8.3 The Lymphatic System

In this section, you will:

• **Describe and explain** the function of the lymphatic system
• **Identify and list** the main cellular and non-cellular components of the human defence system
• **Describe** the role of the cellular and non-cellular components of the human defence system

Lymphatic Circulatory System

• Network of vessels
• Associated with glands and nodes
• Collect lymph fluid
  – Interstitial fluid
  • Fluid between cells/tissue
• Maintain balance of fluids

• Crash Course - Immune System

Circulation

• As blood circulates plasma escapes into the interstitial fluid
• Interstitial fluid is absorbed into vessels of lymphatic system and if needed gets mixed back into the blood
• Eventually **re-joins** the main circulatory system.
  – Ducts that join vessels near the heart
• The Lymph System (3min)
White Blood Cells

- Lymphocytes mature in the lymph nodes
  - Contain other defense aiding mechanisms – hence when you get sick
- Macrophages are also found in lymph nodes
  - Lymph nodes swell because the white blood cells in your body are growing in number!

Body defense

- The skin – prevents entry of pathogens
- White blood cells – use phagocytosis to destroy invading bacteria
- Immunity – antibodies exist within the body to recognize and destroy antigens. This is the main role of lymphocytes:
  - B cells – mature in bone marrow
  - T cells – mature in the thymus gland near the heart
  - Contain antigen receptors to find invading pathogens

What are pathogens?

- “Producers of suffering”
- Ex.
1. First Line of Defence:
   1. Physical & chemical barriers (ex. Skin, eyelashes, cilia, tears, acid).

2. Second Line of Defence:
   1. Non-specific defences - cell mediated
   2. Macrophages, neutrophils, monocytes

3. Phagocytes

1. Third Line of Defence:
   1. Specific defences - Antibody mediation
      1. Immunity
         1. Lymphocytes
   2. B cells - mature in bone marrow
   3. T cells - mature in thymus gland

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**B-Cells**

- B-cell binds to antigen - swells and divides to produce **Memory B-cells**
  - Travel in the blood stream carrying information antibodies to help fight pathogens
- After the infection is gone the memory B cells remain to help fight off another attack

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**T-Cells**

- **Helper T** - recognize antigen and give off chemical signals
  - Warning
- **Killer T** - bind to infected cells and destroy them
  - Kill
- **Suppressor T** - slow or suppress the immune response so that normal tissues doesn't get destroyed
  - Inhibitor
- **Memory T** - help the body remember previous encounters with a particular pathogen and recognize it quicker the next time
  - Quickens response
Blood Type | Antigen on Red Blood Cells | Antibody in Plasma
---|---|---
A | A | anti-B
B | B | anti-A
AB | A and B | none
O | none | anti-A and anti-B
Blood Types

- Individuals with blood type AB are **universal recipients** (they can receive A, B, AB, or O blood) because they do not have anti-A or anti-B antibodies.
- Type O individuals are **universal donors** (they can donate blood to those with A, B, AB or O blood) because their blood cells do not carry A or B antigens – Do not react with either anti-A or anti-B antibodies.

**Blood Types**

Rh Factor

- Antigen on surface of red blood cells - **Rh factor**
- People who have protein - **Rh+**
  – Those who lack it are **Rh-**.
- Rh- blood **does not** have Rh antibodies
- Rh- blood can **develop Rh antibodies** if he or she receives Rh+ blood
  – Rh antigens triggers Rh antibodies.

- Person with Rh+ blood can **receive** blood from a person with Rh- blood
- When an Rh- mother gives birth to an Rh+ infant, the Rh- mother makes “anti-Rh” antibodies.
  – Mother’s antibodies may pass to an Rh+ fetus in a future pregnancy
  - Fetus's RBC clump- lead to fetal death.
Immunity Response Project

- Work alone, with a partner, or in a group of THREE.
- You will be allowed class time today, and tomorrow.
- Due before Thursday’s review.

Reminder - Ch. 8 Exam Friday

Immune System Disorders

- **Autoimmune** disorders; cause unknown
  - **Rheumatoid arthritis**
    - Chronic joint inflammation
    - Pain, stiffness, swelling, fever, fatigue
    - Treatment- Aspirin, steroid, medication

Allergies

- **Exaggerated** response
  - **Acute**
    - Most common
    - Antibodies trigger histamine release
    - Causes permeability of blood vessels = red & swelling
      - Cellular fluid release = watery nose & nose
      - Vomiting, diarrhea, asthma attack
  - **Delayed**
    - Set off by T-cells
    - Slower/longer
    - Skin issues, wheezing, aches, pains
      - Ex. Cosmetic/ jewelry
  - **Anaphylaxis**
    - Immediate & dangerous reaction (Epi-pen)