barriers – skin, mucous membranes, and tears prevent the entry of certain pathogens.
- C. Chemical Barriers
 - 1. acid or lysozyme kill many pathogens.
 - 2. Interferons, antiviral proteins, are produced by viral-infected cells and stimulate nearby cells to produce antiviral enzymes
- D. Fever - interferes with the proper conditions that promote bacterial growth.
- E. Inflammation
 - 1. characterized by redness, swelling, heat, pain, loss of function.
 - 2. Major actions that occur: dilation of blood vessels; invasion of white blood cells; fibrin walls off area
- F. Phagocytosis – cells ingest and destroy foreign bodies or dead cells
 - 1. neutrophils – small, die after one encounter, become part of pus
 - 2. macrophages – after leaving blood, enlarge 5x, do most of the phagocytosing

III. Adaptive (Specific) Immunity

- A. recognition and memory
- B. **Antigens**
 - 1. Before birth, body makes an inventory of "self" proteins.
 - 2. molecules that elicit an immune response.
- C. **Lymphocytes**
 - 1. T cells attack foreign, antigen-bearing cells by direct cell-to-cell contact.
 - 2. Killer T cells secrete toxins that kill your infected cells
 - 3. B cells attack pathogens by differentiating into plasma cells that secrete antibodies.
- D. **Immune Response**
 - 1. Macrophage engulfs and destroys a pathogen
 - 2. Presents antigens of the pathogen on its surface
 - 3. Helper T Cells match antigen and causes release of chemicals
 - 4. Chemical causes more T cells to be made
 - 5. Some become Killer T Cells and go attack infected cells
 - 6. Some become Memory T Cells and stick around in case needed for another attack.
 - 7. Helper T Cells match with B Cells that have also “seen” the antigen which causes more B Cells to be made.

8. B Cells turn into Plasma Cells that make antibodies (Y-shaped proteins)

9. Antibodies bind to pathogens making them inactive or clump them for phagocytes

10. Some B Cells turn into Memory B Cells – stay in system in case of another attack to start the antibody production sooner

E. **Classification of Immunity**

1. Naturally acquired active immunity occurs after exposure to the antigen itself.

2. Artificially acquired active immunity occurs through the use of vaccines, without the person becoming ill from the disease.

3. Artificially acquired passive immunity involves the injection of antibodies from an animal or another person and is short-lived. (antiserum)

4. Naturally acquired passive immunity occurs as antibodies are passed from mother to fetus or to baby during breastfeeding

F. **Allergic Reactions** - excessive immune responses