Immune System Objectives

To identify the defense team of the specific immune response.
To recognize the incredible diversity of antibodies and why this structure is engineered to deactivate foreign substances.
To identify the difference between active immunity and passive immunity.

Case study involving Hepatitis & gammaglobulin.
To address how the immune system is involved with allergic response.
To distinguish the difference between an immune deficiency disorder and an autoimmune disease.

Assignment: Flow chart to trace the immune response on Pg 2-15.

Specific Immunity

Lymphocytes – Originate in the bone marrow.

I. B cells (mature in the bone marrow)
II. T cells (mature in the thymus gland)
   - Cytotoxic - bind and destroy target cells
   - Helper T’s – stimulate response
   - Suppressor – inhibit immune response

III. Memory – long term immunity for the future.

Immuno-competency

When B & T cells become immuno-competent they display unique receptors on their surface.

Major Histocompatibility Complex

MHC I – Found on ALL body cells
MHC II* – Found only on cells involved with immunity.

* These receptors commit the cell to only interacting with that antigen form. Coded by Genes!

Types of Humoral Immunity

I. Active: B cells encounter antigens & produce antibodies.
   - Natural (contract the disease/infection & survive)
   - Artificial (vaccines)

II. Passive: Antibodies harvested from serum of a human or animal donor.
   - Mother to fetus (placenta & breast milk)
   - Injections of gamma globulin (after exposure)
   - Serum – for fast protection
     - Snake bites, Botulism, Rabies, Tetanus

Hepatitis

Inflammation of the liver
Viral infection
Types:
   - Hepatitis A – from contamination of food, water, shellfish [32% of cases in U.S.]
   - Hepatitis B – from blood and sexual contact, immunization exists [40% of the cases in U.S.]
   - Hepatitis C – can lead to chronic liver infections, can lead to death. [Treatment with interferon drugs]

Discuss Case Study 2-16

What about Allergies?

Hypersensitivity
   - Allo = altered
   - Erg = reaction

Result when the immune system causes tissue damage as it fights off a perceived threat.

Overproduction/ inappropriate response of IgE antibodies.
   - Allergen: antigens that incite this reaction.
     - Examples - Pollen, mold, sting, food, dander
   - Hapten – antigen grabs a self molecule & blends e.g. drugs, poison ivy, detergents
Immediate Hypersensitive

*Acute or Type I*

**Anaphylaxis** – Initial encounter produces no symptoms, but sensitizes the individual. Later encounter can set up an extreme reaction of the immune system.

- Involves: T cells, B cells, mast cells (detector cells) and basophils.
- Massive release of *histamines* by mast cells.
- Asthma type symptoms occur.

> **Epinephrine** is the drug of choice to reverse.

Immune deficiency

Congenital or acquired condition that decreases the effectiveness of the immune system.

Examples:
- SCID – genetic deficit of B or T cell production.
- AIDS – Acquired Immune deficiency Syndrome.
  - Caused by HIV – which destroys Th cells.
- Hodgkin’s Disease – cancer of the lymph nodes

Autoimmune diseases

Immune system loses its ability to *distinguish* itself from foreign antigens. The body produces antibodies and sensitized Tc cells that set about to destroy the body’s own tissues.

Examples of Autoimmune diseases:
- Multiple sclerosis – destruction of myelin in nervous sys.
- Type I (juv) diabetes – destruction of pancreatic beta cells
- Rheumatoid arthritis – destruction of the joints