Immune System
Objectives
To define resistance to disease.
To identify the types of non-specific immune response.
Enumerate the steps of inflammation.
To outline the steps of the complement system.
To recognize and explain the role of interferon in fighting viral infection.
To describe the antigen/antibody complex involved with immune response.

Resistance
The ability of the body to resist invading organisms and chemicals

I. Non-specific/Innate
II. Specific/Adaptive

Immunity – The body’s ability to protect itself.

Non-specific Responses aka Innate Defenses
1) Skin & Mucous membranes
2) Phagocytes – first line of cellular response by macrophages.
3) Natural Killer cells – target cancerous cells or viral infected cells for immediate destruction.
4) Inflammation – isolate and repair after trauma
   WBC's move in to attack.
5) Fever
6) Lysozyme & Stomach Acids

Inflammation
Signs of Acute inflammation:
- Pain
- Swelling
- Heat
- Redness
- Impairment of function e.g. joint movement reduced.

Inflammatory Response
Steps
1) Alarm is sent out (May Day!)
2) Cytokines released
3) Inflammatory chemicals released (mediators)
4) Hyperemia
5) Capillaries become more permeable

Result: Macrophages on the scene attack & eat!

The Complement System
This defense system "complements" or enhances the effectiveness of innate and adaptive defenses
Composed of plasma proteins

Mechanism:
Attack & ultimately kill invading cells via lysis.
Inactive plasma proteins called to active duty:
- Stimulate phagocytosis
- Cytotoxic (cell destroying) abilities

"Self invested" fighting team
Interferon

Importance – viral infection
Produced by cells of the body – already infected.
- These cells will not be saved.
- Infected cells sound the alarm to save others.
- These cells make a protein that interferes with the viral replication in healthy cells by disrupting viral use of the protein synthesis mechanism.
- Activates macrophages & NK cells

Fevers are the immune system's method of fighting infection.
The normal body temperature is 98.6 degrees F
Fever inhibits bacterial reproduction.
Pyrogens & Prostaglandins
When fevers are above 102 degrees Fahrenheit they are a cause for concern. Potential damage to the Central Nervous System can result.

Adaptive Immune Response

Provides defense against specific foreign agents or microbes.
Exposure prompts ways to cope with subsequent/later infections.
Competent lymphocytes provide specific, trained armies to deal with an attack.

When Nonspecific Defenses are insufficient → Adaptive Response

I. Cell Mediated Immunity
- T cells
II. Humoral Immunity
- B cells produce antibodies for a specific response.
  - Plasma cells
  - Memory B cells

Antibody

Characteristics:
- A Y-shaped protein produced by cells of the immune system.
- Found circulating in the blood.
- Recognize foreign antigens.
- Highly variable but specific to their target.
- Normally facilitates destruction of the antigen.
- Found commonly attached to surface of B cells.
Function of Antibodies

Neutralize the invading organism.
Promote phagocytosis
Agglutination
Activate complement reactions

Antigens

A complex molecule
Stimulates the production of specific antibodies.
Typically found on the surface cells.

Antibody response Generating

Examples: Bacteria, mold, pollen, dust and dander, toxins, household chemicals.

Specific Immunity

Lymphocytes – Originate in the bone marrow.

I. B cells (mature in bone marrow)
II. T cells
   > Cytotoxic (bind & destroy target cells)
   > Helper T’s (stimulate response)
   > Suppressor (Inhibits immune response)
III. Memory – long term immunity for future.

Humoral Immunity

I. Passive
   Artificial Immunity (Serum with antibodies)
   Natural Immunity (From mothers)
II. Active
   Natural Immunity
   Artificial Immunity

The Immune System: Importance of Vaccines – Segment 6