

# Chapter 18 - Host-Parasite Interactions: Nonspecific Host Resistance

## Vocabulary to Know

Good Health - good defense mechanism

Pathology - study of disease

Etiology - course of disease

Pathogenesis - manner in which disease develops

Infection - colonization of body by pathogen

Disease - any change from the normal state of health

**Pathogenic** - In order for a microbe to be a disease causing pathogen:

1. Must infect host
2. Must metabolize & multiply in host
3. Must resist host defenses
4. Must damage host

## Factors Enhancing Virulence

**Virulence** - measures the degree of pathogenicity (compared to avirulent)

### Establishing disease:

- Must gain entry
- Must penetrate tissues
- Must grow in new location

**Portal of Entry** - site where microbe enters body (may vary)

**Dosage** - refers to number of parasites needed to become established. More bacteria = sick faster

### Presence of a Capsule

- capsulated = virulent
- not capsulated = avirulent

**Tissue Penetration (invasiveness)** - ability to penetrate tissues depends on the enzymes that a bacteria can produce

Coagulase - clots plasma (made by some Staphylococcus)

Streptokinase - dissolves clots (used for heart attack victims)

Hyaluronidase - causes cells to come apart (flesh eaters) breaks down Hyaluronic acid (tissue cement)

Leucocidin - kills mostly neutrophils

Hemolysin - breaks down RBC

Both Leucocidin & Hemolysin = help bacteria penetrate the blood stream & avoid WBC

**Toxins** - substances produced by some microorganisms that have a damaging effect on cells & tissues in a host.

Exotoxins - Usually exhibited by gram (+) released from bacteria into surrounding medium. Ex. C. botulinum, Clostridium botulinum (prophage)  
- Exotoxins are proteins

Endotoxins - usually exhibited by gram (-). released from bacteria and remains within the bacteria cell (actually part of the gram (-) cell wall)  
- released when bacteria phagocitized  
- does not initiate antibody production

**Toxoids** - inactivated toxins producing fever, shock, coma. Ex. DPT

## Secondary Lines of Defense or Internal Defense (After Skin & Mucous membranes)

**Inflammation** - Produces Swelling, Heat, Redness, Pain, Loss of function.

1. Tissue injured
2. Histamine released by basophils producing the inflammation
  - Capillary Permeability = leaky membrane (swelling & pain)
  - Vasodilation = heat & redness
3. Neutrophils - arrive to start phagocytosis
4. Clots - tissue repair
  - localizes the infection so that bacteria do not enter the blood stream.
  - Septicemia = bacteria multiplying in the blood

**Fever** - fever develops when you encounter a pyrogenic agent. Fever helps against rhinobacteria and Neisseria

37°C = normal body temp

- Regulated by hypothalamus
- Body temp may be reset by using:
  - Endotoxins produced by bacteria
  - Endogenous pyrogen

43.3°C = disorientation or irrational

45°C = proteins denature

Temp. increase - constricts peripheral vessels = chills

Temp. decrease - vasodilation = sweating

**Natural Killer Cells** - Lymphocytes who function to kill undesirable cells such as tumor or virus infected cells.

- NK cells kill by binding to target cells and releasing membrane destroying enzymes
  - a. contact cell
  - b. lyse the target cell by releasing lethal proteins punching holes in target cytoplasmic membranes.
  - c. NK cells activity enhanced by Interferon which is a group of proteins that help the body protect itself against viral infection.

**Phagocytosis** - Action of engulfing bacteria, foreign proteins, and the remains of dead body cells carried out by Phagocytes which are a derivative of the leukocytes (WBC) Specifically: neutrophils & monocytes

1. Chemotaxis - chemical attractor to microbe
2. Adherence - microbe adheres to phagocytic cell
3. Ingestion - using pseudopods
4. Digestion - use enzymes (lysozymes)
5. Elimination - contents released after destruction

Leukocytosis - increase in WBC

Leukopenia - decrease in WBC (sometimes seen in viral infections)

**Leukocytes** (WBC)

### Granulocytes

1. Eosinophils - (Red) for allergic responses and parasite infections
2. Basophils - (Blue) for inflammation and release of histamine
3. Neutrophils - (Neutral) Phagocytes

### Agranulocytes

1. Lymphocytes - give rise to T cells and B cells (Antibodies)
2. Monocytes - give rise to Macrophages

## Complements

1. Draw phagocytes to site
2. Help phagocytes attach to bacteria cell
3. Lysis of bacteria cell

**Interferon** - Protein substance within infected cells that protect other cells from infection with the same or unrelated viruses. It binds to receptor sites preventing transcription.

- Contains Anti-Viral and Anti-Cancer activity

If infected with a cold interferon could actually keep you from getting the flu. It won't kill the virus within its cell but it can keep other cells from getting infected.