

# Introduction / Terminology

---

## Objectives :

1. Obtain an understanding of anatomy and the subdivisions which comprise the major disciplines in the study of the structure of the human body
2. Obtain an understanding of the generalized body structure
3. Mastery of Anatomical terms : Body Regions, Planes of section, Directional Terms, Body Cavities
4. Understanding of serous membranes and their significance

**I. Anatomy** : Human Anatomy is the scientific discipline concerned with the organization and structure of the human body. The term *anatomy* originates from its Greek roots meaning literally to “*cut up*.” Anatomy was born from the discoveries of these early anatomists. Since their study was limited to observations made available through the dismemberment of unfortunate individuals, their study was confined to only those structures discernable with the naked eye; large, visible, dissectible, physical attributes. Today this aspect of anatomy is described as *Macroscopic* (large) or *Gross Anatomy*. As with all other scientific disciplines, the study of anatomy has paralleled technology. Unlike the early anatomists which were limited to structures they could see with the unaided eye, today anatomists go beyond elucidating just macroscopic structures and include the descriptions and understanding of structures visible through the use of technology. Anatomy today includes structures which are discernible through the use of highly advanced microscopic and computerized digital equipment, such as electron microscopes, CT scans (Computerized Tomography), and MRI's (Magnetic Resonance Imaging). We will begin our understanding of the structure of the human body with the smallest structural unit of life, the cell. This study of cell and cellular function is referred to as Cytology. It will serve the same purpose in our studies as it does in the body; it will form the framework onto which we will build our understanding of Anatomy.

Anatomy is more than just observing the physical structure of the body and body parts. The *goal* of anatomy is to be able to discern the plausible function in the structure. The beauty and the challenge of anatomy is to be able to determine the functional significance for a specific structural design. Beneath every structural design in lies the function. It is through the understanding of anatomy that we will build the foundation for our understanding the function, or the *Physiology*, of the human body.

**II. Divisions of Anatomy** : Anatomy is a broad field of study consisting of several divisions or sub-disciplines. Each division of anatomy specializes on a specific aspect of the body's arrangement. These divisions are outlined below :

1. **Macroscopic (Gross) Anatomy** : Study of structures which can be seen with an unaided eye.
  - a. **Surface Anatomy** : Study of the general form and superficial markings of the body.
  - b. **Systemic Anatomy** : Study of 11 specific body systems (ie ; Digestive, Endocrine, Nervous Systems)
  - c. **Regional Anatomy** : Study of specific regions of the body, including all tissues residing within the region (ie ; Upper extremity, head & neck, abdominal region).
2. **Microscopic Anatomy** : Study of structures which cannot be seen without the aide of magnifying equipment.
  - a. **Cytology** : (*Cyto* = cell) Study of the internal structure of individual cells.
  - b. **Histology** : (*Histo* = tissue) Study of the structure of groups of cells and how they interact to form functional tissues.
3. **Specialized Anatomical Study** :
  - a. **Developmental Anatomy** : Study of the structural changes in the form of and individual from the fertilized egg to the mature adult. Embryology is a sub-branch of developmental anatomy.
  - b. **Medical / Radiological** : Study of the characteristic changing in anatomy during disease. / Study of anatomical features visible which radiographic technology.

**III. Generalized Body Structure :** The human body is not a solid mass of cells, but rather one large hollow structure (trunk), subdivided into smaller spaces. Within these hollow spaces (*cavities*), specialized organs are contained. The extremities, while advantageous to have are not explicitly necessary, serving simply to move the body in its surrounding or the surrounding around the body. The head sits atop the trunk surveying the internal and external environments making the necessary adjustments to ensure continued body function.

**A. Body Divisions :** On a very basic level, the body can be divided into three main divisions;

1. **Body Wall :** The structures forming the framework of the body, supporting and enclosing vital organs. The skin, skeleton, and skeletal muscles are all components of the body wall. The head, arms, and legs will be considered specialized modifications of the body wall.
2. **Body Cavities :** The internal spaces within the body wall are filled with the body's organs. The largest body cavity is the *Ventral (abdominal side) Cavity*. This cavity is further divided into the *Thoracic Cavity*, housing the heart and lungs, and the *Abdominopelvic Cavity*, housing the abdominal and pelvic organs (stomach, liver, intestines, bladder, reproductive structures). Body cavities are significant because they function to protect and house the internal organs, while still allowing them the freedom of movement. The heart would be very ineffective in pumping blood if it were housed in a solid tissue unable to move and beat.
3. **Organs :** Structures within the body capable of specific functions. Organs can be found 1) contained within the body cavities (heart, liver), 2) as a component of the body wall (skeletal muscle, bone), or 3) transiting between the two (blood vessels, nerves).

**B. Body Systems :** Together, the body wall, cavities, and organs interact to form a beautifully constructed human structure. Body organs which function to perform a similar function are grouped together as a body systems, responsible for accomplishing specific essential tasks. There are *eleven body systems* which comprise the human body.

1. **Integumentary System :** Forms the outermost part of the body wall (the skin) parts: epidermis, dermis (accessory structures: hair, nails, glands, sensory endings) Function : Protection from the environment & temperature control.
2. **Skeletal System :** Component of the body wall. Consists of bones, ligaments, cartilage and connective tissue. Function : Support, protection, blood formation, mineral storage.
3. **Muscular System :** Component of body wall. Consists of skeletal muscles and tendons. Function : support, mobility, and heat production.
4. **Nervous System :** Central (brain & spinal cord) and peripheral (motor & sensory nerves) nervous systems. Function : controls body systems, perceiving internal and external environments.
5. **Endocrine System :** Glandular tissue throughout the body. Function : coordinates and controls body systems (use chemical signals - hormones).
6. **Cardiovascular System :** Heart and blood vessels throughout body. Function : Internal transport of dissolved materials : nutrients, gases, waste.
7. **Lymphatic System :** Structures throughout the body. Consists of lymph vessels, nodes and organs. Function : Internal defense and blood volume maintenance.
8. **Respiratory System :** Structures involved in the exchange of gases; lungs, nose, larynx, trachea, bronchi. Exchange of gases ( $O_2$  &  $CO_2$ ) with the body and the environment.
9. **Digestive System :** Primarily within the abdominal cavity. Function : processing of food and the absorption of nutrients, minerals, vitamins, & water and the elimination of waste.
10. **Urinary System :** Primarily within the pelvic cavity ; consists of the kidney, ureter, bladder & urethra. Function : regulation of blood chemistry via the elimination of excess water, salts, & waste products.
11. **Reproductive System :** Primarily within pelvic cavity. Consists of sex organs (ovaries / testis) and support structures. Function : production and support of sex cells and hormone production.

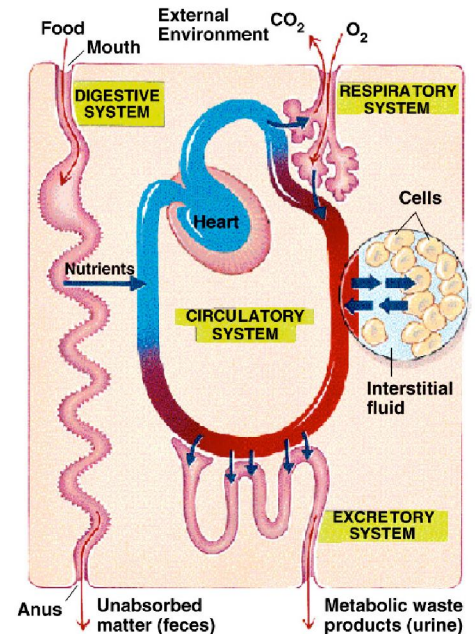


Fig.1.1 Generalized diagram of interactions between the main human body systems

**IV. Anatomical Terminology** : Anatomy is the study of the body's internal and external structures and the physical relationships between them. In the study of Anatomy it is essential that you are able to express yourself correctly and without confusion. Anatomy uses an international language of terms which enables one to correctly convey information to health care professionals around the world, as well as scholars in basic and applied health sciences. Your successful study of the body's structure will rely on your ability to not only communicate using the correct terminology and spelling, but to also understand the language of directionality and organization.

**A. Standard Anatomical Position** : All descriptions of the human body are based on the assumption that the individual is standing what is known as the Standard Anatomical Position (SAP).

Standard Anatomical Position: An individual in SAP will adhere to the following positions: (see fig. 1.2)

- Stand erect
- Upper limbs are at ones side
- Lower limbs are together
- Face, palms, and feet are directed forward

**B. Principle Body Regions** : In your study and use of the following regional terminology, it is important to be able to communicate correctly to you peers as well as to the lay person. It is therefore important to learn both the anatomical term in conjunction with the common names. The anatomical terms and common names and used to describe the principle body regions are given below :

★ *You are responsible for knowing all anatomical names, regions and areas (common names) listed :*

Anatomical Name	Anatomical Region	Area indicated (common name)
1. Cephalon	Cephalic	Head
a. Cranium	Cranial	Skull
b. Nasus	Nasal	Nose
c. Bucca	Buccal	Cheek
d. Auris (Otic)	Aurical	Ear
e. Oculus	Ocular	Eye
f. Oris	Oral	Mouth
2. Cervicis	Cervical	Neck
3. Thoracis	Thoracic	Chest
a. Mamma	Mammary	Breast
4. Axilla	Axillary	Armpit
5. Acromium	Acromial	Shoulder
6. Brachium	Brachial	Portion of upper limb closest to trunk(arm)
7. Antebrachium	Antebrachial	Forearm
8. Antecubitis	Antecubital	Front of elbow
9. Carpus	Carpal	Wrist
10. Manus	Manual	Hand
a. Palma	Palmar	Palm
b. Digits (phalanges)	Digital (phalangeal)	Fingers
11. Abdomen	Abdominal	Abdomen
12. Pelvis	Pelvic	Pelvis
a. Coxa	Coxal	Hip
b. Pubis	Pubic	Anterior Pelvis
13. Inguen	Inguinal	Groin
14. Lumbus	Lumbar	Lower Back
15. Gluteus	Gluteal	Buttock
16. Femur	Femoral	Thigh
17. Patella	Patellar	Knee
a. Popliteus	Popliteal	Back of knee
18. Crus	Crural	Leg; from knee to ankle
19. Sura	Sural	Calf
20. Tarsus	Tarsal	Ankle
21. Pes	Pedal	Foot
a. Planta	Plantar	Sole of foot
b. Digits (phalanges)	Digital (phalangeal)	Toes
22. Calcaneus	Calcaneal	Heel

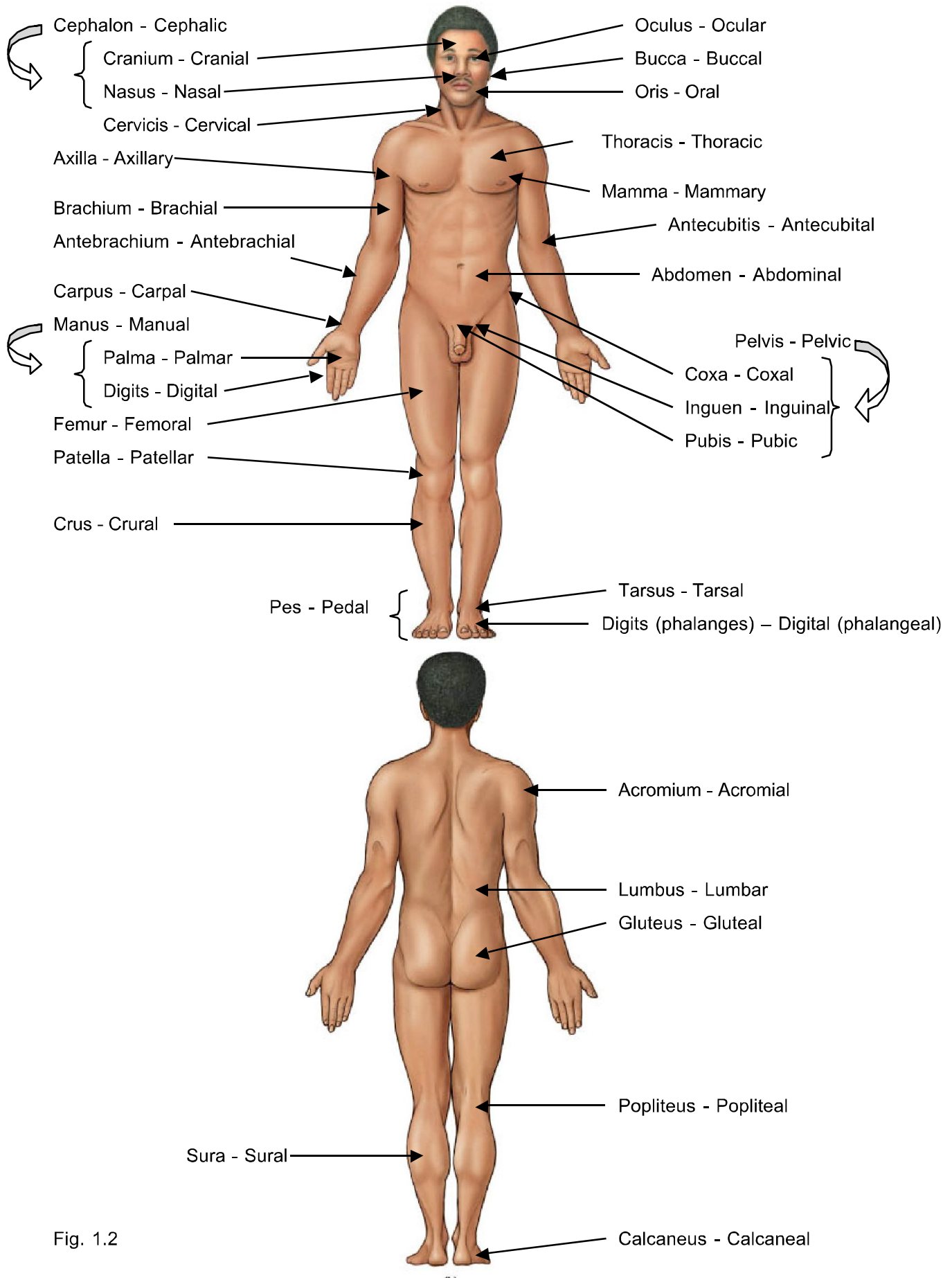
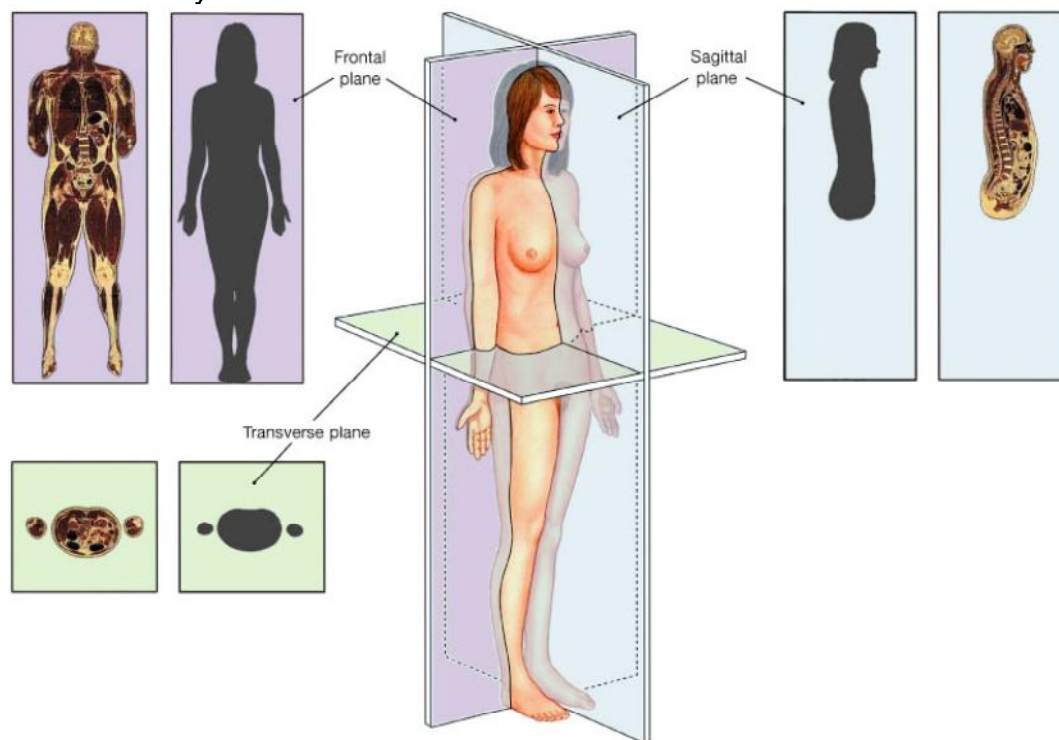


Fig. 1.2

C. **Planes of Section** : The human body can be dismantled (dissected) into pieces (sections) along imaginary planes (Imaginary flat surfaces that pass through the body). See figure 1.3

1. **Sagittal Plane** : Divides the body or organ into *Right* & *Left* sections
  - ★ **Midsagittal Plane** : Passes through the mid-line & divides the body or organ into exactly EQUAL right and left halves
  - ★ **Parasagittal Plane** : Divides the body or organ into UNEQUAL right & left sections
2. **Frontal (Coronal ) Plane** : Divides the body or organ into *Anterior* (Front) & *Posterior* (Back) sections
3. **Transverse (Cross-sectional or Horizontal) Plane** : Divides the body or organ into *Superior* (top) & *Inferior* (Bottom) sections
4. **Oblique Plane** : Passes through the body or organ at an angle and divides the body into unequal sections.

Figure 1.3 : Anatomical Body Planes of Section :



D. **Directional Terms** : When expressing anatomical locations it is important to utilize correct directional terms. Various adjectives, arranged into antagonistic pairs, describe the relationship of body parts and compare the relationship of anatomical structures with each other. See figure 1.4

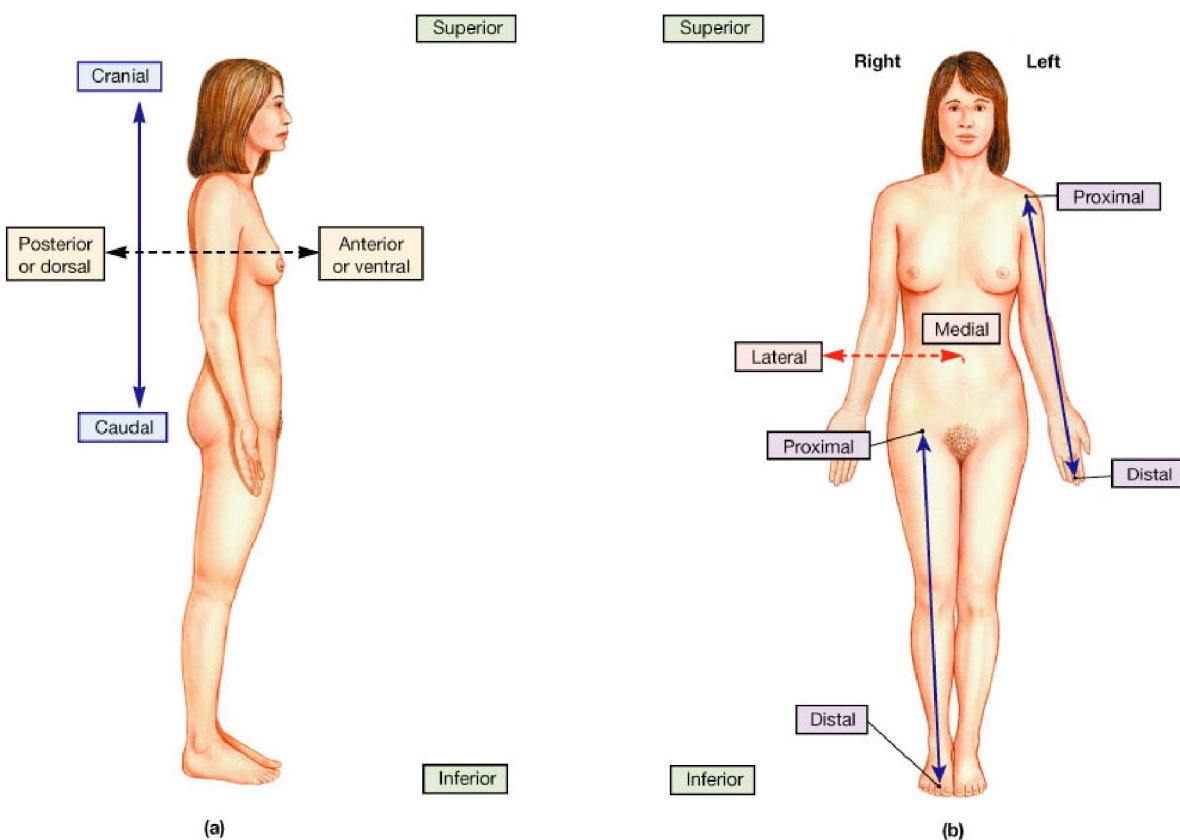
★ *All directional terms express relative location : i.e. The cephalon is superior to the cervicis*

1. a. **Superior**: Above ; at a higher level (in humans - toward the head)  
 b. **Inferior** : Below; at a lower level (in humans - toward the feet)
  - The cranial region is superior to the cervical region
  - The patellar region is inferior to the inguinal region
2. a. **Cephalic or Cranial** : Toward the head
  - The cranial border of the pelvis is the attachment site for many abdominal muscles
3. a. **Anterior (Ventral)** : Near the front of the body or structure (belly side).  
 b. **Posterior (Dorsal)** : Near the back of the body or structure.
  - The crus is anterior to the sura
  - The tarsus is posterior to the phalanges



4. a. **Medial** : Toward the midline (longitudinal axis) of body or structure.  
 b. **Lateral** : Away from the midline (longitudinal axis) of body or structure.
  - The medial portions of the thighs may touch
  - The lateral digit is the pollex (thumb)
5. a. **Ipsilateral** : On the same side of the body.  
 b. **Contralateral** : On the opposite side of the body.
  - The appendix and gall bladder are ipsilateral
  - The Spleen and liver are contralateral
6. a. **Proximal** : Near to point of attachment (trunk) - Used to describe relative distance down a limb.  
 b. **Distal** : Far from point of attachment (trunk) - Used to describe relative distance down limb.
  - The femur is proximal to the crus
  - The antebrachium is distal to the brachium
7. a. **Superficial** : Toward the surface of the body or organ .  
 b. **Intermediate** : Between a superficial structure and a deep structure.  
 c. **Deep** : Away from the surface of the body or organ (more internal)
  - The skin is superficial to the muscle
  - The muscle is intermediate between the skin and the bone
  - The bone is deep to the muscle and the skin

Figure 1.4 : Directional Terminology



- E. **Body Cavities** : When viewed in section one realizes that the human body is not a solid object. It has numerous spaces and internal chambers. These internal chambers, called cavities, house the body's organs. There are 2 major body cavities (*Ventral & Dorsal Body Cavities*) which are further subdivided into smaller cavities housing specific organs.

**Functional significance** : Body cavities have several functions :

1. They house & separate body organs
2. They protect & cushion organs from external impact
3. They allow considerable freedom for movement of internal organs without disrupting the functions of other organs
  - ★ The Heart, Lungs, & Small Intestine all require the relatively uninhibited ability to move
4. They enable different pressures to be developed within the body without disrupting other organs
  - ★ Lung Cavity : Breathing results from changes in pressures within the Thoracic cavity

**F. 2 Principal Body Cavities** : With further subdivisions :

1. **Dorsal Body Cavity** : Cushions & protects the Central Nervous System (Brain & Spinal Cord)
  - a. **Cranial Cavity** : Cavity formed by the bones of the Skull ; Houses the Brain
  - b. **Spinal (Vertebral) Cavity** : Cavity formed by the vertebral column; Houses the Spinal Cord
2. **Ventral Body Cavity (Coelom)** : Enclosed by the ribs, abdominal and lumbar musculature. Surrounds organs of the Respiratory, Digestive, Cardiovascular, Urinary, & Reproductive systems
  - ★ *Ventral Cavity is further divided into 2 cavities by the transversely oriented Diaphragm*
  - a. **Thoracic Cavity** : Enclosed by the rib cage & separated from the abdominopelvic cavity by the diaphragm.
    1. **Right & Left Pleural Cavities** : House the right & left lungs
    2. **Pericardial Cavity** : Houses the heart
  - b. **Abdominopelvic Cavity** : Enclosed by the abdominal and lumbar muscles, inferior to the diaphragm. Houses abdominal Viscera (Organs)
    1. **Abdominal Cavity** : Separated from inferior Pelvic cavity by an imaginary line at the pelvic brim. Houses Digestive Organs and Glands
    2. **Pelvic Cavity** : Separated from superior Abdominopelvic cavity by an imaginary line at the pelvic brim. Houses Urinary, Reproductive, & distal portions of Digestive Systems.
    - ★ *There is no definitive structure which separates Abdominal & Pelvic Cavities*

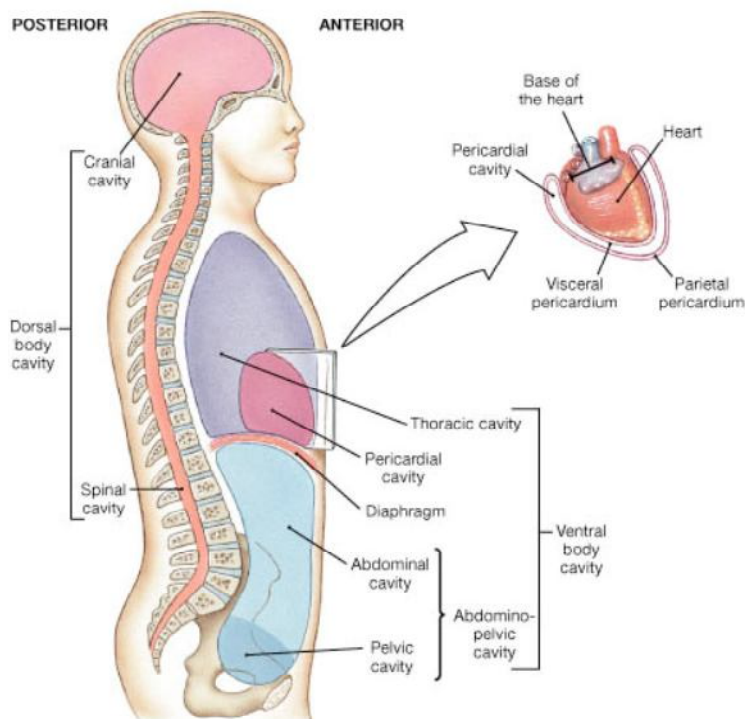


Figure 1.5 ; Body Cavities – Lateral

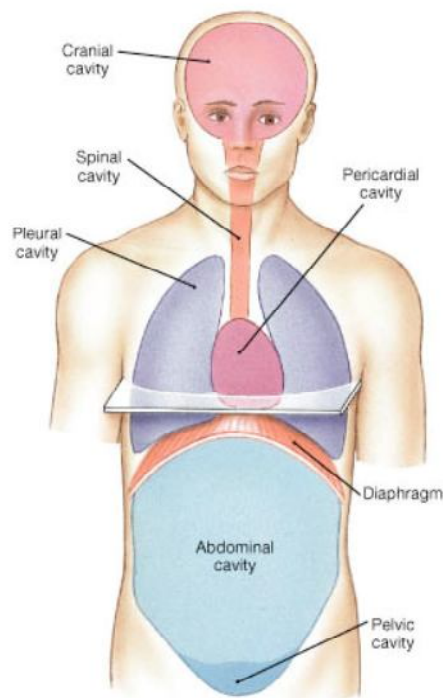


Figure 1.6 : Body Cavities – Anterior

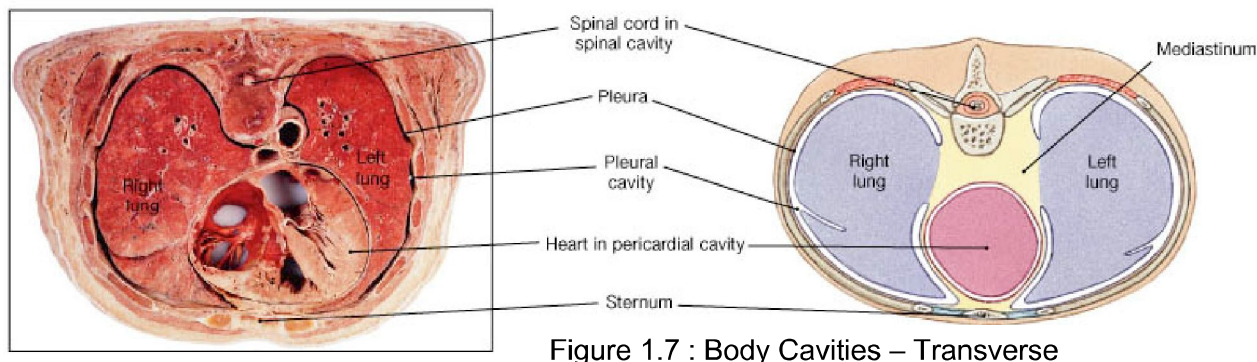


Figure 1.7 : Body Cavities – Transverse

**V. Serous Membranes** : All body cavities & organs are lined with a thin continuous layer of fluid secreting cells. These cells form a specialized membrane called a *Serous Membrane*. The serous membrane which lines all cavities and organs functions to secrete a slippery fluid called serous fluid or *Transudate*. Serous membranes are significant because they function to allow the frictionless movement of moist organs across one another.

**Serous Membrane Terminology** : Serous Membranes are named according to their location.

1. **Visceral Serous Membranes (Visceral Serosa)** : Cover all *body organs*
  - a. **Visceral Pleura** : Membrane covering the lungs
  - b. **Visceral Pericardium** : Membrane covering the heart
  - c. **Visceral Peritoneum** : Membrane covering all abdominal organs
2. **Parietal Serous Membranes (Parietal Serosa)** : Cover & line all *body cavities*
  - a. **Parietal Pleura** : Membrane lining the Pleural Cavity
  - b. **Parietal Pericardium** : Membrane lining the Pericardial Cavity
  - c. **Parietal Peritoneum** : Membrane lining the Abdominopelvic Cavity

The Serous membranes which line the Pleural cavities meet in the middle of the thoracic cavity. The space within the thoracic cavity which lies between the pleural cavities is called the **MEDIASTINUM**. The mediastinal space contains the pericardial cavity and portions of the trachea & esophagus, thymus, and major arteries & lymph vessels which pass through. (see fig. 1.7)

**Clinical Significance** : Peritonitis is an inflammation of the Abdominal Peritoneum. Peritonitis can occur after an injury or infection to the abdominal peritoneal serous linings. The injuries or infection can cause an increase in the production and an accumulation of serous fluid (called ascites) resulting in abdominal swelling. Several symptoms can result : heart burn, indigestion, & lower back pain.



## Introduction / Terminology

### Define the following :

1. Anatomy :
2. Histology :
3. Body Cavity :
4. Standard Anatomical Position :
5. Midsagittal Plane :
6. Serous Membrane
7. Mediastinum :

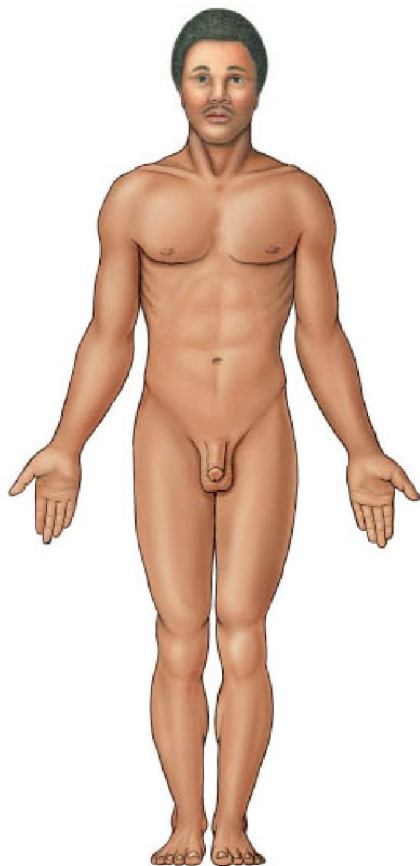
### Matching 1.1 : Body Systems

- |                          |       |  |
|--------------------------|-------|--|
| 1. Urinary System        | _____ | a. Structures involved in the exchange of gases; lungs, nose, larynx, trachea, bronchi.        |
| 2. Respiratory System    | _____ | b. Controls body systems, perceiving internal and external environments                        |
| 3. Cardiovascular System | _____ | c. Glandular tissue throughout the body. Coordinates and controls body systems                 |
| 4. Muscular System       | _____ | d. Internal transport of dissolved materials : nutrients, gases, waste.                        |
| 5. Endocrine System      | _____ | e. Internal defense and blood volume maintenance.  |
| 6. Nervous System        | _____ | f. Regulation of blood chemistry via the elimination of excess water, salts, & waste products. |
| 7. Reproductive System   | _____ | g. Support, mobility, and heat production.   |
| 8. Skeletal System       | _____ | h. Forms the outermost part of the body wall (the skin) parts: epidermis, dermis               |
| 9. Digestive System      | _____ | i. Production and support of sex cells and hormone production.                                 |
| 10. Integumentary System | _____ | j. Support, protection, blood formation, mineral storage.                                      |
| 11. Lymphatic System     | _____ | k. Processing of food & absorption of nutrients, minerals, vitamins, & water.                  |

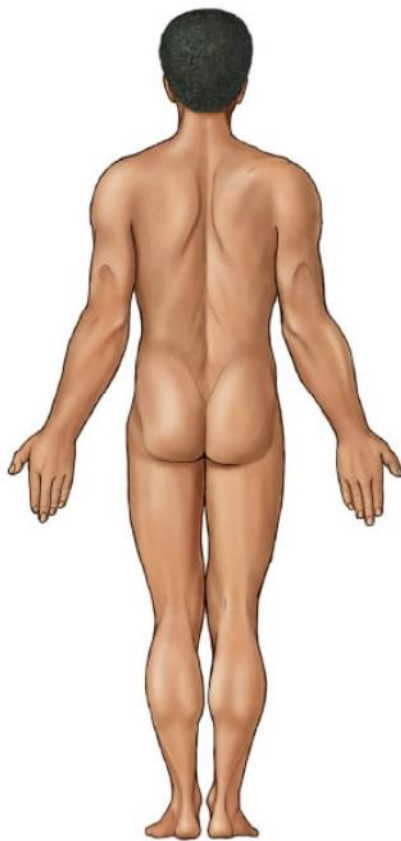
### Matching 1.2 : Body Regions (Anterior Surface)

- |                       |       |                 |
|-----------------------|-------|-----------------|
| 1. Patella            | _____ | a. Armpit       |
| 2. Antebrachium       | _____ | b. Leg          |
| 3. Axilla             | _____ | c. Ankle        |
| 4. Brachium           | _____ | d. Groin        |
| 5. Pes                | _____ | e. Forearm      |
| 6. Thoracis           | _____ | f. Back of Knee |
| 7. Cervicis           | _____ | g. Foot         |
| 8. Phalanges (digits) | _____ | h. Buttock      |
| 9. Inguin             | _____ | i. Chest        |
| 10. Popliteus         | _____ | j. Arm          |
| 11. Gluteus           | _____ | k. Knee         |
| 12. Femur             | _____ | l. Neck         |
| 13. Tarsus            | _____ | m. Fingers      |
| 14. Crural            | _____ | n. Thigh        |

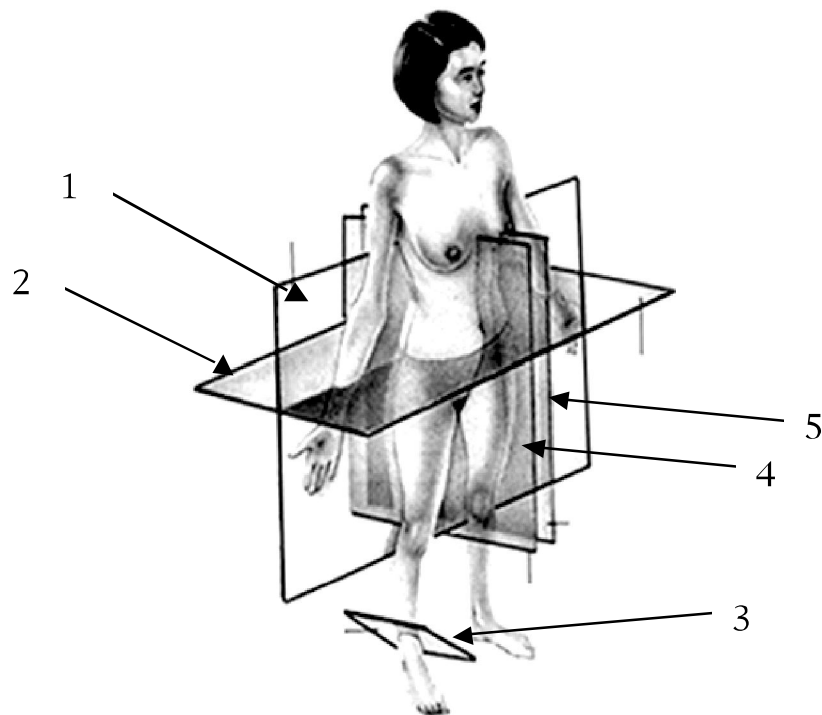
**Labeling 1.1 : Body Regions – Anterior :** Label the figures below with all relevant anatomical terms



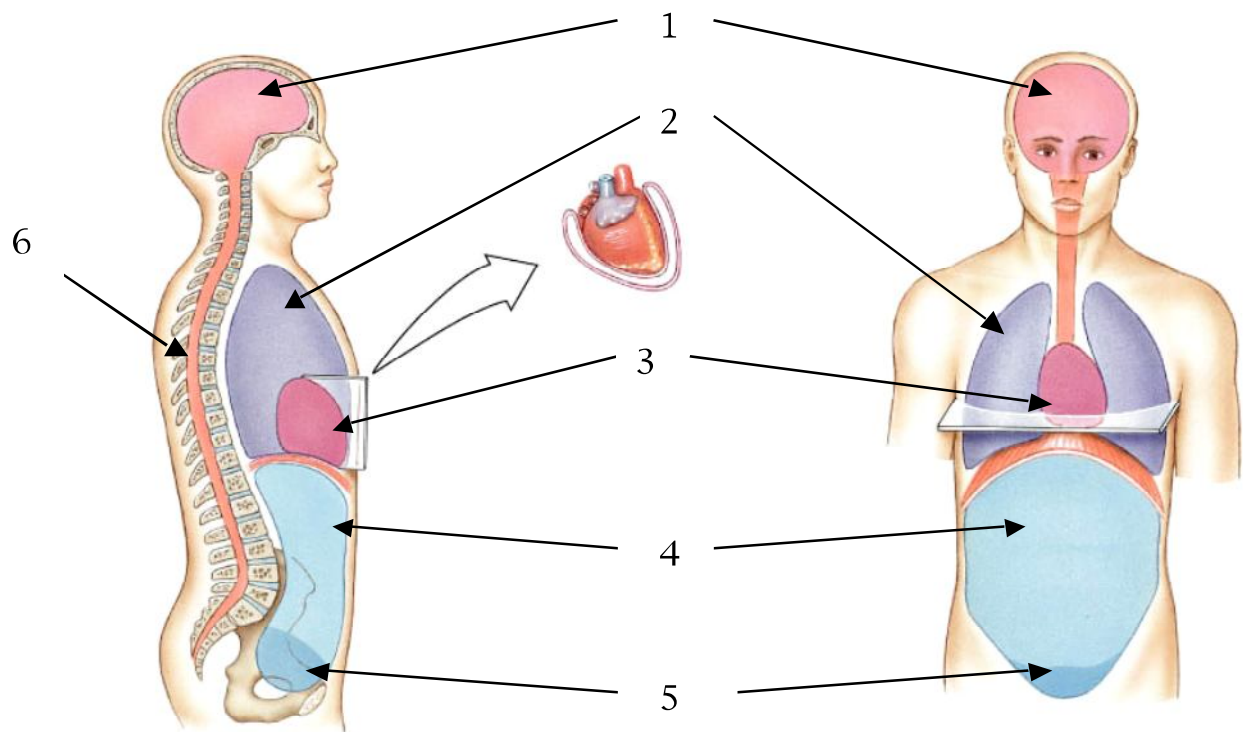
**Labeling 1.2 : Body Region - Posterior**



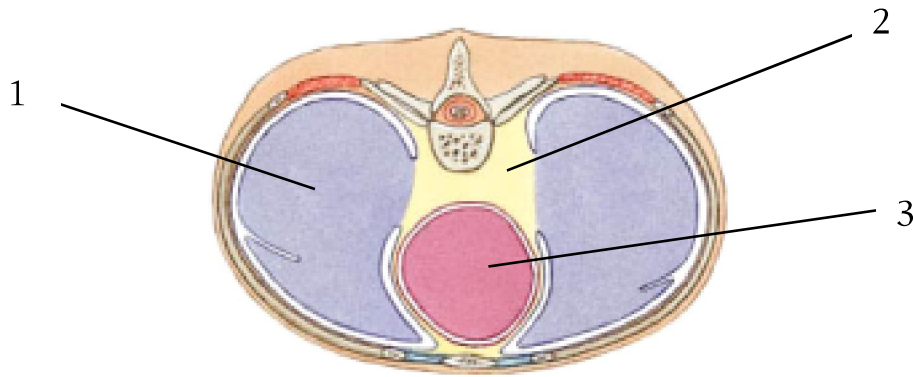
**Labeling 1.3 : Planes of Section :** Label the specific planes of section identified



**Labeling 1.4 : Body Cavities**



### Labeling 1.5 : Transverse section through the Thoracic Cavity



**Fill ins 1.1 : Directional Terms** : For each set of structures or regions, give the directional term that best describes the relationship

1. The Antebrachium is \_\_\_\_\_ to brachium.
2. Cranial region is \_\_\_\_\_ to cervical region.
3. Phalanges are \_\_\_\_\_ to the Carpus.
4. Inguen is \_\_\_\_\_ to the Coxa.
5. Crural region is \_\_\_\_\_ to sural region.
6. \_\_\_\_\_ is lateral to the thoracic region.
7. The axilla is proximal to the \_\_\_\_\_.
8. Patellar is anterior to the \_\_\_\_\_.
9. \_\_\_\_\_ is inferior to the cervical region.
10. The antecubital region is \_\_\_\_\_ to the phalanges.

### Fill'ins 1.2 : Body Cavities & Membranes

1. The \_\_\_\_\_ cavity contains the brain, and the \_\_\_\_\_ cavity contains the spinal cord. Both cavities are a part of the larger \_\_\_\_\_ cavity.
2. The abdominopelvic cavity is separated by the muscular \_\_\_\_\_ from the \_\_\_\_\_ cavity.
3. In the thoracic cavity, the esophagus, thoracic nerves, and pericardial cavity (with the heart) occupy an area called the \_\_\_\_\_.
4. The \_\_\_\_\_ cavity includes the \_\_\_\_\_ cavity which houses the heart and the \_\_\_\_\_ cavity which houses the lungs.
5. The \_\_\_\_\_ membrane functions to line the abdominal cavity.
6. The \_\_\_\_\_ lines the heart, functioning to reduce friction by the secretion of transudate (serous fluid).
7. The \_\_\_\_\_ lines the plueal cavity.