page 1  Human Body Systems: Class Notes

**Anatomy**: Structure of Body Parts. Morphology

**Physiology**: Function of body parts. What they do and how.

A & P are very closely related; structure is closely related to function.

### Characteristics of Life
- Movement - self initiated change in position, motion of internal parts
- Responsiveness (irritability) - Ability to sense changes within or around the organism and react to them
- Growth - increase in body size
- Reproduction - Parents produce offspring / producing new individuals
- Respiration - Obtaining oxygen (O2), using it to release energy from food substances, and getting rid of wastes
- Digestion - Chemically changing (breaking down) food substances, and getting rid of wastes
- Absorption - Passage of digested products (food substances) through membranes and into body fluids
- Circulation - Movement of substances throughout the body
- Assimilation - Changing absorbed substances into chemically different substances
- Excretion - Removal of wastes

**METABOLISM**: All physical and chemical changes occurring in an organism

Needs: Water, food, oxygen, heat, pressure. All must be regulated.

**HOMEOSTASIS**: Tendency of the body to maintain a stable, balanced internal environment. Accomplished through self-regulating adjustments.

### Levels of Organization (from simplest to most complex)

- Atoms --> Molecules --> Macromolecules --> Organelles --> Cells --> Tissues --> Organs --> Organ Systems --> Organism
  - A group (mass) of cells working together to carry out certain common functions form a tissue.
  - A group of tissues working together to carry out certain common functions form an organ.
  - A group of organs…

### ORGAN SYSTEMS

<table>
<thead>
<tr>
<th>1. Integumentary</th>
<th>Body covering. Skin, hair, nails, sweat glands. Function: protect underlying tissues and regulate body temperature</th>
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<tbody>
<tr>
<td>2. Skeletal</td>
<td>Bones, ligaments, cartilage Function: Support, movement, protection, and production of blood cells</td>
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<td>3. Muscular</td>
<td>Muscles of the body Function: Movement, maintenance of posture, production of body heat</td>
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<td>4. Nervous</td>
<td>Brain, spinal cord, nerves through the body Function: Communication throughout body, mental activities, maintaining homeostasis</td>
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<td>5. Endocrine</td>
<td>Ductless glands = pituitary, adrenal, thyroid, parathyroid, pancreas, ovaries, testes, thymus, pineal glands Function: Secretion of hormones, communication between body parts</td>
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<td>6. Digestive</td>
<td>Mouth, teeth, pharynx, esophagus, stomach, small intestine, large intestine, liver, gall bladder, and many glands including the pancreas Function: Breakdown of food substances into simpler forms that can be absorbed (digestion).</td>
</tr>
<tr>
<td>7. Circulatory = Cardiovascular and 7b. Lymphatic</td>
<td>Heart, blood vessels, blood. Function: Transports materials throughout the body.</td>
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<td>*Lymphatic system usually included with the circulatory system</td>
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8. Excretory = Urinary
Kidneys, ureters, urinary bladder, urethra
Function: Removes (filters) wastes from the blood and helps maintain the body's water and electrolyte balance

9. Reproductive
Reproductive organs, primarily the ovaries (females) and testes (males)
Function: Produce special reproductive cells for reproduction

10. Respiratory
Nose, mouth, trachea, bronchi, LUNGS, alveoli
Function: Brings O₂ to the blood, takes CO₂ away from blood.

Skeletal System/Bones:
- ALIVE
- Help in movement and support, also protection
- Honeycomb structure is strong. Bending prevents breaking.
- Stronger with use and good nutrition.
- More bones when born, later they fuse together
- Form, protection and support

Muscular System:
- Voluntary muscles are connected to bones (skeletal)
- Muscles of internal organs are not connected to skeleton
- Actively contract (shorten), passively relax (lengthen)
- Brain sends nerve signals to control movement
- Muscle breaks or tears when goes beyond limit
- External signals like shock can cause movement

Skin:
- largest organ of the body
- perspires to cool body when water evaporates

Digestive System:
- breaks down food into molecules that are absorbed
- Mechanical digestion: teeth/ stomach muscles
- Chemical digestion: saliva/ stomach acids/ enzymes
- Most absorption in the small intestine
- After absorption, blood vessels carry nutrients to the body
- Small intestine-- VERY long but small diameter
- Large intestine reabsorbs water
- Not enough lactase enzyme= lactose intolerant
- Stomach is lined with mucus to protect from acid damage
- Ulcers are caused when acid irritates lining of stomach
- Tapeworms ingested- decrease food absorption
- **Peristalsis**- movement of food by muscles in esophagus
- Large intestine:
  - absorbs too much water= constipation  
  - absorbs too little water= diarrhea
- Solid waste removal

Excretory (Urinary) System:
- Kidney is a filter system
- Ureter carries filtered urine to bladder
- 2 ureters (1 for each kidney)
- 1 urethra (from the bladder)
- Light yellow urine= enough fluids
- Dark yellow urine= not enough fluids
• Bladder has muscles to hold (little kids use thighs...not good)
• Urinalysis= tests run to see if sick
  o Glucose= diabetes
  o Protein= kidney disease
  o Nitrate= infection
  o White Blood Cells = infection
• Wastes= Carbon dioxide, water, urea
• liquid waste removal

**Respiratory System**
• Takes in oxygen, gives off carbon dioxide (gas exchange)
• Bronchitis= inflammation in tubes
• Pneumonia= lungs fill with fluid
• Blocked trachea= choking
• Epiglottis blocks tube so food will not enter
• Larynx= voice box
• Laryngitis= inflammation of larynx
• Emphysema= damage of lung tissue, often from smoking
• Tumor= blocks lung and reduces gas exchange
• **diaphragm** = muscle that is used to help you breathe
• Diaphragm spasms= hiccup

**Circulatory system or Cardiovascular system:**
• Movement of oxygen, nutrients, and wastes throughout body
• Four chambers of heart
• Pumps red and blue blood
• Shock paddles are used to restart heart with pacemaker cells
• Shock paddles STOP the heart from beating
• Cholesterol (size of sand grain) can block the vessel= heart attack
• Know the cyclical path of blood:
  o from heart, pushed to lung to pick up oxygen and drop off CO2, turns RED.
  o returns to heart, pumped to the rest of body where it drops off oxygen and picks up CO2 and turns BLUE.
  o then returns to the heart to start cycle again.

**Immune System** is complex, so we will focus just on invasion by influenza virus:
• “spiky virus” attaches to cell in the throat
• Sore throat from special cells spraying toxin, kill bad and good cells
• Fever because body turns up thermostat to fight invaders
• Body tricked into thinking it is cold, so you shiver and feel very cold
• Headache= vessels swell due to increased temp
• Pain/aches due to the body sending chemical to slow you down
• Medicines do not treat virus, they just make your symptoms lessen
• 3 points of attack: barriers, inflammatory response, and immune response (T and B cells)

**Nervous System:**
• Brain is control center of all body activities
• Sends out “chemical” signal in body
• Neurons = nerve cell = axon, dendrites, terminal branches, cell body
• Some nerves send signals from sensors (e.g. touch or heat or light) to brain; other nerves send signals from brain or spinal cord to muscles.
• Synapse is a gap between neurons.