

Chapter 1

Introduction to Human Anatomy and Physiology

Introduction:

- The early students of anatomy and physiology were most likely concerned with treating illnesses and injuries.
- Early healers relied on superstitions and magic. Later, herbs were used to treat certain ailments.
- Eventually, after much controversy the study of medicine with standardized terms in Greek and Latin began.

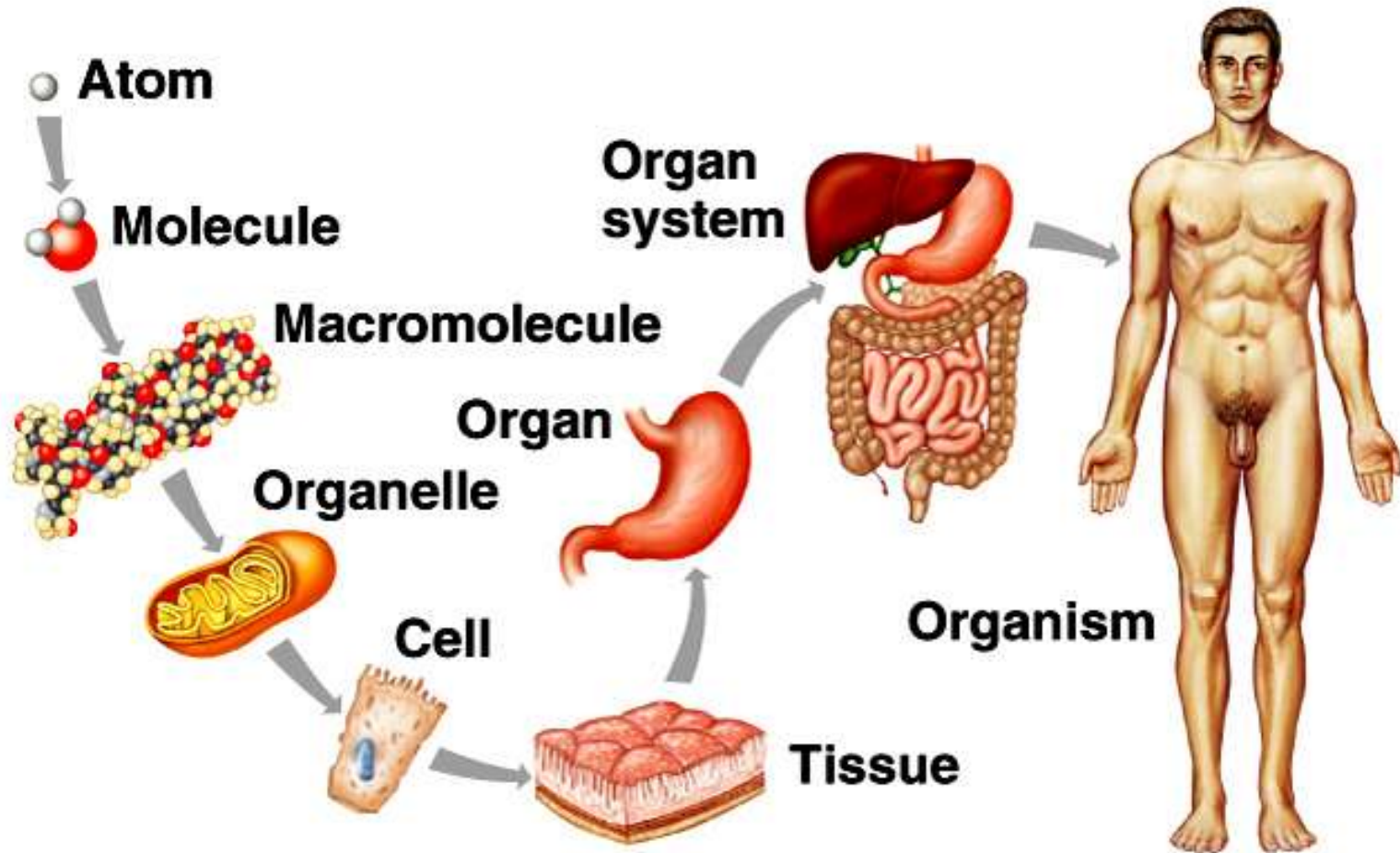
Anatomy and Physiology

- Anatomy deals with the structure (morphology) of the body and its parts; in other words, what are things called?
- Physiology studies the functions of these parts or asks the question, “how do they work?”
- The two disciplines are closely interrelated because the functional role of a part depends on how it is constructed.

- Anatomists rely on observation and dissection, while physiologists employ experimentation.
- It is more common to discover new information about physiology but anatomical discoveries are being made as well.

Levels of Organization:

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Levels of Organization:

The human body is the sum of its parts and these parts can be studied at a variety of levels of organization.

1. Atoms are the simplest level.
2. Two or more atoms comprise a molecule.
3. Macromolecules are large, biologically important molecules inside cells.
4. Organelles are aggregates of macromolecules used to carry out a specific function in the cell.

Levels of Organization Continued:

5. Cells are the basic living unit.
6. Tissues are groups of cells functioning together.
7. Groups of tissues form organs.
8. Groups of organs function together as organ systems.
9. Organ systems functioning together make up an organism.

Characteristics of Life

- Fundamental characteristics of life are traits shared by all organisms.

Characteristics of life include:

1. *Movement* (internal or gross)
2. *Responsiveness* (reaction to internal or external change)
3. *Growth* (increase in size without change in shape)
4. *Reproduction* (new organisms or new cells)
5. *Respiration* (use of oxygen; removal of CO₂)

Table 1.1

6. *Digestion* (breakdown of food into simpler forms)
 7. *Absorption* (movement of substances through membranes and into fluids)
 8. *Circulation* (movement within body fluids)
 9. *Assimilation* (changing nutrients into chemically different forms)
 10. *Excretion* (removal of metabolic wastes)
- Taken together, these 10 characteristics constitute *metabolism*.

Maintenance of Life

Requirements of Organisms:

- ❖ Life depends on the availability of the following:
 - a. Water
 - b. Food
 - c. Oxygen
 - d. Heat
 - e. Pressure

- ❖ Both the quality and quantity of these factors are important.

Homeostasis:

- Maintenance of a stable internal environment is called homeostasis.
- Homeostasis is regulated through control systems which have receptors, a set point and effectors in common.

Examples include:

- a. Homeostatic mechanisms regulate body temperature in a manner similar to the functioning of a home heating thermostat.
- b. Another homeostatic mechanism employs pressure-sensitive receptors to regulate blood pressure.

- Many of the body's homeostatic controls are **negative feedback** mechanisms.
- Each individual uses homeostatic mechanisms to keep body levels within a normal range; normal ranges can vary from one individual to the next.

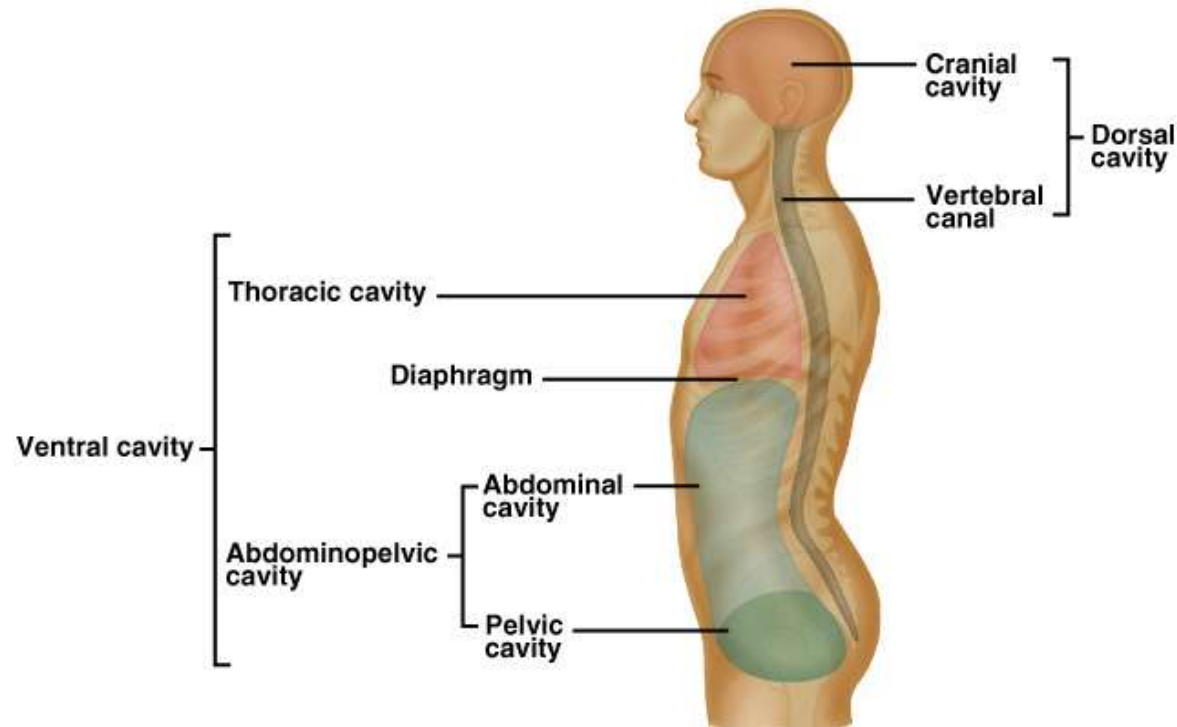
Organization of the Human Body

- Major features of the human body include its cavities, membranes, and organ systems.

Body Cavities:

- The body can be divided into an appendicular portion (upper and lower limbs) and an axial portion (head, neck, and trunk), which includes a *dorsal* and a *ventral* cavity. Organs within these cavities are called viscera.

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a. The dorsal cavity can be divided into two areas:

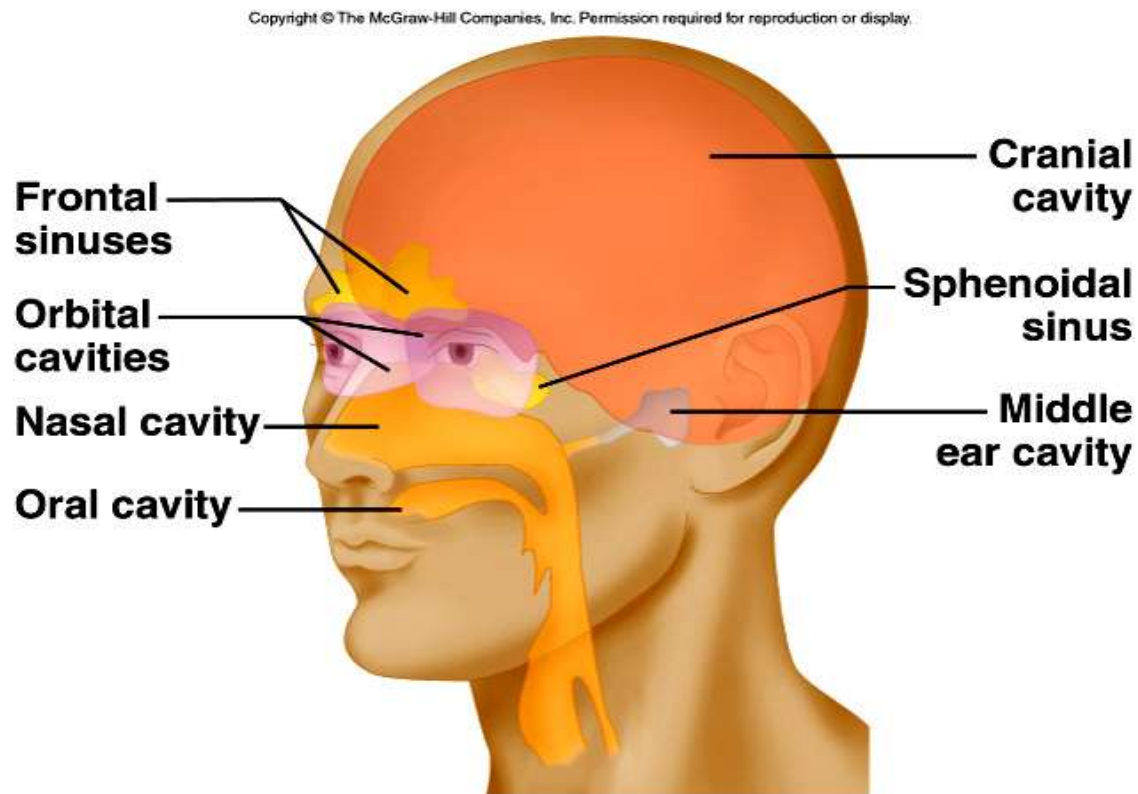
- 1) Cranial cavity
- 2) Vertebral canal

b. The ventral cavity is made up of the following:

- 1) Thoracic cavity
 - The mediastinum divides the thorax into right and left halves.
- 2) Abdominopelvic cavity
 - The abdominopelvic cavity can be divided into the abdominal cavity and the pelvic cavity.

❖ A broad, thin muscle called the diaphragm separates the thoracic and abdominopelvic cavities.

- c. Smaller cavities within the head include the oral cavity, nasal cavity, orbital cavities, and middle ear cavities.

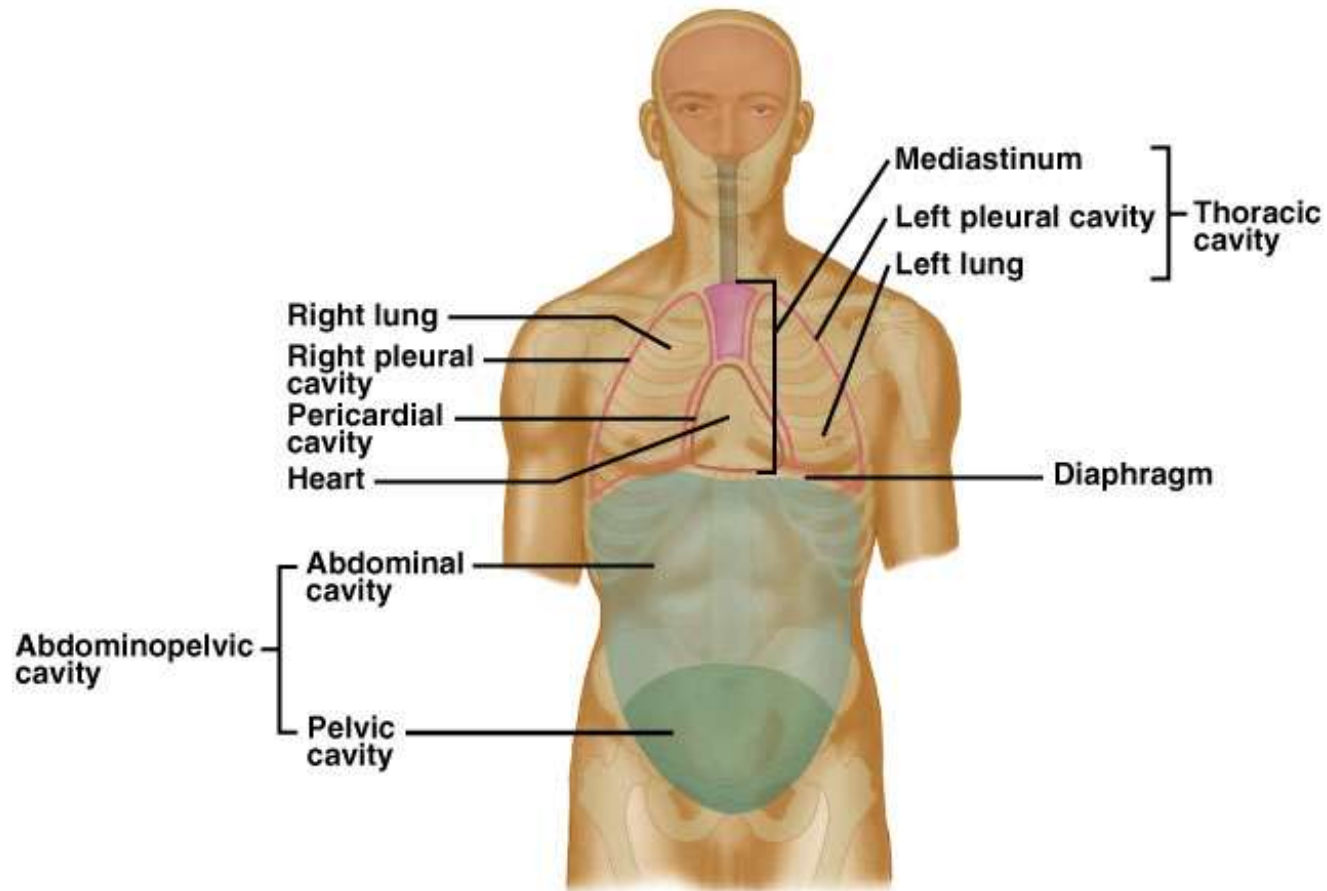


Thoracic and Abdominopelvic Membranes:

1. The **thoracic** cavity is lined with pleural membranes; the *parietal pleura* lines the cavities while the *visceral pleura* covers the lungs. A thin layer of serous fluid separates the two layers.
2. The **heart** is surrounded by pericardial membranes. The *parietal pericardium* makes up an outer sac and the *visceral pericardium* covers the heart. Serous fluid separates the two layers.
3. Peritoneal membranes line the **abdominopelvic cavity**; a *parietal peritoneum* lines the wall while *visceral peritoneum* covers the organs.

Thoracic and Abdominopelvic Membranes

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Organ Systems

- *Body Covering*
 - a. The integumentary system, including skin, hair, nails, and various glands, covers the body, senses changes outside the body, and helps regulate body temperature.

- *Support and Movement*
 - a. The skeletal system is made up of bones and ligaments. It supports, protects, provides frameworks, stores inorganic salts, and houses blood-forming tissues.
 - b. The muscular system consists of the muscles that provide body movement, posture, and body heat.

- *Integration and Coordination*
 - a. The nervous system consists of the brain, spinal cord, nerves, and sense organs. It integrates incoming information from receptors and sends impulses to muscles and glands.
 - b. The endocrine system, including all of the glands that secrete hormones, helps to integrate metabolic functions.

- *Transport*
 - a. The cardiovascular system, made up of the heart and blood vessels, distributes oxygen and nutrients throughout the body while removing wastes from the cells.
 - b. The lymphatic system, consisting of lymphatic vessels, lymph nodes, thymus, and spleen, drains excess tissue fluid and includes cells of immunity.

- *Absorption and Excretion*
 - a. The digestive system is made up of the mouth, esophagus, stomach, intestines, and accessory organs. It receives, breaks down, and absorbs nutrients.
 - b. The respiratory system exchanges gases between the blood and air and is made up of the lungs and passageways.
 - c. The urinary system, consisting of the kidneys, ureters, bladder, and urethra, removes wastes from the blood and helps to maintain water and electrolyte balance.

- *Reproduction*

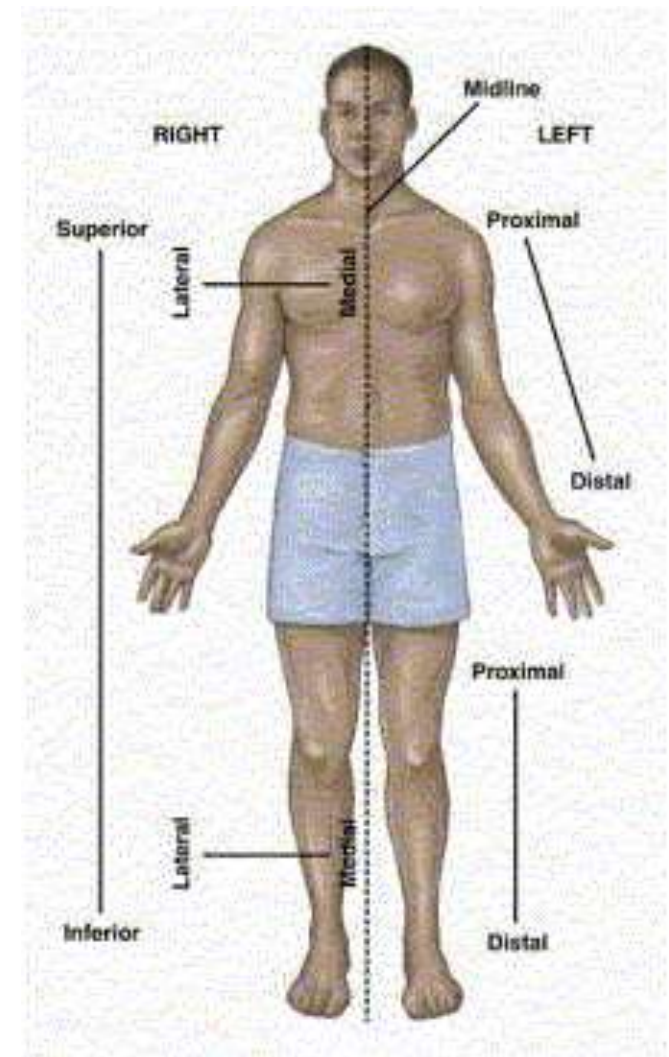
- a. The reproductive system produces new organisms.
 - i. The male reproductive system consists of the testes, accessory organs, and vessels that conduct sperm to the penis.
 - ii. The female reproductive system consists of ovaries, uterine tubes, uterus, vagina, and external genitalia. The female reproductive system also houses the developing offspring.

Anatomical Terminology

- Relative Positions:
 1. Terms of relative position describe the location of one body part with respect to another.
 2. Terms of relative position include: superior, inferior, anterior, posterior, medial, lateral, proximal, distal, superficial (peripheral), and deep.

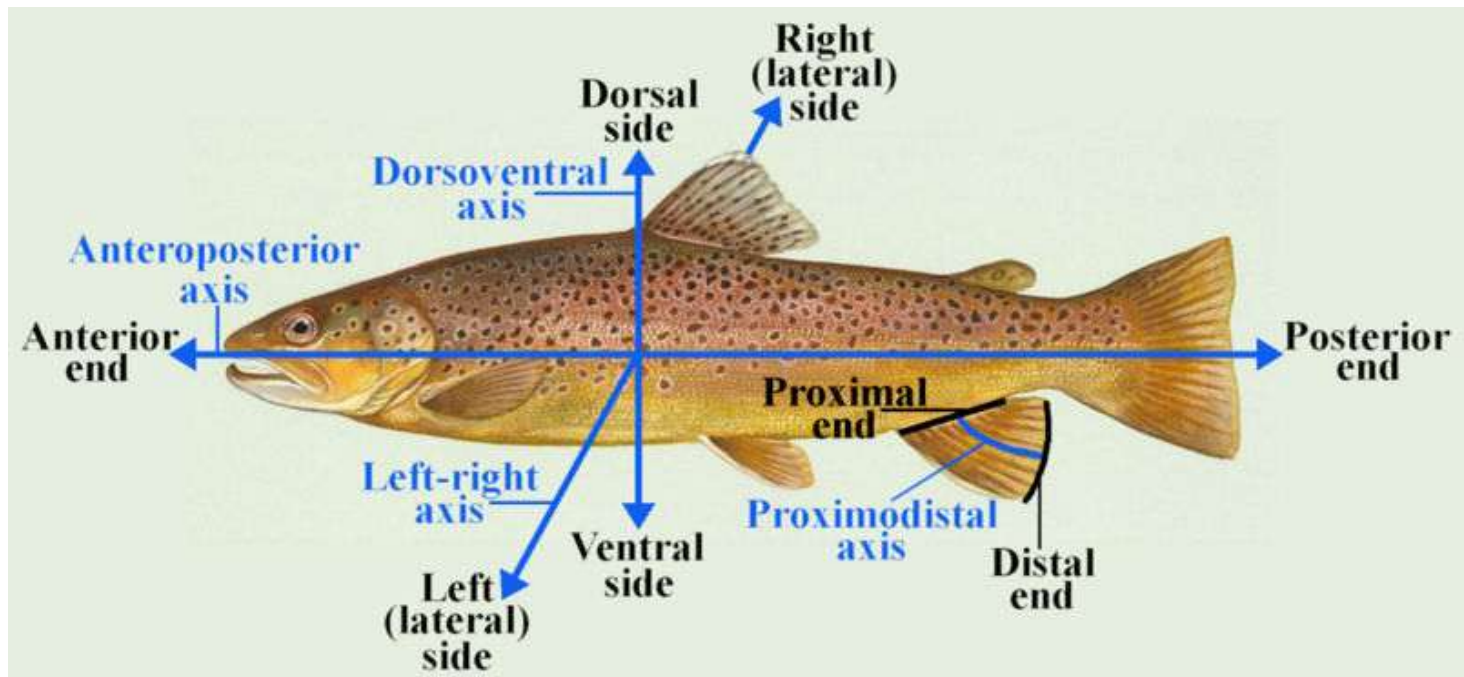
Anatomical Position

- Body erect.
- Feet on floor and slightly apart.
- Head and palms facing forward, arms at side.



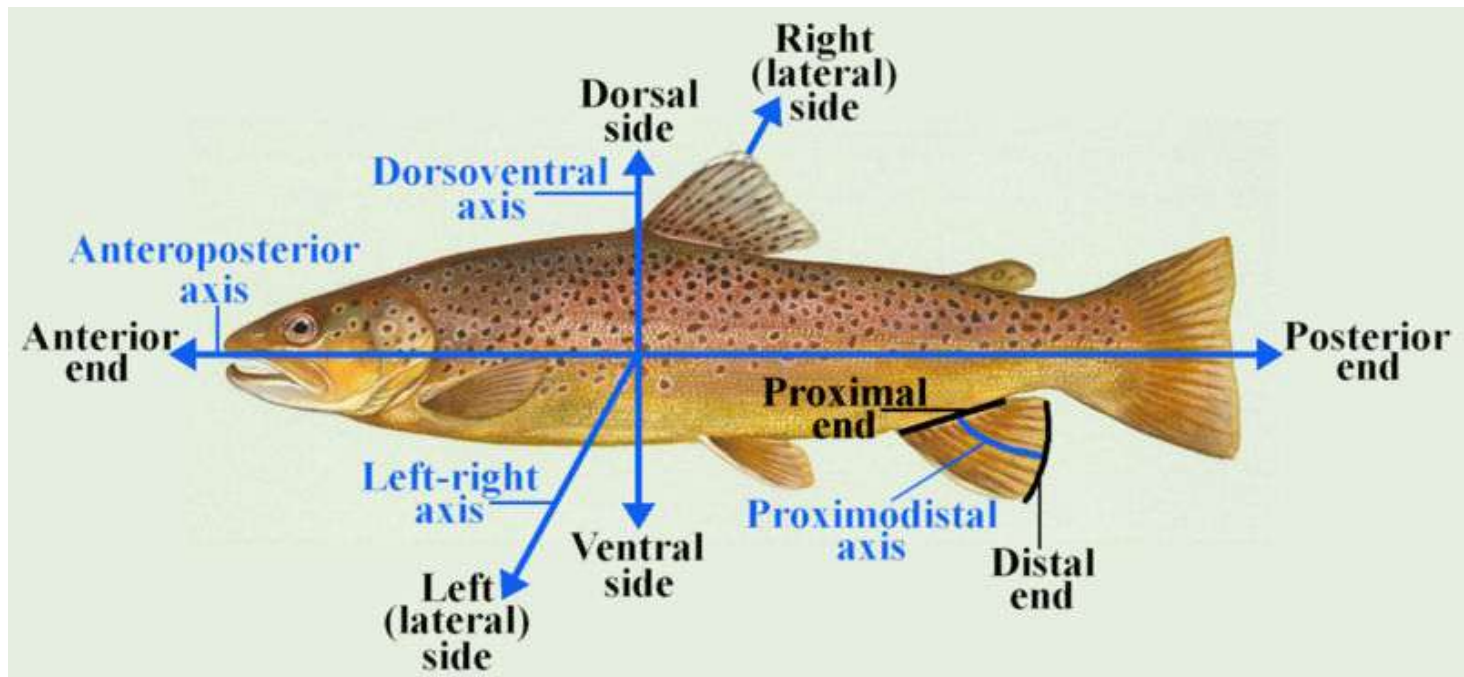
Directional Terms

- Anterior- toward the front of the body.



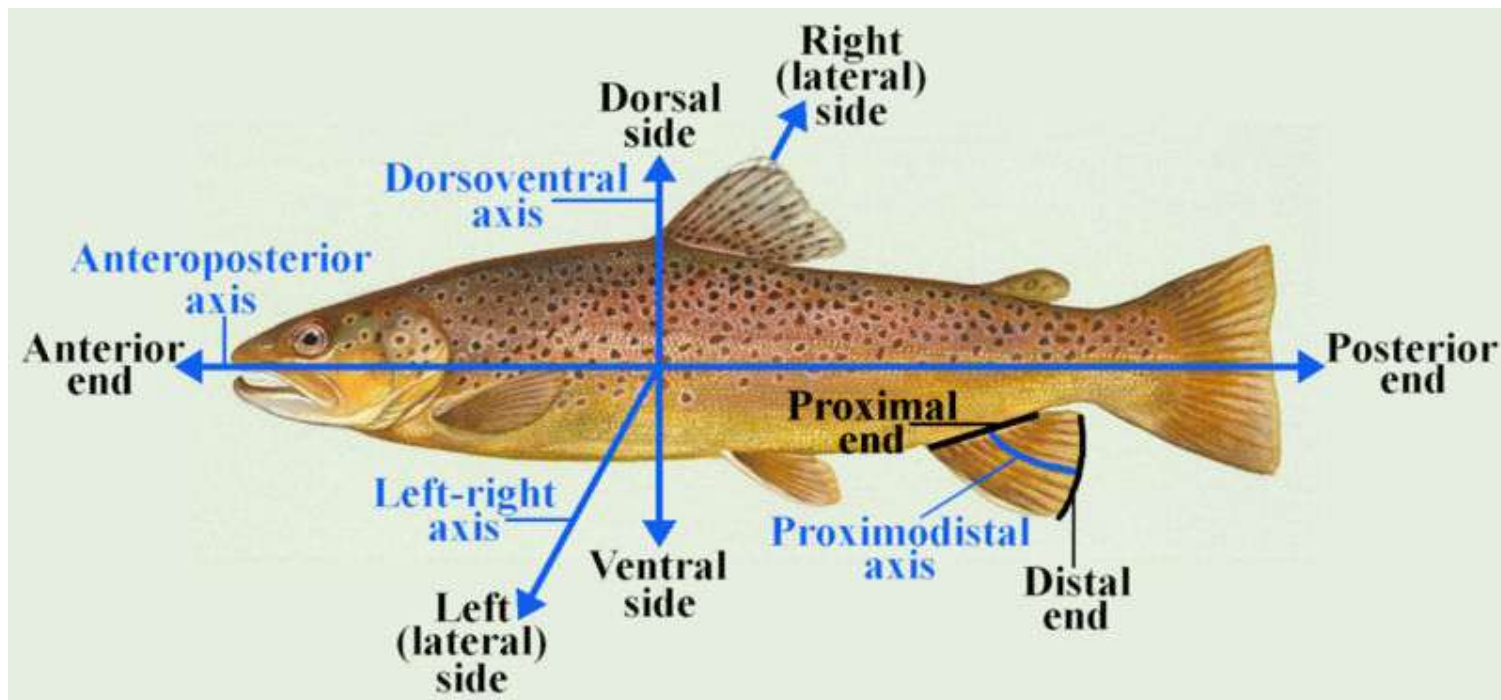
Directional Terms

- Posterior- toward the back of the body.



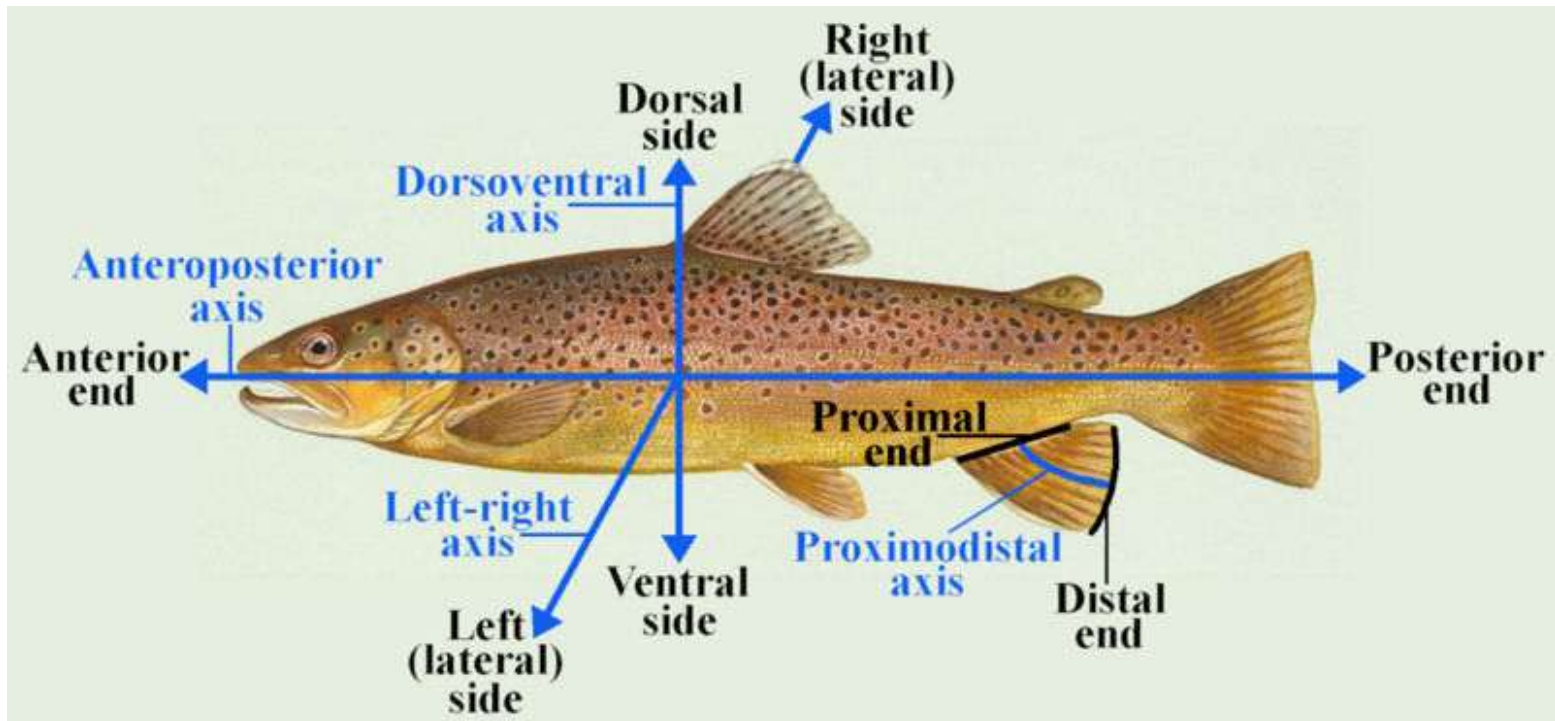
Directional Terms

- Ventral- the underside of the body.

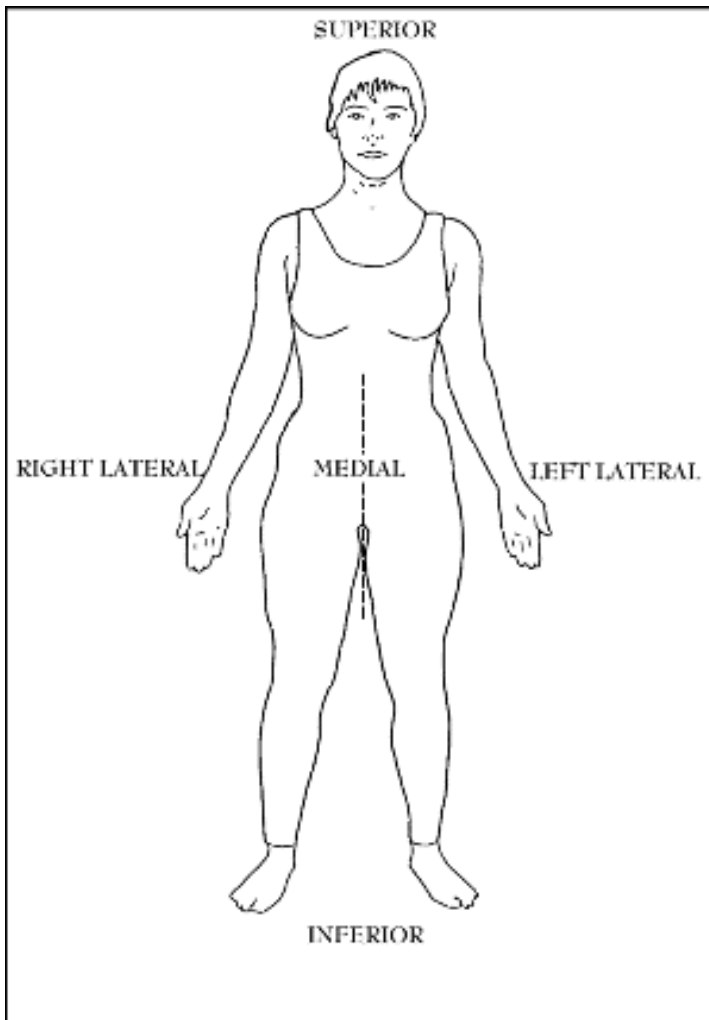


Directional Terms

- Dorsal- the backside of the body.



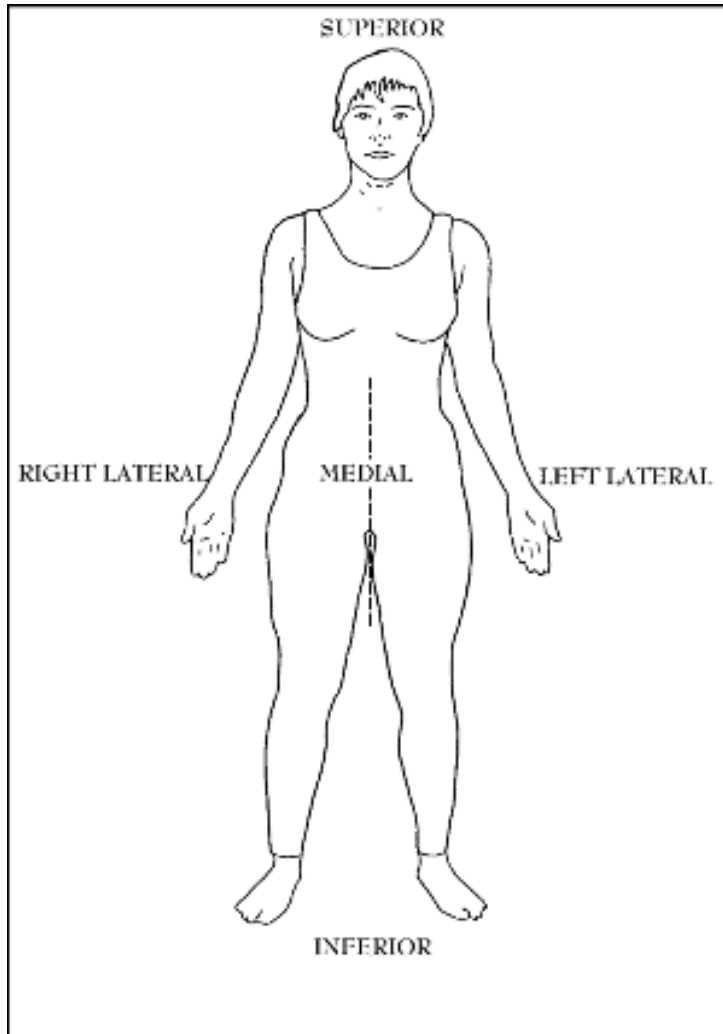
Directional Terms



- Superior-
upward or
above.

Figure 1 Anatomical terms

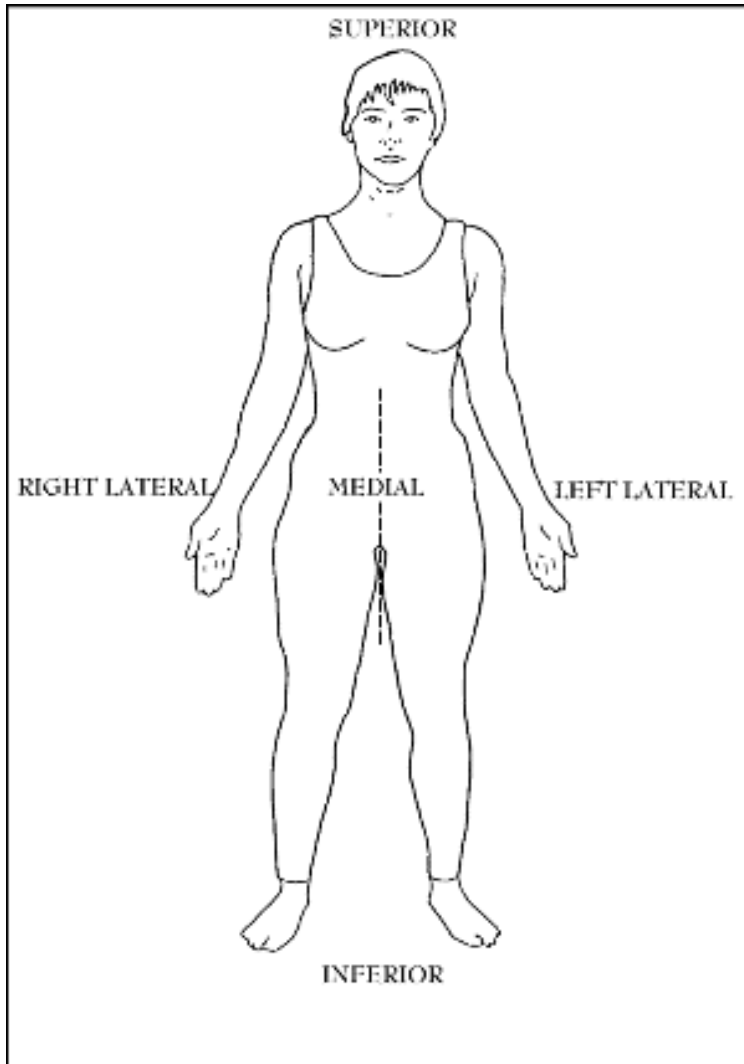
Directional Terms



- Inferior-
downward or
below.

Figure 1 Anatomical terms

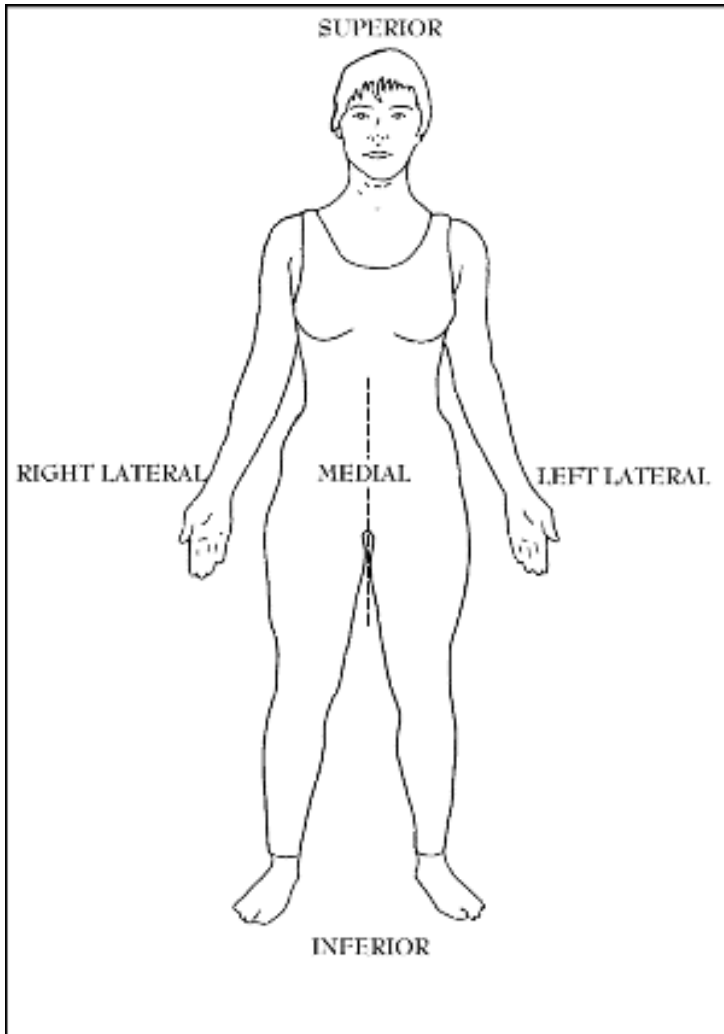
Directional Terms



- Medial- closer to the vertical midline of the body.

Figure 1 Anatomical terms

Directional Terms



- Lateral- farther away from the vertical midline of the body.

Figure 1 Anatomical terms

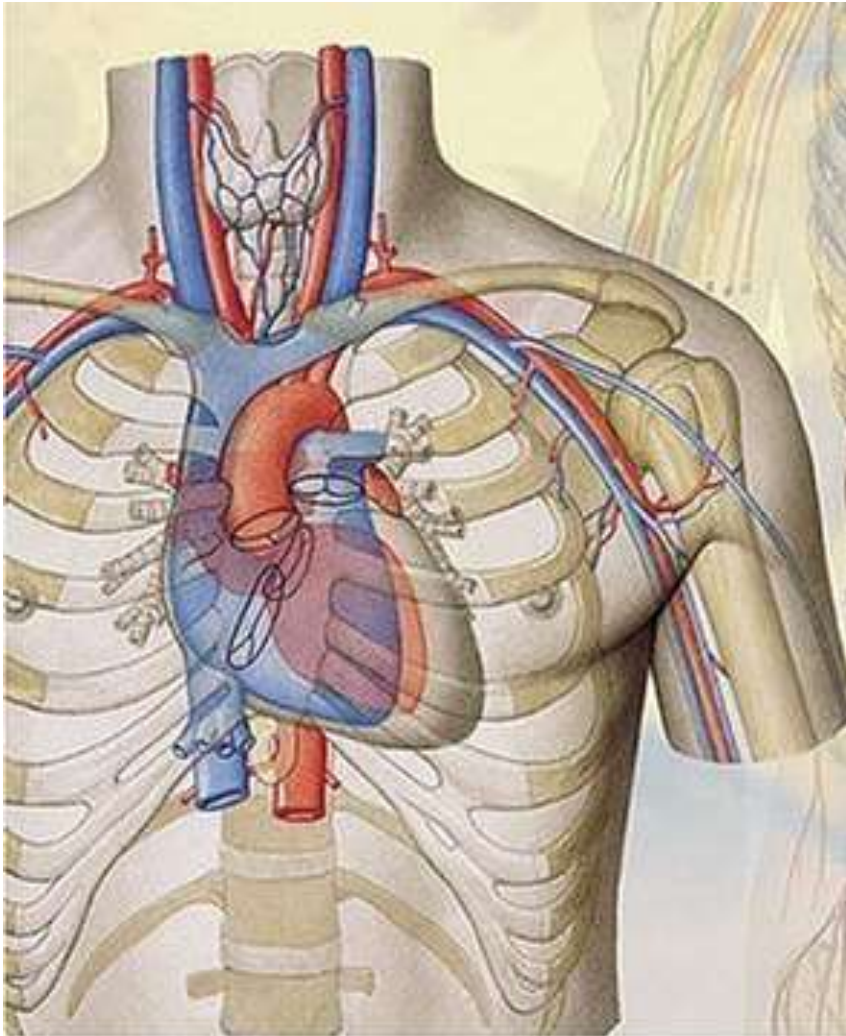
Directional Terms



- Superficial- at or toward the surface of the body.

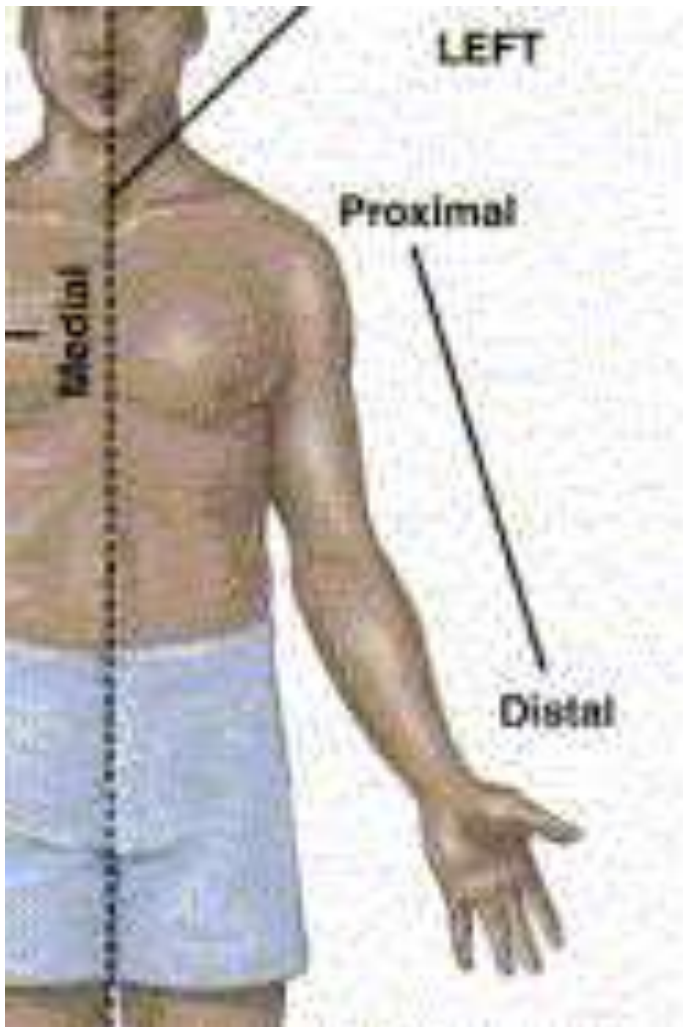
' I'M A SUCKER FOR MONEY ! ' "

Directional Terms



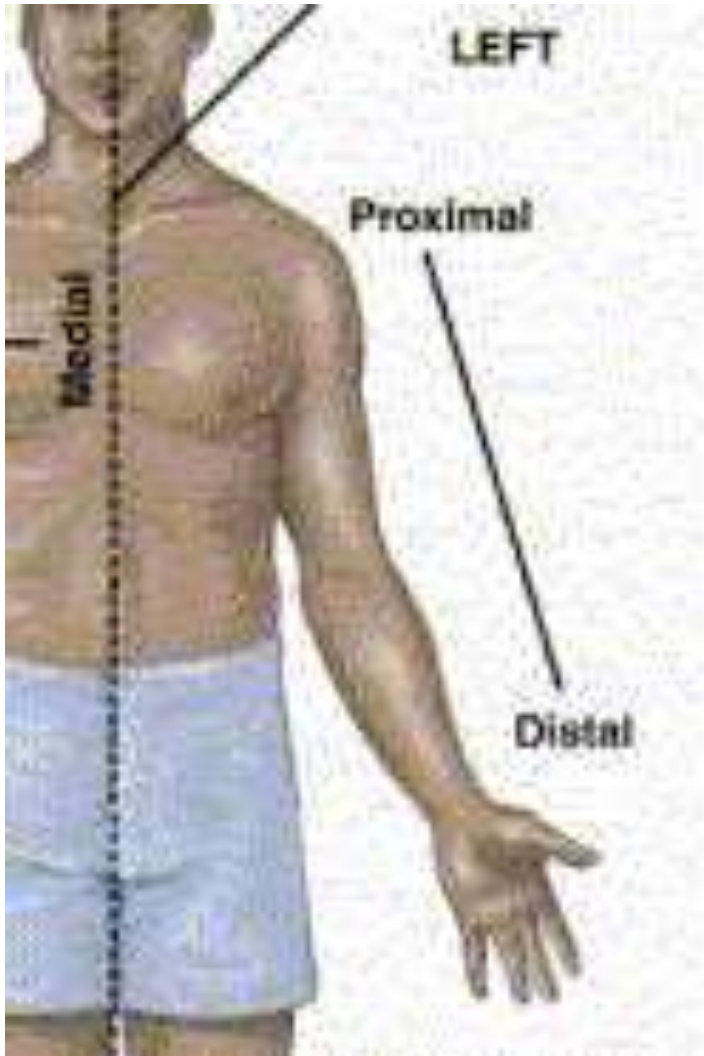
- Deep- lies within.

Directional Terms



- Proximal-
closer to the
point of
attachment.

Directional Terms



- Distal- farther away from the point of attachment.

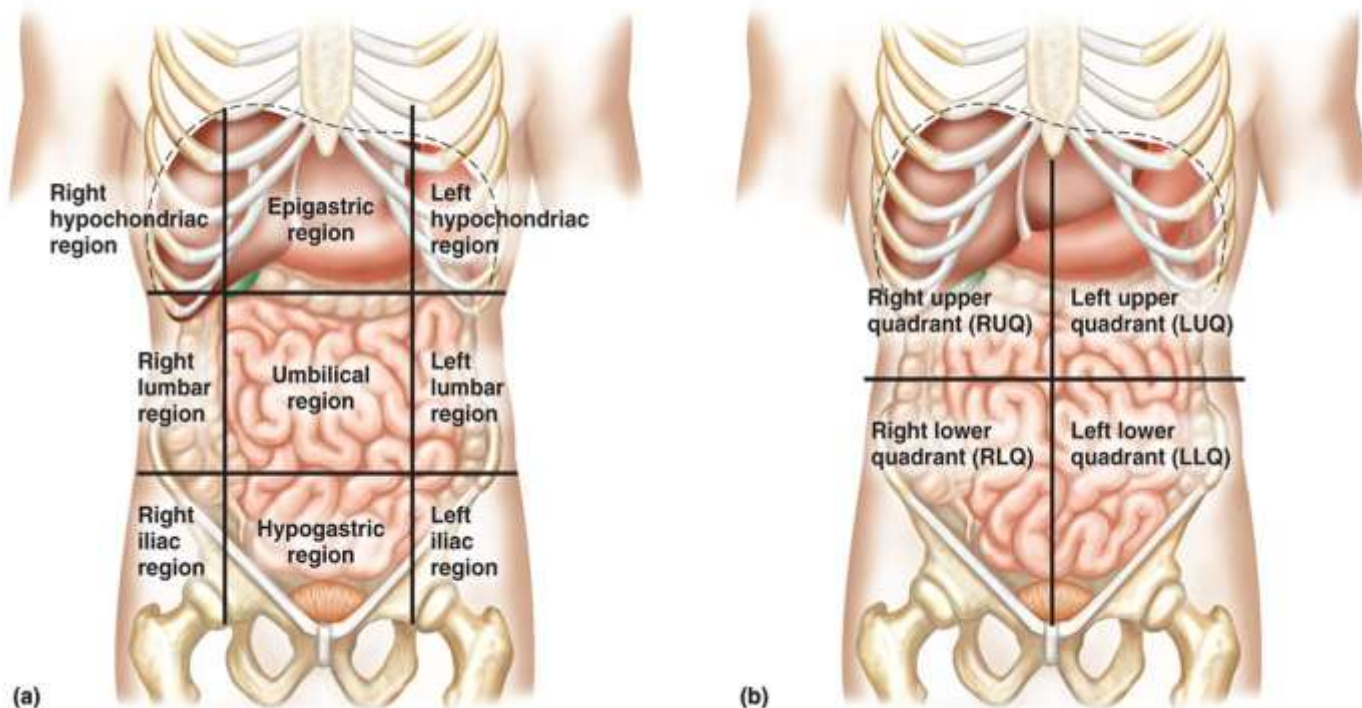
Body Sections:

1. A sagittal section divides the body into right and left portions.
2. A transverse section divides the body into superior and inferior portions. It is often called a "cross section".
3. A coronal section divides the body into anterior and posterior sections.

Body Regions

1. The abdominal area can be divided into nine regions.
2. Terms used to refer to various body regions are depicted in Fig. 1.16.

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Body Regions

- The following adjectives are commonly used to refer to various body regions.
- These body regions are shown in fig 1.17 on page 18.

Frontal

- Forehead.



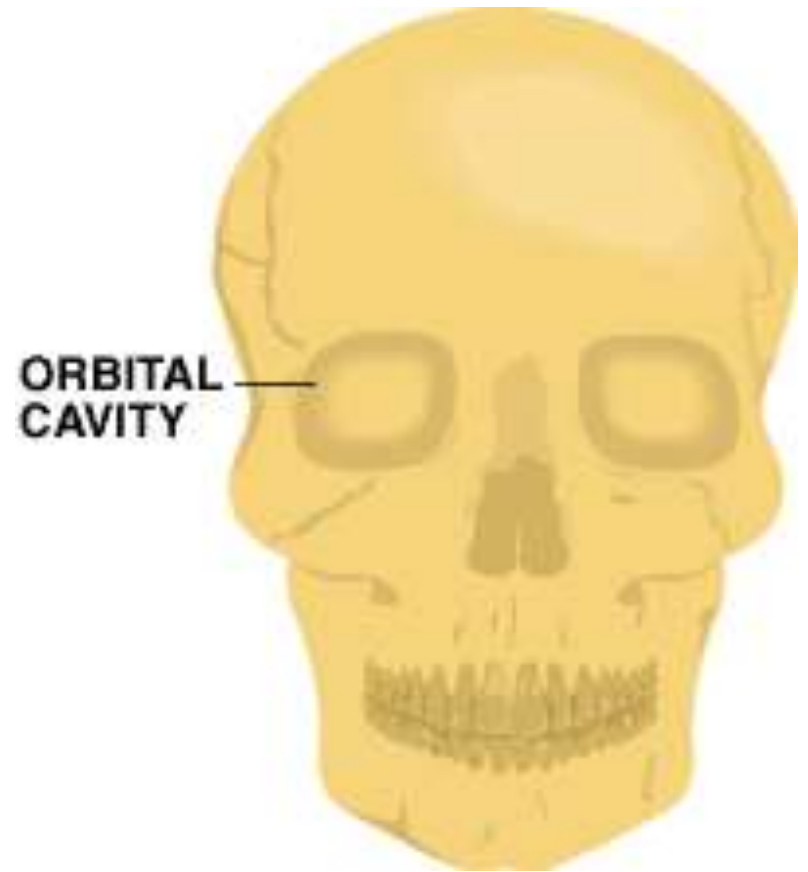
Cephalic

- Head



Orbital

- Eye



Nasal

- nose



Buccal

- Cheek



Mental

- chin



Oral

- Mouth



Otic

- Ear



Occipital

- Base of the skull



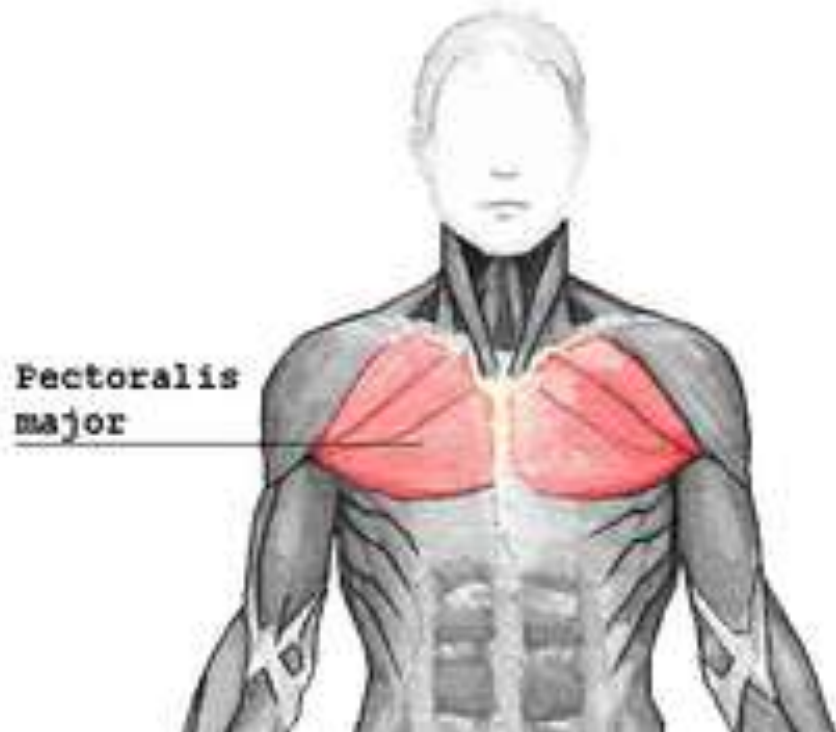
Cervical

- Neck



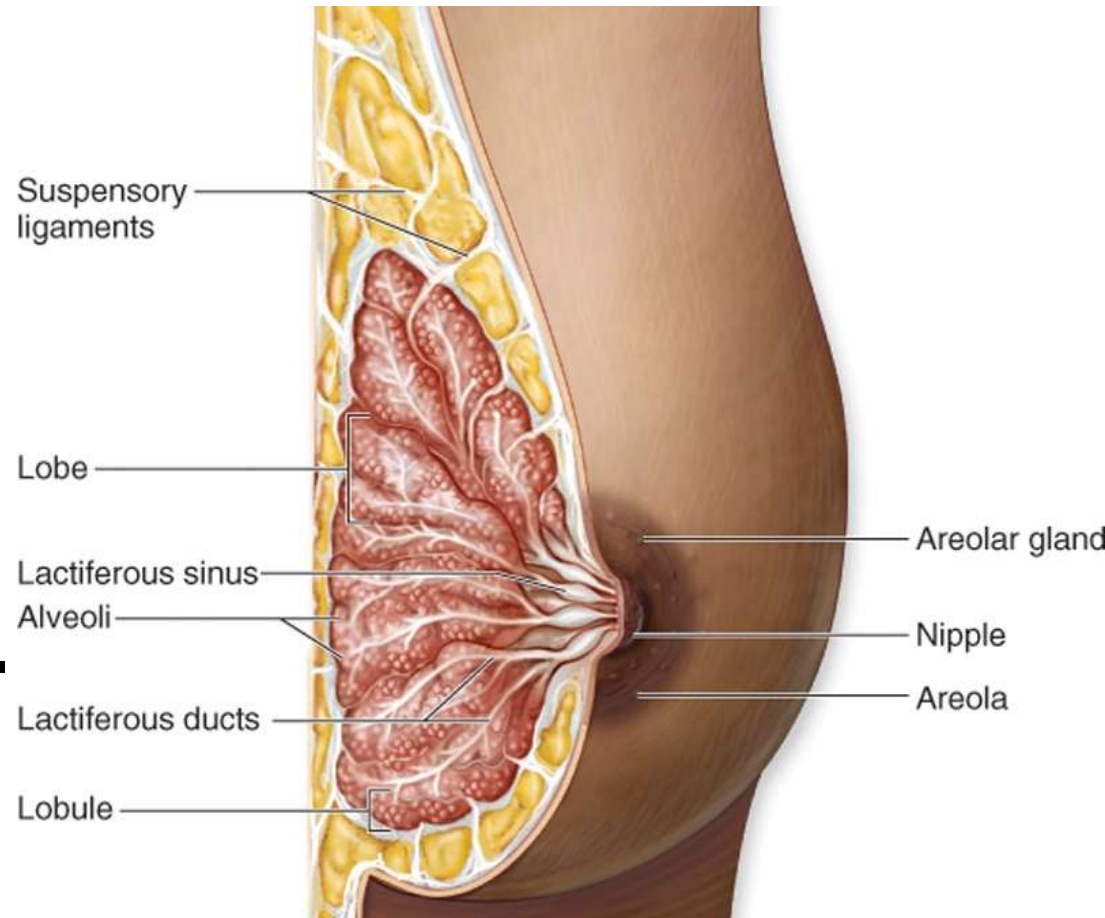
Pectoral

- Front wall of the thorax (chest).



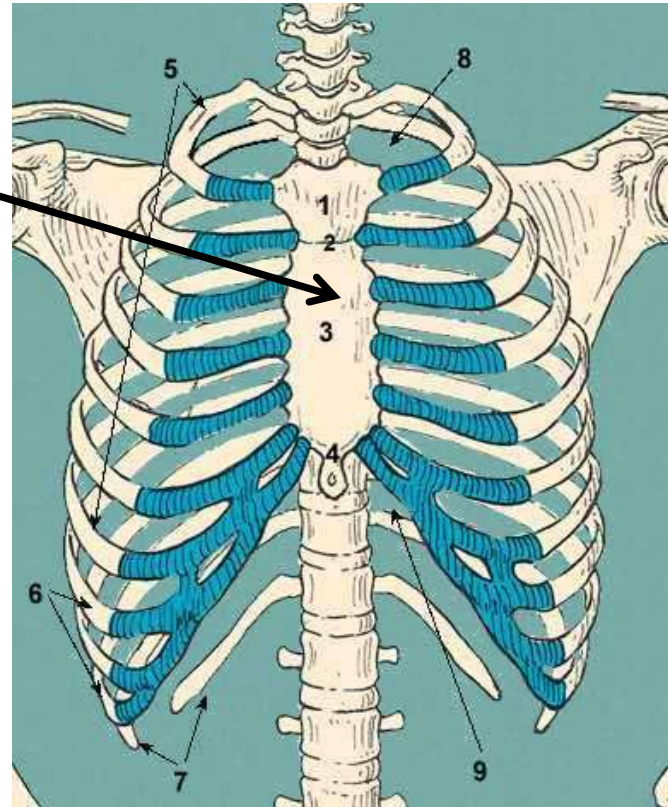
Mammary

- Breast.
Supplies
milk to
newborn
mammals.



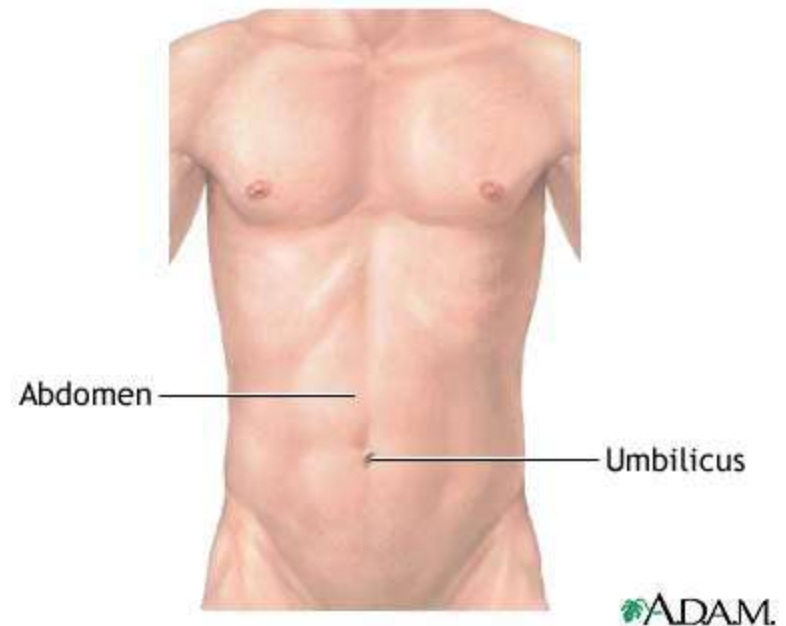
Sternal

- Middle of chest



Abdominal

- abdomen



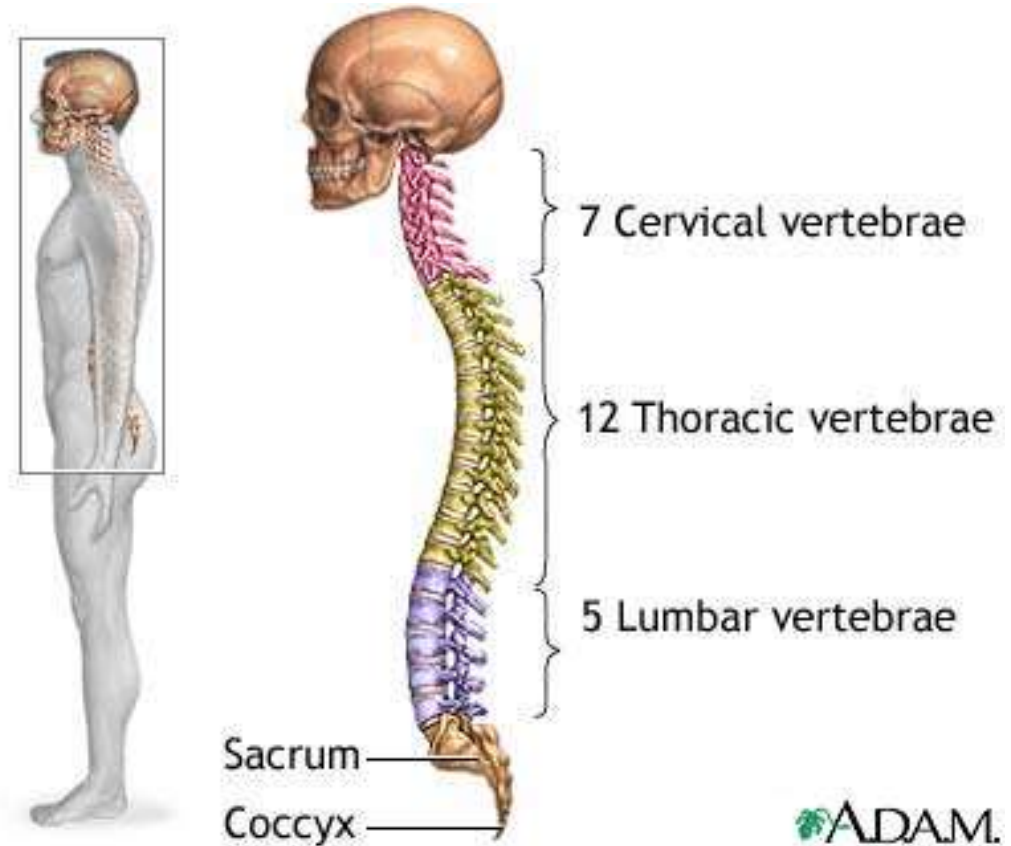
Umbilical

- Navel (bellybutton)



Vertebral

- Spinal column



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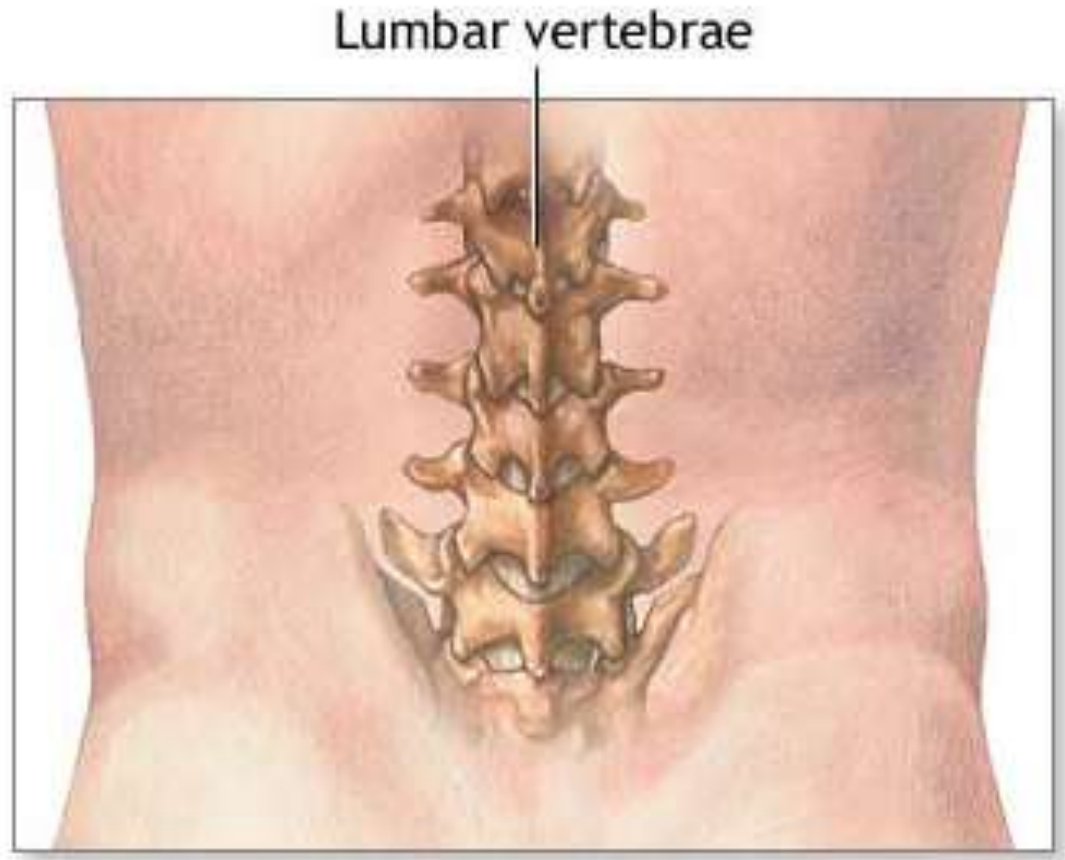
Dorsum

- back



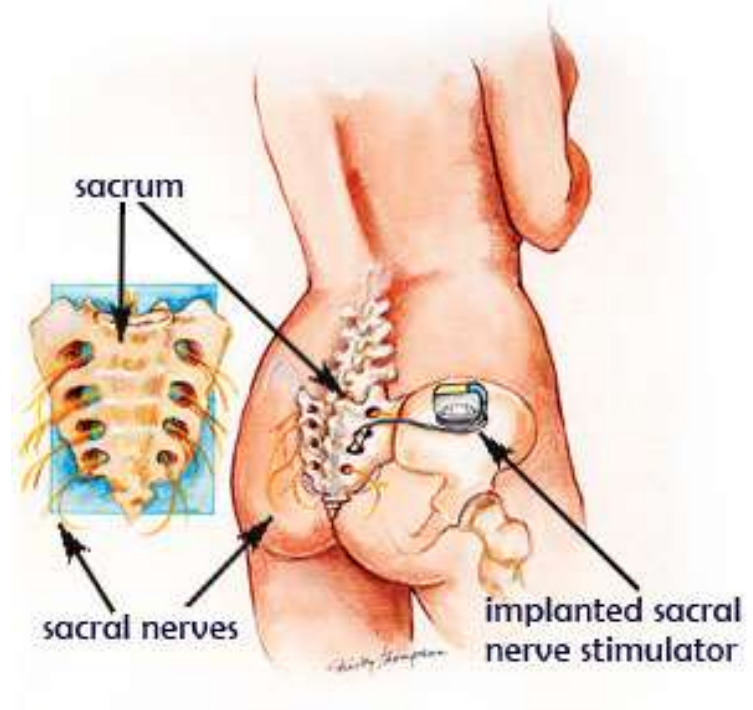
Lumbar

- Lower back region.



Sacral

- Between hips



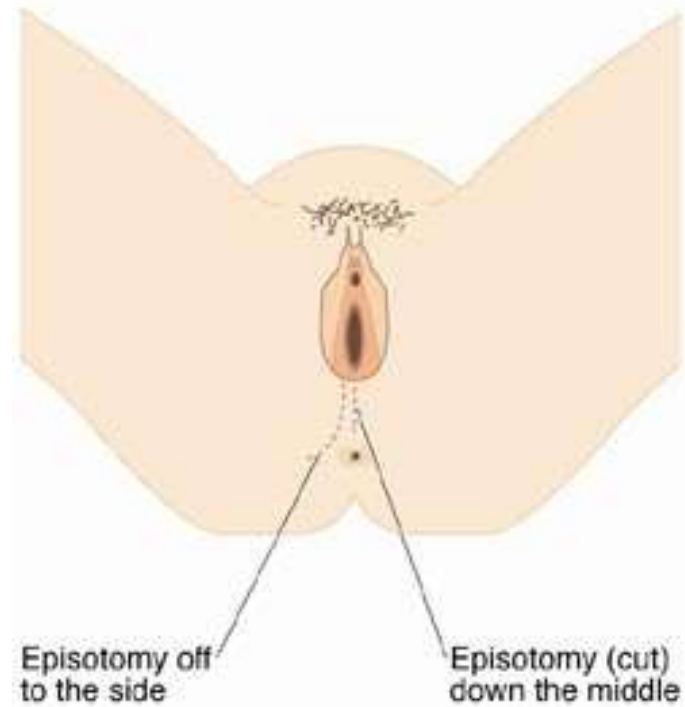
Gluteal

- Buttock region.



Perineal

- Between anus and genitals



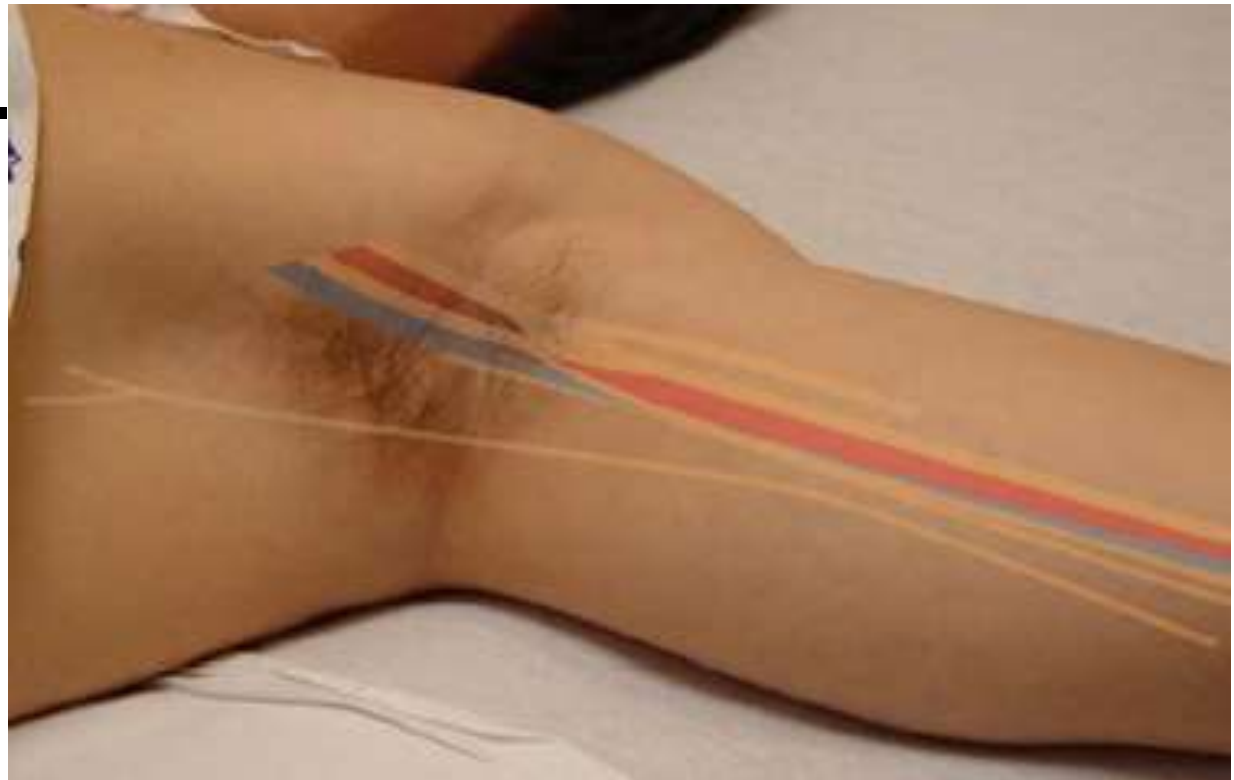
Acromial

- Point of shoulder



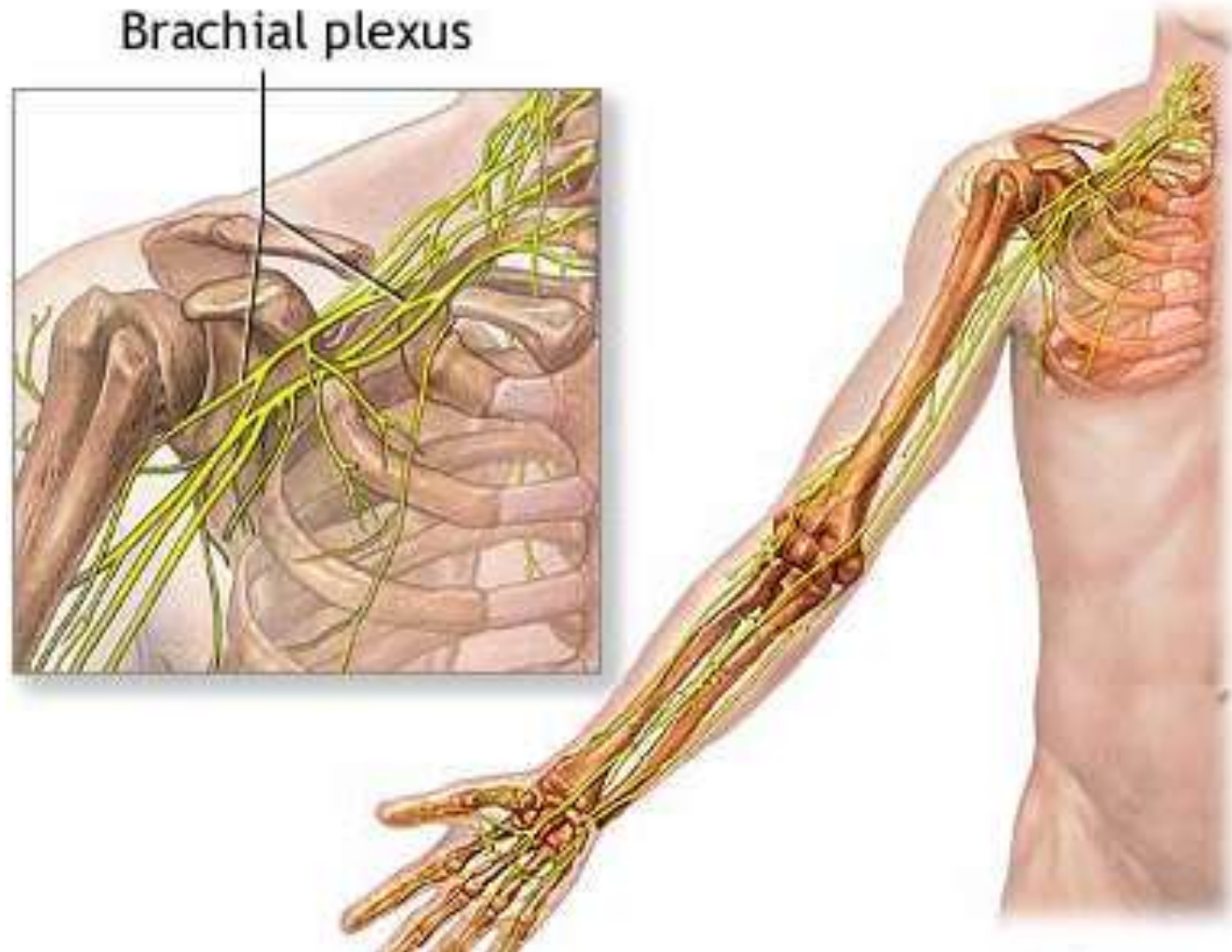
Axillary

- Armpit region.



Brachial

- arm



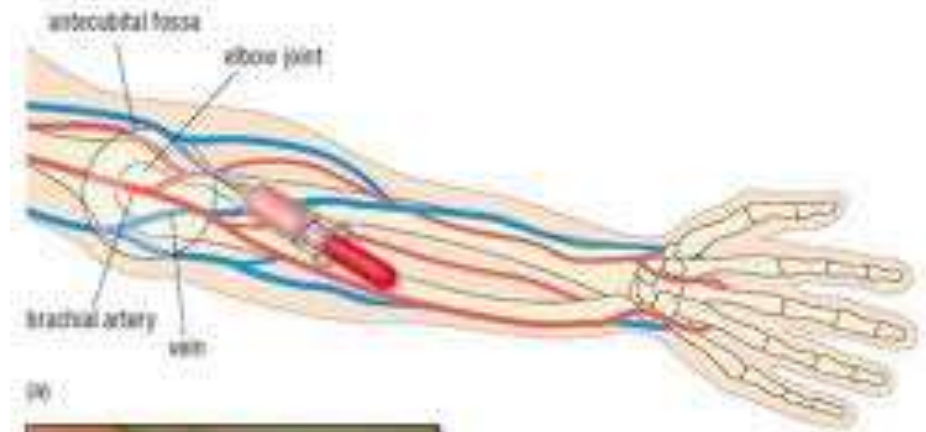
Antebrachium

- Forearm



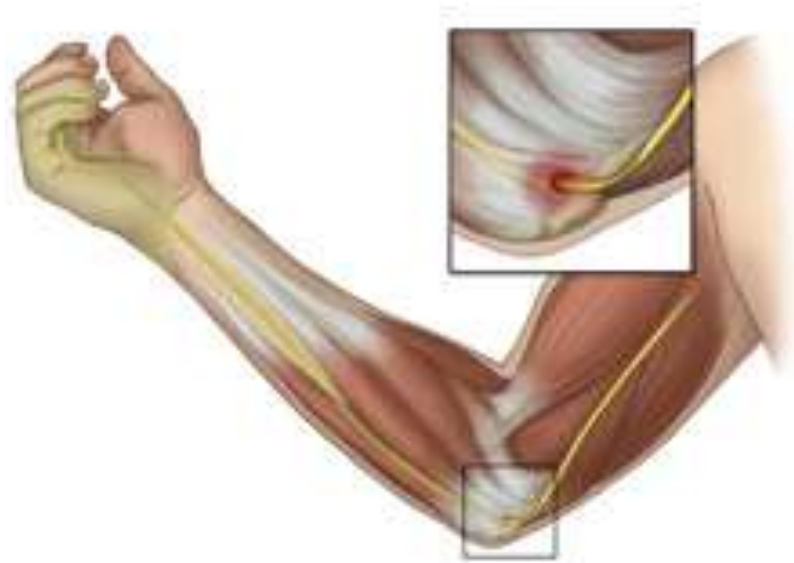
Antecubital

- Front of elbow



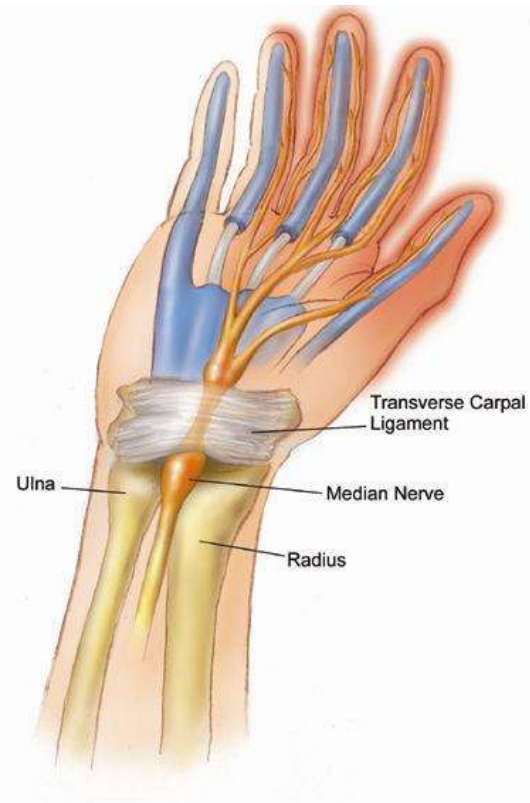
Cubital

- Elbow



Carpal

- wrist



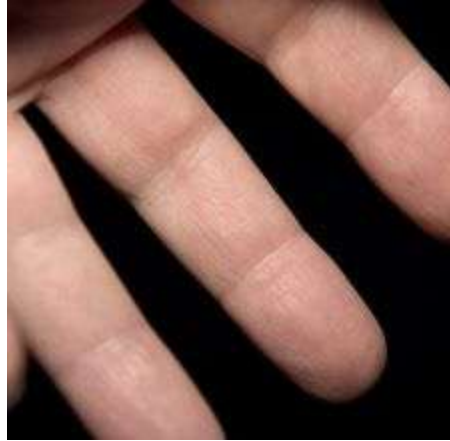
Palmar

- Palm of hand



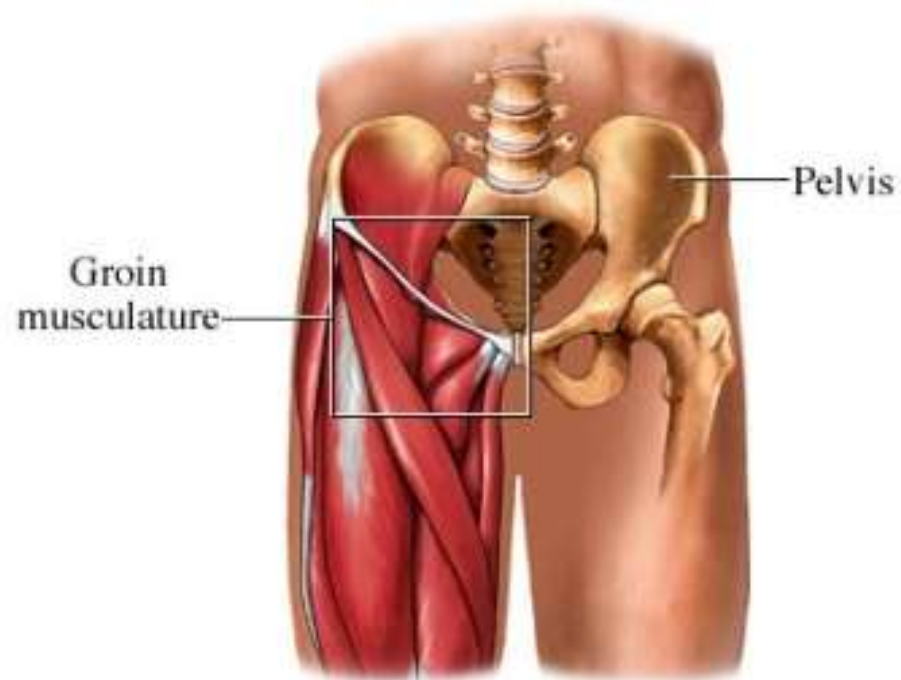
Digital

- Finger or toe



Inguinal

- groin



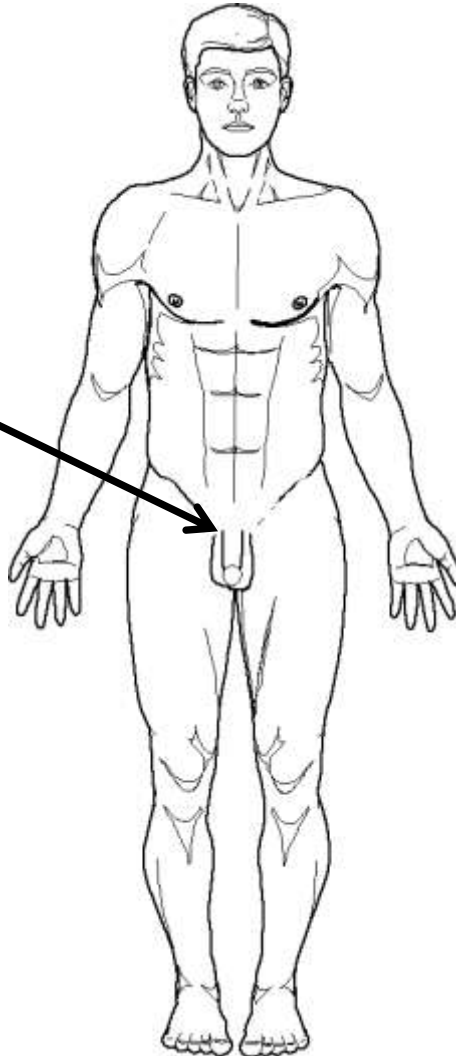
Coxal

- hip



Genital

- Reproductive organs



Femoral

- Thigh



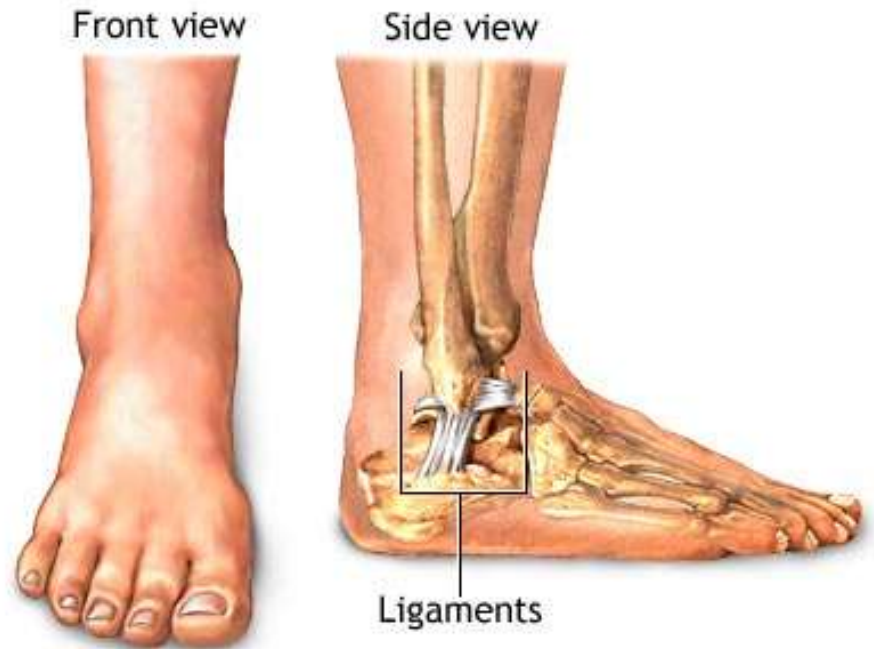
Patellar

- Knee cap



Tarsal

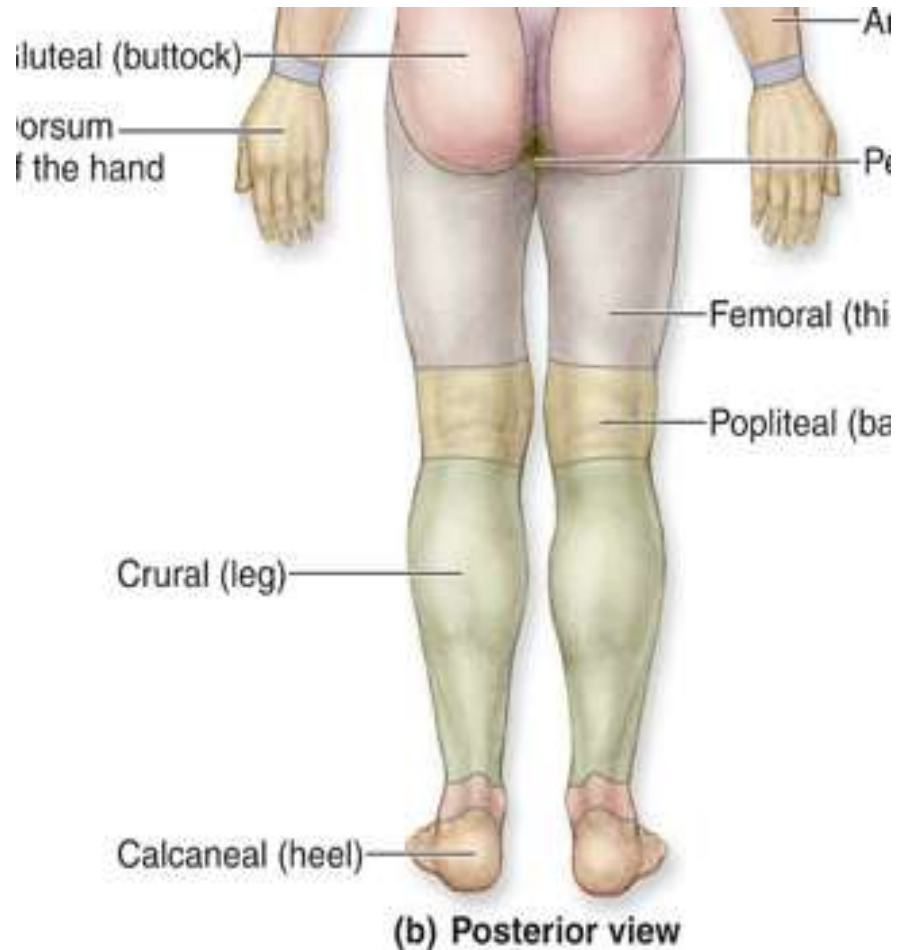
- Ankle (instep)



ADAM.

Crural

- Lower leg



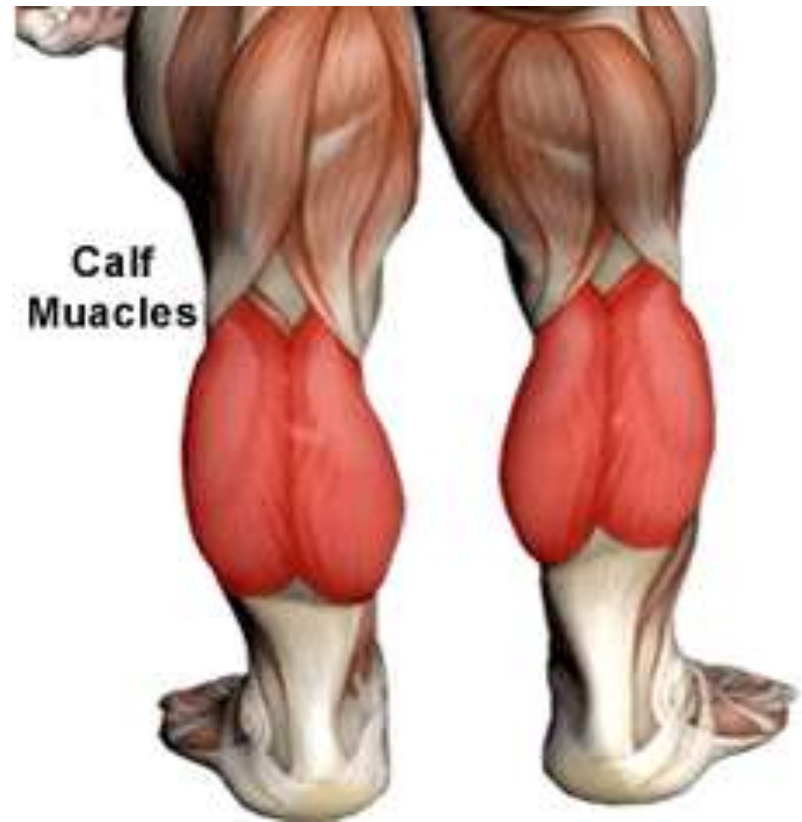
Popliteal

- Region behind the knee.



Sural

- calf



Pedal

- foot



Plantar

- Sole of the foot.

