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Objective:
Students will be able to describe the lymphatic system, its pathways, the organs involved, and the function of the system.

**Lymphatic System v. Cardiovascular System**

**Similarities**
- Both systems contain networks of vessels carrying fluid throughout the body
- Both systems' capillaries are made up of a single layer of squamous epithelial tissue
- Both systems involve capillaries that function with the aid of hydrostatic and osmotic pressure differences
- Both systems use muscle contractions to aid in moving the fluid through the vessels

**Differences**

<table>
<thead>
<tr>
<th>Lymphatic</th>
<th>Cardio</th>
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<tbody>
<tr>
<td>fluid = lymph</td>
<td>fluid = blood</td>
</tr>
<tr>
<td>lymphocytes</td>
<td>RBCs</td>
</tr>
<tr>
<td>lymph nodes</td>
<td>WBCs</td>
</tr>
<tr>
<td>collecting ducts</td>
<td>heart</td>
</tr>
<tr>
<td>vessels thinner,</td>
<td>arteries, veins</td>
</tr>
<tr>
<td>but like veins</td>
<td>filters proteins</td>
</tr>
<tr>
<td>w/valves</td>
<td>from blood</td>
</tr>
<tr>
<td>returns small</td>
<td></td>
</tr>
<tr>
<td>proteins to blood</td>
<td></td>
</tr>
</tbody>
</table>
Functions of the System
- Transport excess tissue fluid (interstitial)
- Fat Absorption: lacteals (capillaries in sm. intestine) absorb fats--transport to venous circulation
- Body defense

Functions of Lymph
- Filtration (exceeds reabsorption)
- Transports foreign particles to lymph nodes
- Returns small proteins to blood stream

Functions of a Lymph Node
- Filtration (especially harmful particles before going back into blood)
- Immune Surveillance (monitors body fluids using lymphocytes and macrophages to attack and destroy viruses, bacteria, parasites, etc.)

Structure of the system and a Lymph Node
(insert color sheet)
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Structure of the system and a Lymph Node
(insert color sheet)
Lymphatic Pathways

**Thoracic duct**
- Left side of head, neck, thorax, & mesentery
- Collects lymph from both sides of the body
  - Left subclavian
  - Right lymphatic duct

**Right lymphatic duct**
- Right side of head, neck, thorax, & mesentery
- Collects lymph from the right side of the body

**Lymphatic Capillaries**
- Exit to nearby lymph nodes
- Collects lymph from the tissues

**Cortical Outer portion of body**
- Involves filtration

**Cells, lymphocytes, and macrophages**
- Involved in immune response

**Kosmic pressure in lymphatics**
- Physiological hemodynamics

**To venae cavae -> blood plasma**
1st Line of Defense
- Non-specific resistance
- Mechanical barriers
- Innate

2nd Line of Defense
- Inflammation
- Chemical barriers

3rd Line of Defense
- Cellular (T-cells)
- Humoral (B-cells)

Immunity
2 Types

1st Step
- T Cell Activation

Display Ag
- If Fit with
- If Don't Fit

Bind to Ag-bearing cells
- Cuts holes in membrane
- Kills Cells

Release
- Activates

Attract
- Directly Attack

Secret
- Secrete
- Antibody (Ab)

Phagocytosis
Students will be able to differentiate between innate and adaptive defenses and describe the mechanisms of both.

**Objective:**

1. Innate (Non-Specific)
2. Adaptive (Specific)
3. 1st Line of Defense
   - Species
   - Resistance
   - Mechanical Barriers
   - Chemical Barriers
   - Fever
   - Inflammation
   - Phagocytosis
   - Interfering
4. 2nd Line of Defense
   - Humoral
   - Cellular (cells)
5. I Cells (Activator)
6. B Cells (Activator)
7. Cytotoxic T cell
8. Helper T cell
9. Plasma Cells
10. Antibodies
   - Exclusively
   - Direct Attack
   - Complement
   - Opsonization
   - Chemotaxis
   - Lysis
   - Neutralization
   - Phagocytosis
**Objective:**

Students will be able to differentiate between innate and adaptive defenses and describe the mechanisms of both.

(insert Body Defenses graphic organizer)
Objective:
Students will be able to differentiate between innate and adaptive defenses and describe the mechanisms of both.

(insert Body Defenses graphic organizer)
### Debrief Graphic Organizer

- What are 2 types of defenses in the body's 2nd line of defense?
- What are 2 similarities between cellular and humoral immunity?
- What are 3 different examples of when cellular and humoral immunity overlap?
- What are 3 different ways the body deals with antigens?
- What is the difference between Active and Passive Immunity?
- How is a primary immune response different from a secondary immune response?
- What is acquired immunity? How do we "acquire" it?
- How is the spleen different from the thymus and all other lymph nodes?
### Objective:
Students will be able to explain how allergic reactions, tissue rejection, and autoimmunity arise from immune mechanisms.

### HIV
- Read the Topic of Interest on p. 376 of text.
- On whom should experimental AIDS vaccines be tested?
- What are 3 reasons HIV is so successful
- What are 3 different classes of drugs used to fight HIV?
- What is the most successful way to use drugs to fight HIV?
- Why is a vaccine difficult to develop for HIV?

### SCID
- Read the Genetics Connection on p. 378 of text.
- How are T cells involved in these examples? B cells?
- What are some of the experimental treatments these children received?
- How did these children set the stage for breakthroughs in medical treatments?
- What are ongoing concerns regarding gene therapy and SCID?