

Introduction to Anatomy and Physiology, Cell Transport – **Lecture Outline**

1. Anatomical Directional Terms, body planes, and fluid compartments.

A. Directional Terms

- show relationships between two body parts irrespective of body position
 - useful in locating an anatomical structure
 - universal in application
1. Anterior – front or ventral (opposite: posterior)
 2. Posterior – back or dorsal (opposite: anterior)
 3. Superior – toward the head (opposite: inferior)
 4. Inferior – away from the head (opposite: superior)
 5. Medial – toward the midline (opposite: lateral)
 6. Lateral – away from the midline (opposite: medial)
 7. Proximal – toward the origin or attachment (opposite: distal)
 8. Distal – away from the origin or attachment (opposite: proximal)
 9. Superficial – toward the surface (opposite: deep)
 10. Deep – away from the surface (opposite: superficial)

B. Body Planes

- cut made in the body for visualization purposes
 - 3 types recognized:
1. Frontal or coronal – divides the body into anterior and posterior sections
 2. Sagittal – divides the body into two halves along the long axis
 - Median – divides the body into two equal halves (=bilateral)
 3. Transverse – divides the body into superior and inferior sections

C. Fluid Compartments

- 60 to 70% of an adult human body is made up of fluid
 - where is this fluid located? Why should we study its location?
1. Intracellular Fluid – located within the cell
 2. Extracellular Fluid – located outside the cell
 - a. Interstitial Fluid – located between cells
 - b. Blood Plasma – located within blood vessels

2. Body Cavity

- hollow spaces that house and protect organs
- 2 types recognized:

A. Posterior Cavity

- also known as Dorsal Cavity,
- is protected by hard bones
- is at the back of the body
- 2 subtypes recognized:
 1. Cranial Cavity – houses the brain
 2. Vertebral Cavity – houses the spinal cord

B. Anterior Cavity

- also known as Ventral Cavity
- is partially protected by bones
- is in the front of the body
- is made up of 2 divisions separated by muscle (diaphragm)
- 1. Thoracic Cavity or Chest Cavity: located superior to the diaphragm
 - a. Left Pleural Cavity – houses the left lung
 - b. Mediastinal Cavity – houses trachea, esophagus & thymus
Pericardial Cavity – within the mediastinal cavity houses the heart
 - c. Right Pleural Cavity – houses the right lung
- 2. Abdominopelvic Cavity: located inferior to the diaphragm
 - a. Abdominal Cavity:
 - houses important organs
 - subdivided into 4 compartments as:
 - Right upper quadrant: location of liver, gallbladder and pancreas
 - Left upper quadrant: location of stomach, pancreas and spleen
 - Right lower quadrant: location of cecum, appendix, & ascending colon
 - Left lower quadrant: location of descending & sigmoid colon
 - b. Pelvic Cavity: houses:
 - reproductive systems,
 - distal urinary system (bladder and urethra) and
 - distal large intestine (sigmoid colon, rectum, anus)

3. Negative Feedback Mechanism of Homeostasis

A. Homeostasis –

- the tendency of the human body to remain stable or at an equilibrium in spite of the external environment
- controlled by the CNS and the Endocrine system

B. Negative Feedback Mechanism

- is a control mechanism bringing the body back to normal.
- has 3 components:
 - 1. Sensory Receptor – receives the information
 - 2. Control Center – analyzes the information & sends messages to the effector
 - 3. Effector – produces the desired response

4. Structure and Function of the Cell Membrane: Hk

5. Mechanisms of Cellular Transport

- meaning of cell transport?
- types of transport: 2 types recognized (Passive and Active)
- what is transported? Food, Oxygen, Water, Hormones, Waste, etc.

A. Passive Transport

- no energy is required.
- 4 types recognized:

1. Diffusion

- what is transported?
- small, uncharged molecules; from an area of higher concentration to an area of lower concentration
- What controls rate of transport? Concentration & size of molecules, heat

2. Osmosis

- what is transported?
- water; from an area of higher water concentration to an area of lower concentration through a selectively permeable membrane
- What controls rate of movement? Concentration of solute (from lower solute concentration to higher solute concentration)

3. Filtration – movement of substances due to pressure gradient, i.e., from high pressure to low pressure areas

- what is transported in the human body?
- Waste products from the blood to the Bowman's capsule located in the kidneys

4. Facilitated Diffusion

- what is transported?
- larger molecules using channel proteins from areas of high concentration to areas of lower concentration
- e.g., blood glucose and amino acids are transported this way

B. Active Transport

- energy required
- 2 types recognized:

1. Facilitated Active Transport – transport using carrier protein

- what is transported?
- Charged ions, e.g., Na^+ , K^+ , from low to high concentration

2. Bulk Transport

- what is transported?
- large molecules: 2 types recognized:
 - a. Exocytosis: large molecules sent out of the cell, e.g., wastes
 - b. Endocytosis: large molecules brought into the cell: 2 types recognized:
 - Phagocytosis – the membrane encircles a large undissolved molecule, folds inward and brings it to the interior of the cell for consumption, e.g., white blood cells feeding on bacteria and viruses
 - Pinocytosis – the membrane encircles dissolved particles, folds inward and brings it to the interior of the cell for consumption