Medical Terminology

Lecture 2

Body Terminology

Learning Objects:

- Assess medical language learning to the context of anatomy and physiology.
- Investigate the basic architecture and levels of organization of the human body.
- Evaluate the anatomical position, regional terms, directional terms, body planes, and body quadrants for anatomical positioning.
- Recall body cavities and the functions of associated membranes.

Introduction

It is important to put into context where in the body the medical term is referencing, and then consider how it works within the body.

Anatomy focuses on structure and physiology focuses on function. Much of the study of physiology centers on the body's tendency toward homeostasis.

Consider the structures of the body in terms of fundamental levels of organization that increase in complexity: subatomic particles, atoms, molecules, organelles, cells, tissues, organs, organ systems, organisms, and biosphere (Figure 2.1).

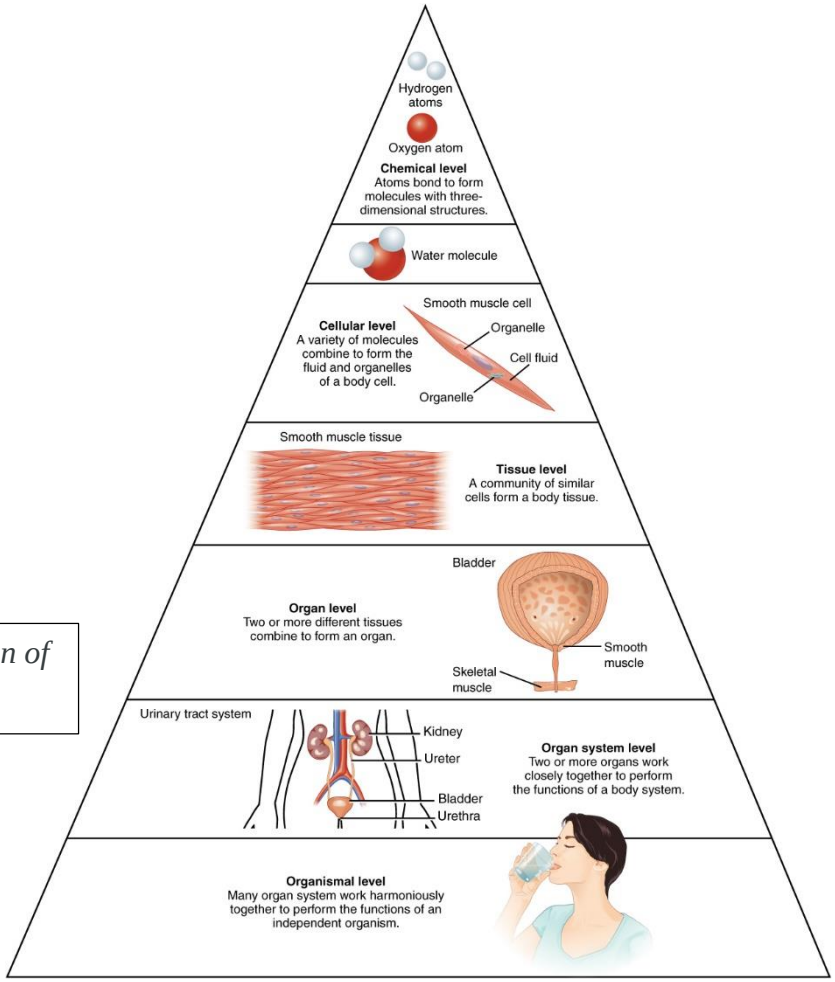

Figure 2.1: Levels of Structural Organization of the Human Body.

The Levels of Organization

The smallest unit of any of these pure substances (elements) is **an atom.**

Atoms are made up of subatomic particles such as proton, electron, and neutron.

Two or more atoms combine to form **a molecule**, such as the water molecules, proteins, and sugars found in living things.

Molecules: are the chemical building blocks of all body structures.

A cell is the smallest independently functioning unit of a living organism.

All living structures of human anatomy contain cells, and almost all functions of human physiology are performed in cells or are initiated by cells. A human cell typically consists of flexible membranes that enclose cytoplasm, a water-based cellular fluid, together with a variety of tiny functioning units called organelles. In humans, as in all organisms, cells perform all functions of life.

A tissue is a group of many similar cells (though sometimes composed of a few related types) that work together to perform a specific function.

An organ is an anatomically distinct structure of the body composed of two or more tissue types. Each organ performs one or more specific physiological functions.

An organ **system** is a group of organs that work together to perform major functions or meet the physiological needs of the body.

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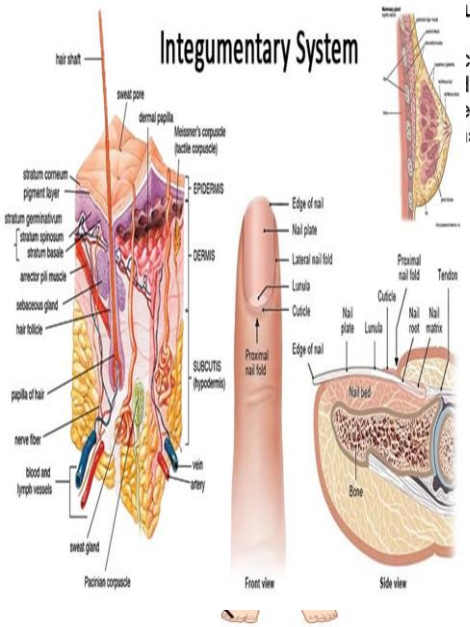
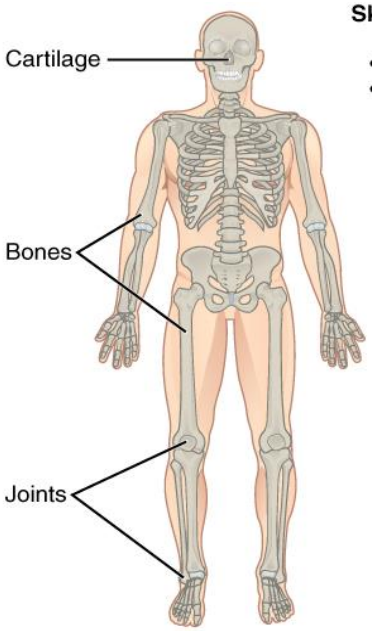


Skeletal System

- Supports the body
- Enables movement (with muscular system)



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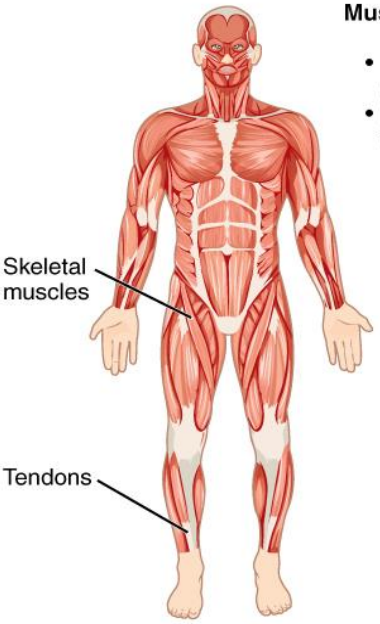
Muscular System

- Enables movement (with skeletal system)
- Helps maintain body temperature



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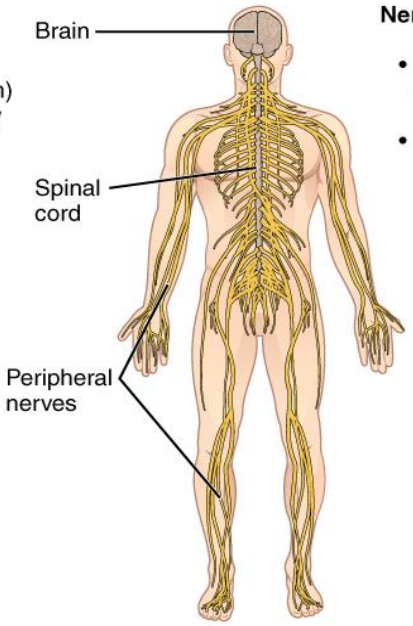
Nervous System

- Detects and processes sensory information
- Activates bodily responses



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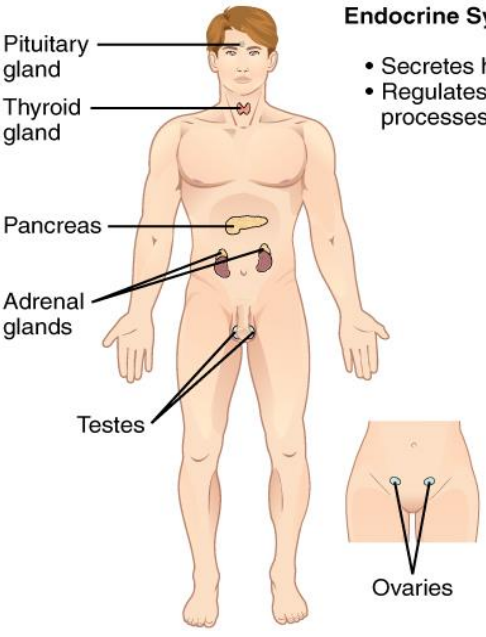
Endocrine System

- Secretes hormones
- Regulates bodily processes



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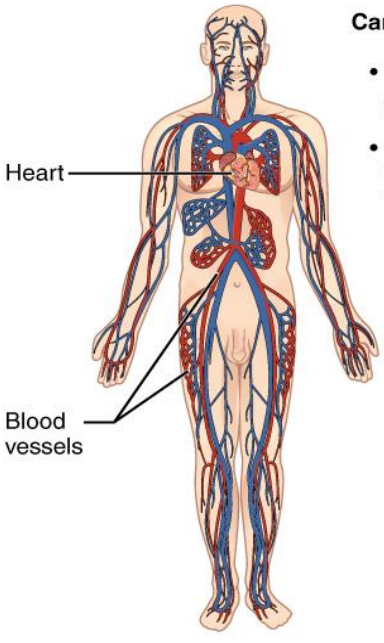
Cardiovascular System

- Delivers oxygen and nutrients to tissues
- Equalizes temperature in the body



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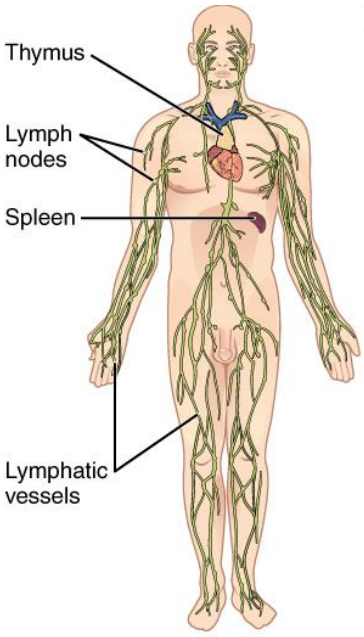

Lymphatic System

- Returns fluid to blood
- Defends against pathogens

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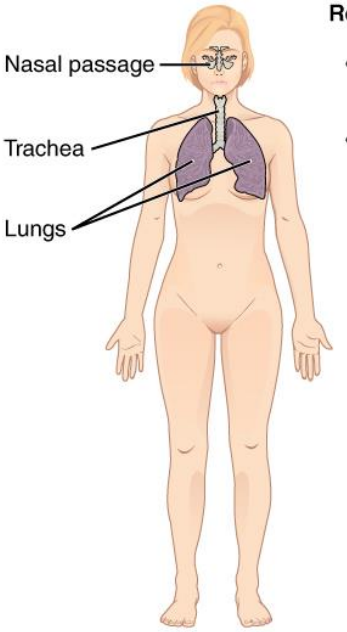

Respiratory System

- Removes carbon dioxide from the body
- Delivers oxygen to blood

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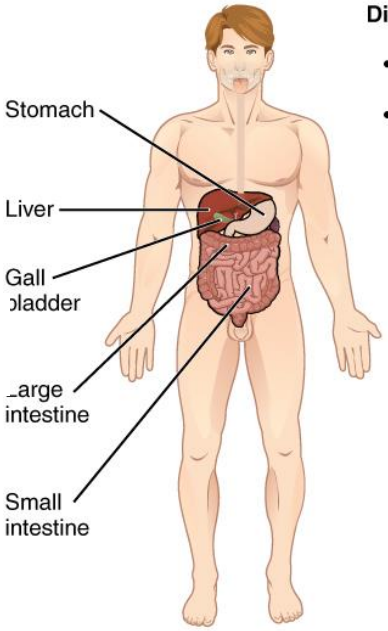

Digestive System

- Processes food for use by the body
- Removes wastes from undigested food

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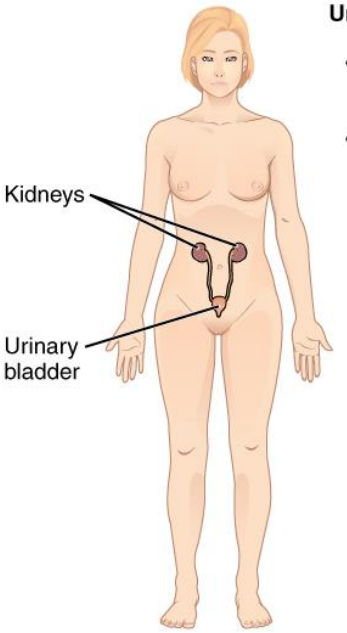

Urinary System

- Controls water balance in the body
- Removes wastes from blood and excretes them

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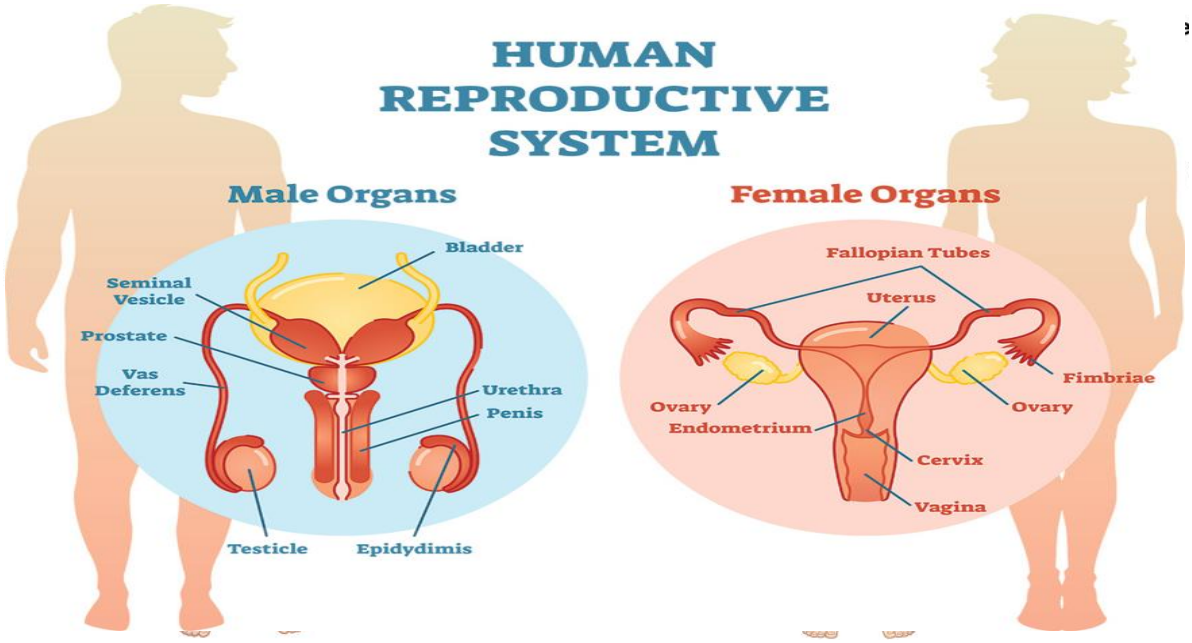


Organ Systems of the Human Body

1. **The integumentary system** encloses internal body structures and is the site of many sensory receptors. The integumentary system includes the hair, skin, and nails.
2. **The skeletal system** supports the body and, along with the muscular system, enables movement. The skeletal system includes cartilage, such as that at the tip of the nose, as well as the bones and joints.
3. **The muscular system** enables movement, along with the skeletal system, but also helps to maintain body temperature. The muscular system includes skeletal muscles, as well as tendons that connect skeletal muscles to bones.
4. **The nervous system** detects and processes sensory information and activates bodily responses. The nervous system includes the brain, spinal cord, and peripheral nerves, such as those located in the limbs.
5. **The endocrine system** secretes hormones and regulates bodily processes. The endocrine system includes the pituitary gland in the brain, the thyroid gland in the throat, the pancreas in the abdomen, the adrenal glands on top of the kidneys, and the testes in the scrotum of males as well as the ovaries in the pelvic region of females.
6. **The cardiovascular system** delivers oxygen and nutrients to the tissues as well as equalizes temperature in the body. The cardiovascular system includes the heart and blood vessels.
7. **The lymphatic system** returns fluid to the blood and defends against pathogens. The lymphatic system includes the thymus in the chest, the spleen in the abdomen, the lymphatic vessels that spread throughout the body, and the lymph nodes distributed along the lymphatic vessels.
8. **The respiratory system** removes carbon dioxide from the body and delivers oxygen to the blood. The respiratory system includes the nasal passages, the trachea, and the lungs. The digestive system processes food for use by the body and removes wastes from undigested food.
9. **The digestive system** includes the stomach, the liver, the gallbladder (connected to the liver), the large intestine, and the small intestine.
10. **The urinary system** controls water balance in the body and removes and excretes waste from the blood. The urinary system includes the kidneys and the urinary bladder.
11. **The reproductive systems** of males and females produce sex hormones and gametes. **The male reproductive system** is specialized to deliver gametes to the female while the female reproductive system is specialized to support the embryo and fetus until birth and produce milk for the infant after birth. includes the two testes within the scrotum as well as the epididymis which wraps around each testis.
12. **The female reproductive system** The female reproductive system includes the mammary glands within the breasts and the ovaries and uterus within the pelvic cavity.

Directional Terms

Directional terms are essential for describing the relative locations of different body structures (Figure 2.2). For instance, an anatomist might describe one band of tissue as "inferior to" another or a physician might describe a tumor as "superficial to" a deeper body structure. Commit these terms to memory to avoid confusion when you are studying or describing the locations of particular body parts.

1. **Anterior (or ventral)** describes the front or direction toward the front of the body. The toes are anterior to the foot.
2. **Posterior (or dorsal)** describes the back or direction toward the back of the body. The popliteus is posterior to the patella.
3. **Superior (or cranial)** describes a position above or higher than another part of the body proper. The hib is superior to the knee
4. **Inferior (or caudal)** describes a position below or lower than another part of the body proper; near or toward the tail (in humans, the coccyx, or lowest part of the spinal column). The pelvis is inferior to the abdomen.
5. **Lateral** describes the side or direction toward the side of the body. The thumb (pollex) is lateral to the digits.
6. **Medial** describes the middle or direction toward the middle of the body. The nose is medial to the eyes and the eyes are lateral to the nose
7. **Proximal** describes a position in a limb that is nearer to the point of attachment or the trunk of the body.
    a. The ankle is proximal to the foot, as the ankle is closer to the trunk than the foot.
    b. The knee is proximal to the ankle, as the knee is closer to the trunk than the ankle.
    c. The hip is proximal to the knee, as the hip is closer to the trunk than the knee.
8. **Distal** describes a position in a limb that is farther from the point of attachment or the trunk of the body.
    a. The knee is distal to the hip, as the knee is farther away from the trunk than the hip.
    b. The ankle is distal to the knee, as the ankle is farther away from the trunk than the knee.
    c. The foot is distal to the ankle, as the foot is farther away from the trunk than the ankle.

9. **Superficial** describes a position closer to the surface of the body. The skin is superficial to the bones.
10. **Deep** describes a position farther from the surface of the body. The brain is deep to the skull.

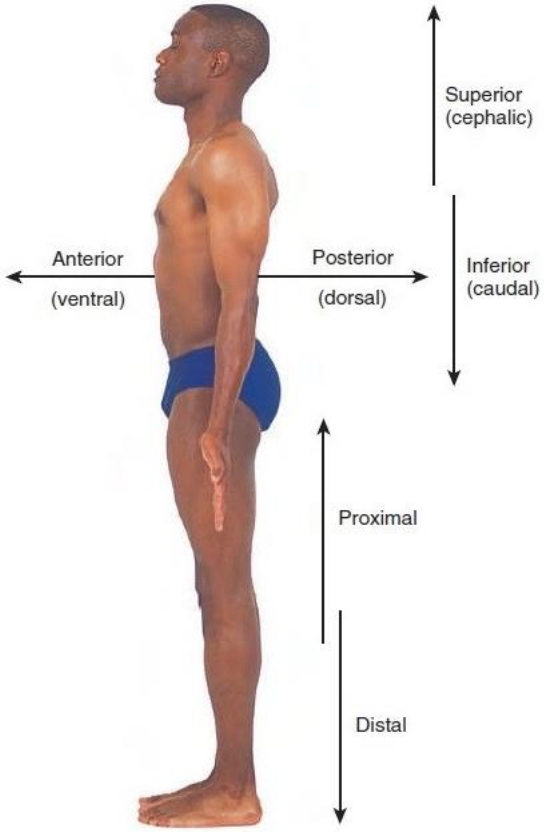


Figure 2.2: Directional Terms Applied to the Human Body.

Anterior and Posterior

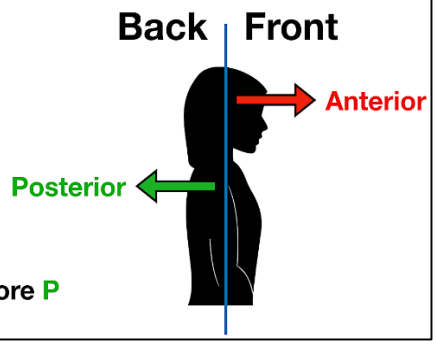
Anterior = *Front*; Toward the front of the body

Anterior = "A" = Front

Posterior = *Back*; Toward the back of the body

Posterior = "P" = Back

A comes before P



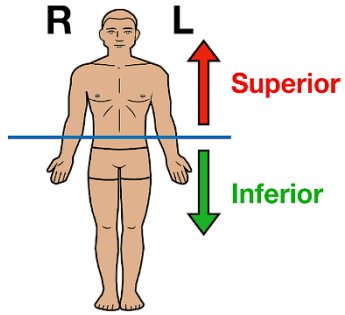
Superior and Inferior

Superior = *Above*; Toward the head

Superior = Skull

Inferior = *Below*; Away from the head

Inferior = Floor



Medial and Lateral

Midline = Imaginary vertical line down middle of body

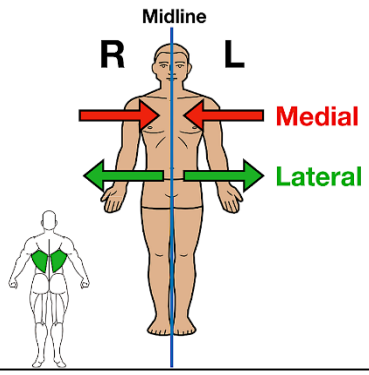
Midline = Middle

Medial = Toward the *midline* or *middle* of the body

Medial = Midline or Middle

Lateral = Toward the *side* of the body

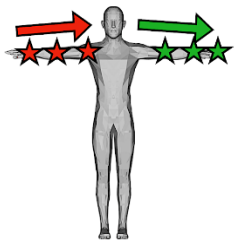
Lateral = "Lats"



Proximal and Distal

Wrist is proximal to the Hand
Elbow is proximal to the Wrist
Shoulder is proximal to the Elbow

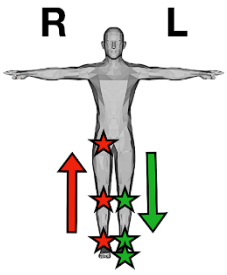
Elbow is distal to the Shoulder
Wrist is distal to the Elbow
Hand is distal to the Wrist



Proximal and Distal

Ankle is proximal to the Foot
Knee is proximal to the Ankle
Hip is proximal to the Knee

Knee is distal to the Hip
Ankle is distal to the Knee
Foot is distal to the Ankle

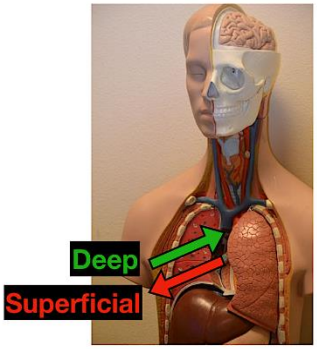


Superficial and Deep

Superficial = Closer to the surface of the body

Superficial = Surface

Deep = Away from the surface of the body



Body Planes

A section is a two-dimensional surface of a three-dimensional structure that has been cut. Modern medical imaging devices enable clinicians to obtain "virtual sections" of living bodies. We call these scans. Body sections and scans can be correctly interpreted, however, only if the viewer understands the plane along which the section was made. A plane is an imaginary two-dimensional surface that passes through the body. There are three planes commonly referred to in anatomy and medicine (Figure 2.3):

The sagittal plane is the plane that divides the body or an organ vertically into right and left sides. If this vertical plane runs directly down the middle of the body, it is called the midsagittal or median plane. If it divides the body into unequal right and left sides, it is called a parasagittal plane or, less commonly, a longitudinal section.

The frontal plane is the plane that divides the body or an organ into an anterior (front) portion and a posterior (rear) portion. The frontal plane is often referred to as a coronal plane ("corona" is Latin for "crown").

The transverse plane is the plane that divides the body or organ horizontally into upper and lower portions. Transverse planes produce images referred to as cross-sections.

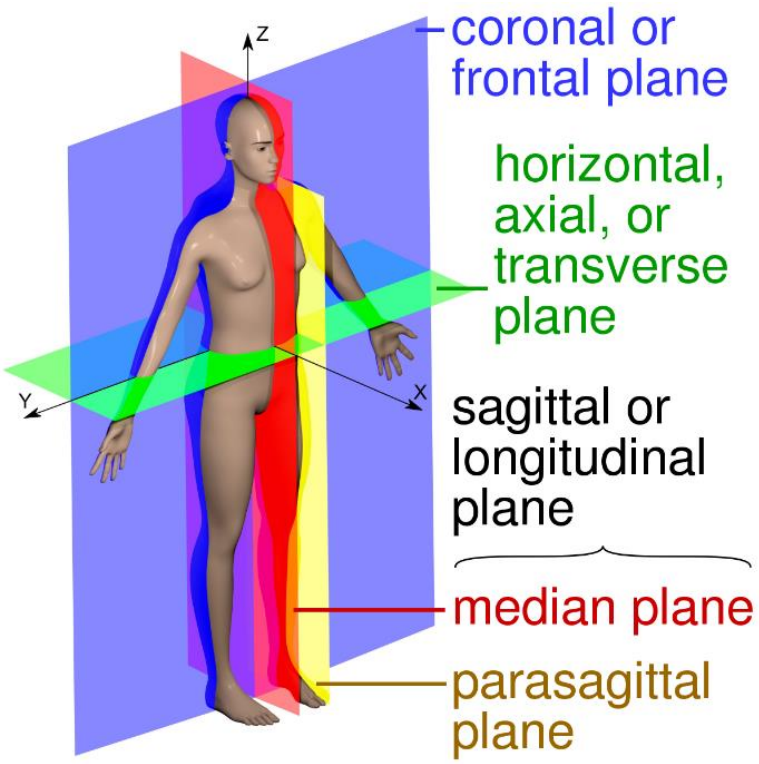


Figure 2.3: Body plans

Body Cavities and Serous Membranes

The body maintains its internal organization by means of membranes, sheaths, and other structures that separate compartments. The dorsal (**posterior)** cavity and the ventral **(anterior)** cavity are the largest body compartments (Figure 2.4). These cavities contain and protect delicate internal organs, and the ventral cavity allows for significant changes in the size and shape of the organs as they perform their functions. The lungs, heart, stomach, and intestines, for example, can expand and contract without distorting other tissues or disrupting the activity of nearby organs.

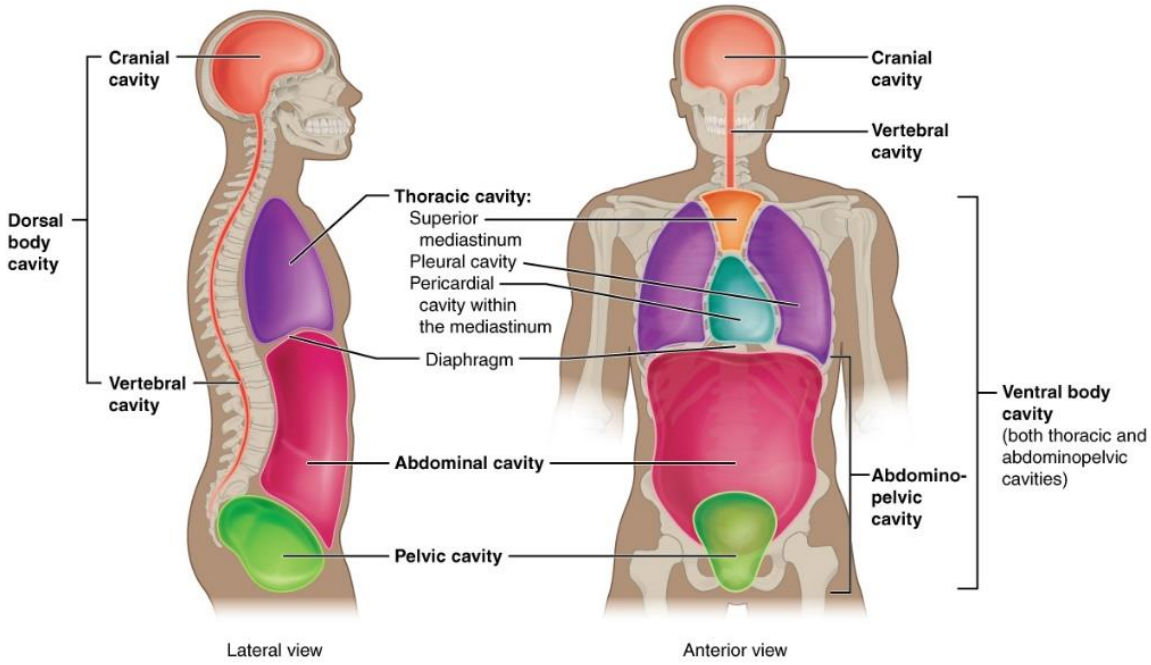


Figure 2.4: Dorsal and Ventral Body Cavities.

The Dorsal Cavity

The dorsal cavity consists of the cranial cavity that houses the brain and the vertebral (or spinal) cavity which contains the spinal cord.

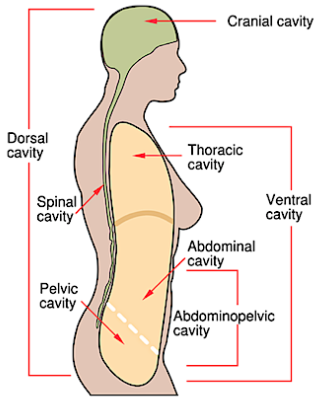
There is no physical separation between the cranial cavity and vertebral cavity. This cavity is a continuous chamber filled with cerebrospinal fluid that surrounds the brain and the spinal cord. "Cerebro-" means "brain" and "spinal" means "of the spine", so the liquid cerebrospinal fluid is named after what it essentially bathes, which is the brain and spine.

The Ventral Cavity

The ventral (or anterior) cavity contains the body's visceral organs. The visceral organs are your body's internal organs, including the heart, the lungs, the liver, the pancreas and the intestines.

The ventral cavity of the human body is divided into two main regions; the thoracic cavity, and the abdominopelvic cavity, each of which have additional subdivisions. The thoracic cavity and the abdominal cavity are separated by the diaphragm.

Body Cavities



Dorsal Cavity

- Cavity in the ***BACK*** of the body

Cranial Cavity

- Brain

Spinal Cavity

- Spinal Cord

Ventral Cavity

- Cavity in the ***FRONT*** of the body

Thoracic Cavity

Pleural Cavities

- Lungs

Mediastinum

- Trachea, Esophagus

Pericardial Cavity

- Heart, Great Vessels

Abdominopelvic Cavity

Abdominal

- Liver
- Stomach
- Pancreas
- Intestines

Pelvic

- Bladder
- Reprod. Organs

Tissue Membranes

A tissue membrane is a thin layer or sheet of cells that covers the outside of the body (for example, skin), the organs (for example, pericardium), internal passageways that lead to the exterior of the body (for example, abdominal mesenteries), and the lining of the movable joint cavities. There are two basic types of tissue membranes: connective tissue and epithelial membranes (Figure 2.5).

Connective Tissue Membranes

The connective tissue membrane is formed solely from connective tissue. These membranes encapsulate organs, such as the kidneys, and line our movable joints. A synovial membrane is a type of connective tissue membrane that lines the cavity of a freely movable joint. For example, synovial membranes surround the joints of the shoulder, elbow, and knee.

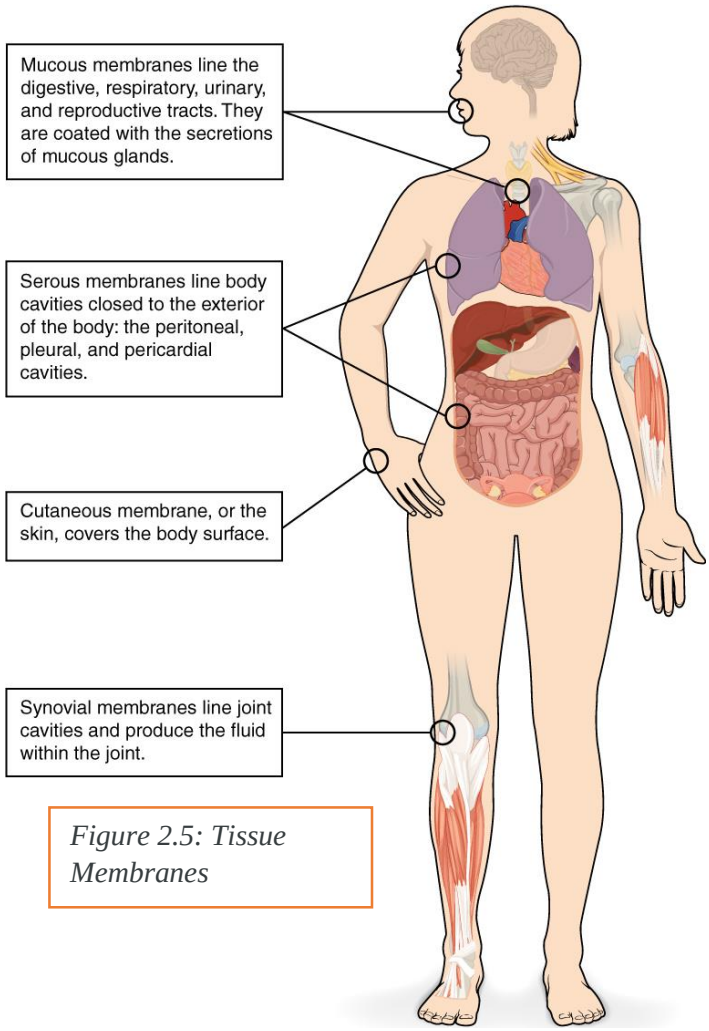


Figure 2.5: Tissue Membranes

Epithelial Membranes

The epithelial membrane is composed of epithelium attached to a layer of connective tissue.

For example, your skin. The mucous membrane is also a composite of connective and epithelial tissues. Sometimes called mucosae, these epithelial membranes line the body cavities and hollow passageways that open to the external environment and include the digestive, respiratory, excretory, and reproductive tracts. Mucus, produced by the epithelial exocrine glands, covers the epithelial layer. The underlying connective tissue, called the lamina propria (literally "own layer"), helps support the fragile epithelial layer. The skin is an epithelial membrane also called the cutaneous membrane.

Membranes of the Anterior (Ventral) Body Cavity

A serous membrane (also referred to as serosa) is an epithelial membrane composed of mesodermally derived epithelium called the mesothelium that is supported by connective tissue (Figure 2.6). These membranes line the coelomic cavities of the body and they cover the organs located within those cavities. They are essentially membranous bags, with mesothelial lining the inside and connective tissue on the outside.

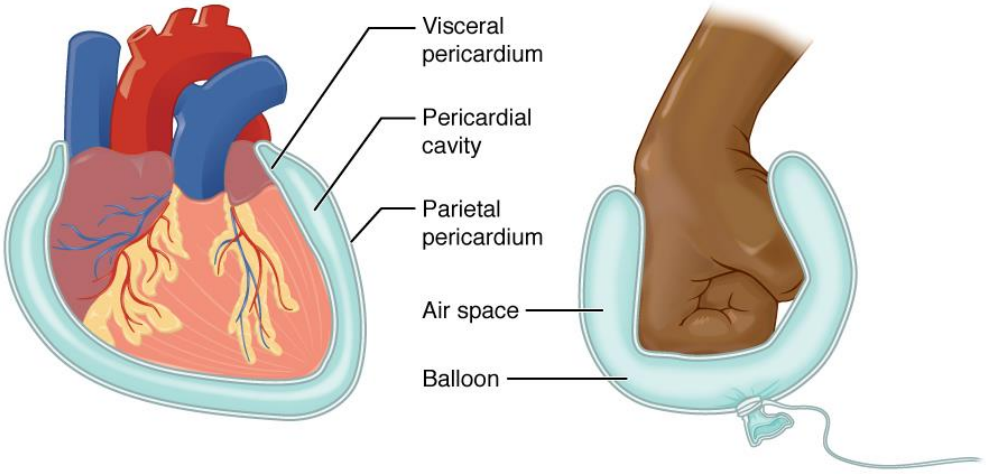
Parietal layers: line the walls of the body cavity.

Visceral layer: covers the organs (the viscera).

Between the parietal and visceral layers is a very thin, fluid-filled serous space.

Serous membrane of the heart.

Figure 2.6: Serous Membrane. Serous membrane lines the pericardial cavity and reflects back to cover the heart—much the same way that an underinflated balloon would form two layers surrounding a fist.

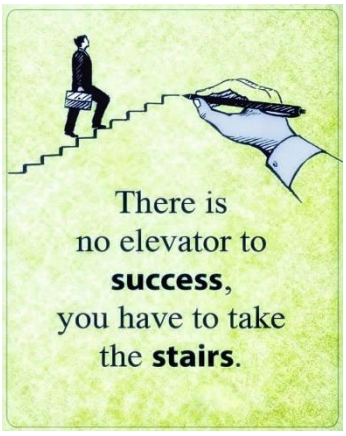


There are three serous cavities and their associated membranes. Serous membranes provide additional protection to the viscera they enclose by reducing friction that could lead to inflammation of the organs.

Pleura: surrounds the lungs in the pleural cavity and reduces friction between the lungs and the body wall.

Pericardium: surrounds the heart in the pericardial cavity and reduces friction between the heart and the wall of the pericardium.

Peritoneum: surrounds several organs in the abdominopelvic cavity. The peritoneal cavity reduces friction between the abdominal and pelvic organs and the body wall.



Worksheet – Lec. 2 Name:

Choose the most correct answer:

1. Which of the following structures is superficial to the teeth?
    a. Lips
    b. Larynx
    c. Tongue
    d. Trachea
2. Which of the following structures is superior to the rib cage(القفص الصدري)?
    a. Feet
    b. Knees
    c. Hips
    d. Neck
3. Your sternum (عظم القفص الصدري) is _____ to your vertebral column.
    a. Inferior
    b. Superior
    c. Posterior
    d. Anterior
4. What's another name for anterior?
    a. Dorsal
    b. Ventral
    c. Cranial
    d. Caudal
5. The wrist is distal to the elbow.
    a. True
    b. False
6. The skin is _____ to the skeletal bones.
    a. Superior
    b. Proximal
    c. Superficial
    d. Inferior
7. The heart is _____ to the shoulder.
    a. Medial
    b. Lateral
    c. Distal
    d. Proximal

8. What is the term for the backside or "back" in the anatomical position:
    a. Anterior
    b. Ventral
    c. Caudal
    d. Posterior
9. My lungs are _____ to my small intestine.
    a. Posterior
    b. Anterior
    c. inferior
    d. superior
10. Of the following, what structures are the MOST medial?
    a. ears
    b. hips
    c. eyes
    d. lips