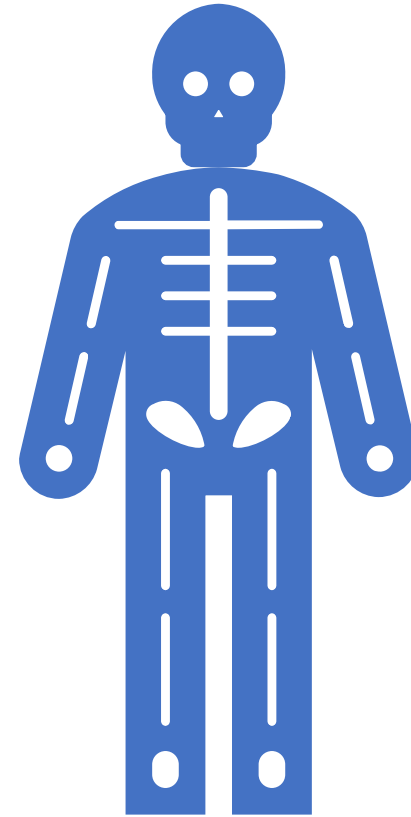


Anatomical BASICS





The importance of Anatomical Positions, Directions and Planes

Nowadays, humans can use GPS to get around. The global positioning device (GPS) technology calculates your location and the location of your destination by calculating the time of the signal with the known position of satellites orbiting Earth! However, this was not always the case.



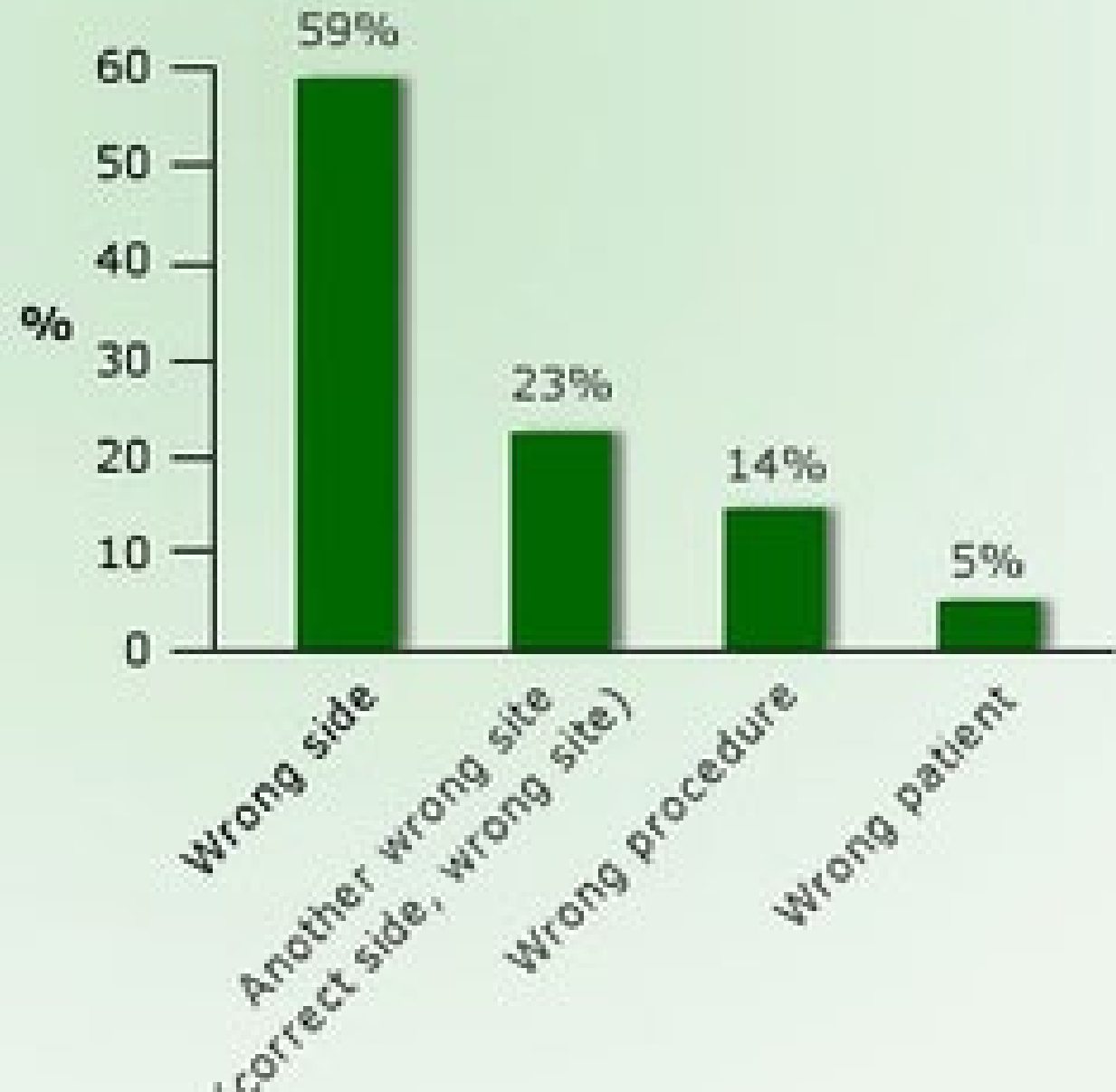
The importance of Anatomical Positions, Directions and Planes

Could you image a time before GPS, or even before maps? Getting around would have been a challenge. A traveler would have to depend on the verbal instructions of others to get from one place to another. Clear instructions would be very important.

*For example, "Go 3 miles, then turn left at Cherry Avenue, then go 2 miles and turn **Left** on Montgomery Street." is abundantly more clear than "Go up the hill a ways 'til you get to the old willow tree and go left 'til you pass the old wooden mill, until you get to the Baker's farm."*

Medical Mistakes due to NOT understanding or clearly explaining anatomical positions, directions or planes!

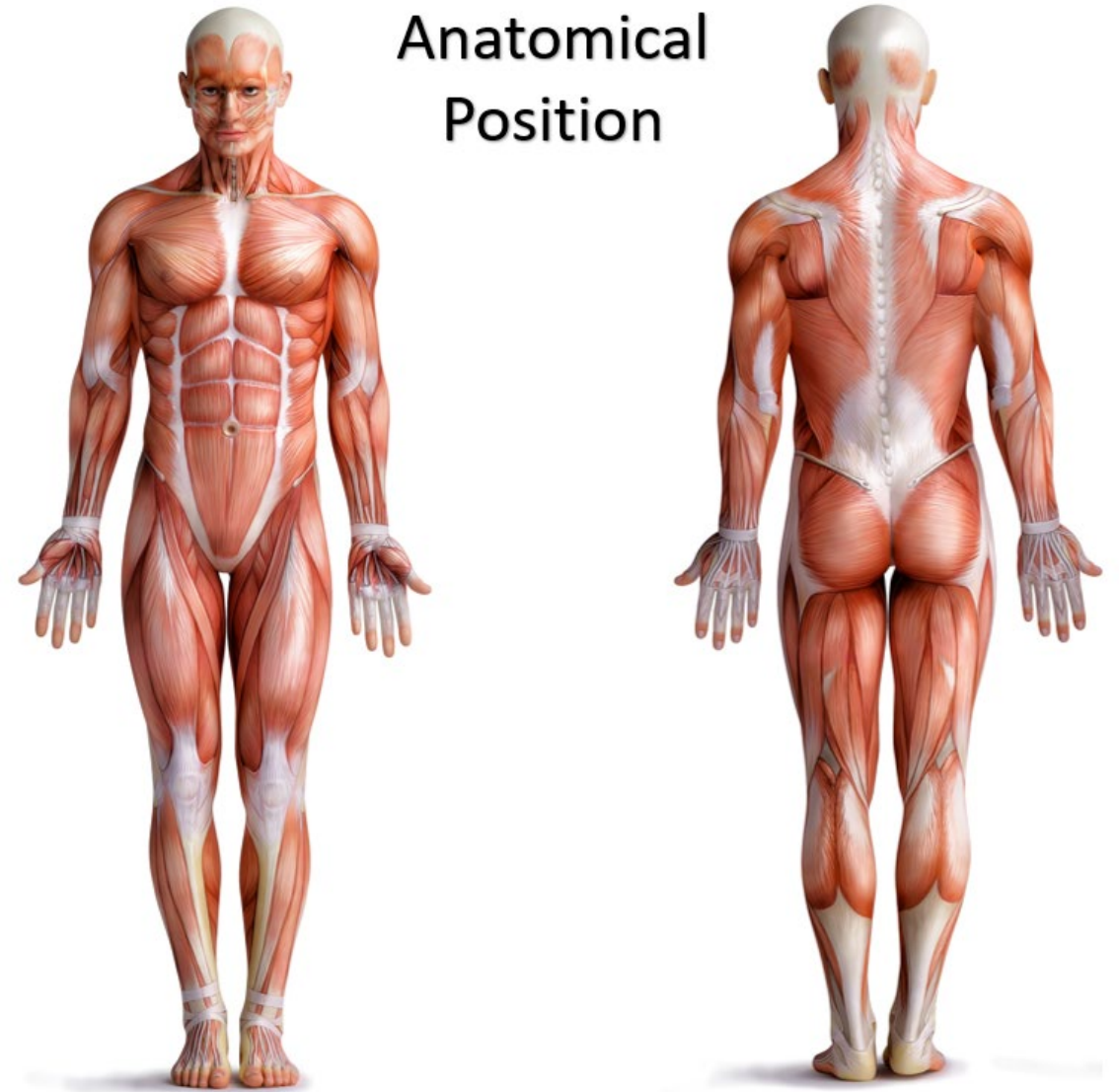
Types of wrong-site surgery observed in the previous 6 months by orthopedic surgeons



- <https://youtu.be/-BVErD8WWKM>

ANATOMICAL POSITION

- When anatomical positioning is discussed, we must have a standard position (see image) that we refer to as a "frame of reference".
- In anatomy, whenever we use positional terminology, we **ALWAYS** refer to the position **AS IF** the patient was in the "anatomical position"



ANATOMICAL POSITION

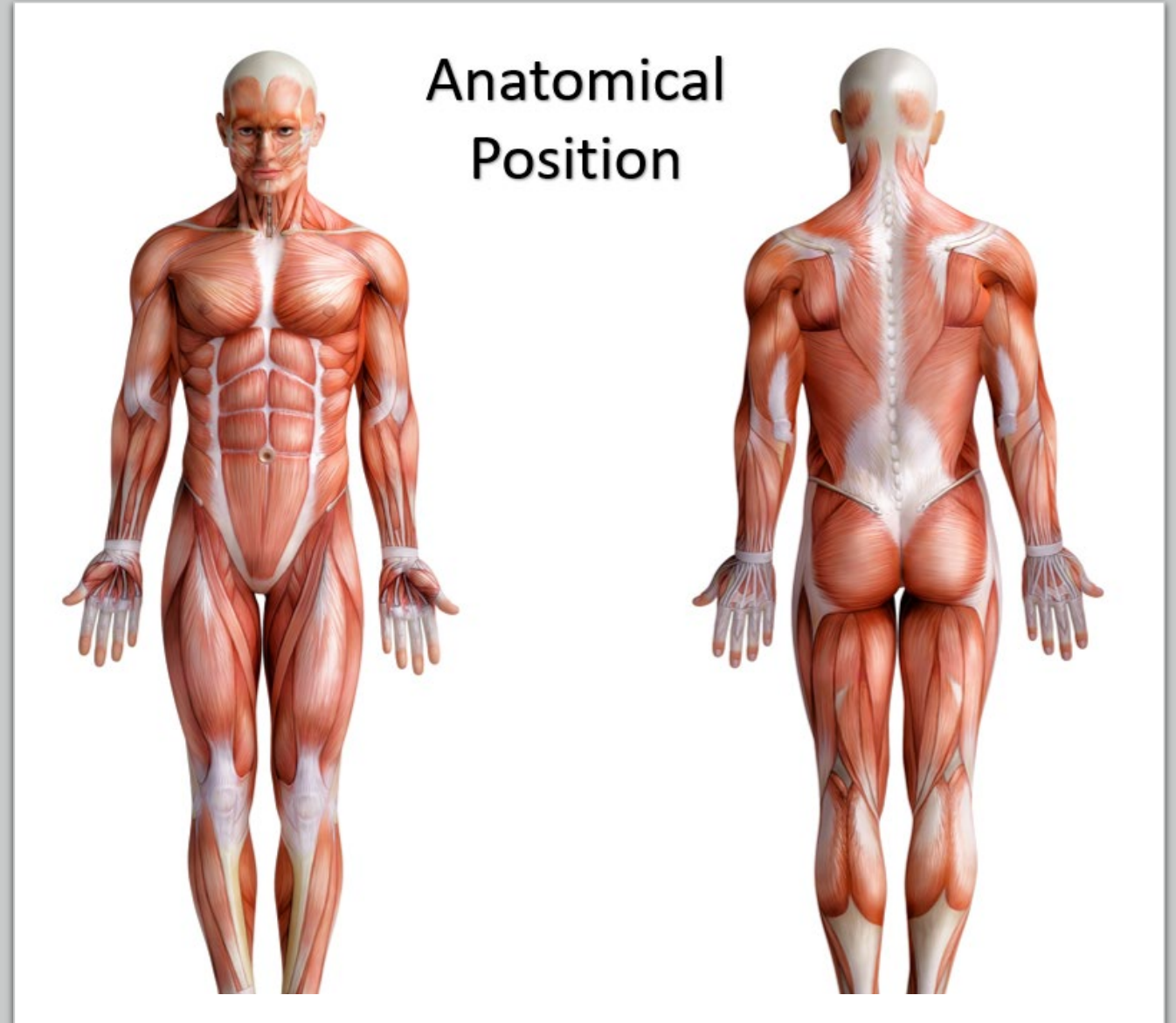
- In the anatomical position, the body is
 - upright, directly facing the observer
 - feet flat and directed forward
 - upper limbs are at the body's sides
 - palms facing forward

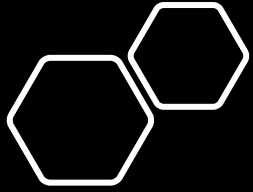
Anatomical
Position



ANATOMICAL POSITION

Also, the “right side” of the body, refers to the patient’s right side. The “left side” of the body, refers to the patient’s left side.





Laterality Terms

- *Ipsilateral = same side*
- *Contralateral = opposite side*
- *Unilateral – one side*
- *Bilateral – both sides / 2 sides*

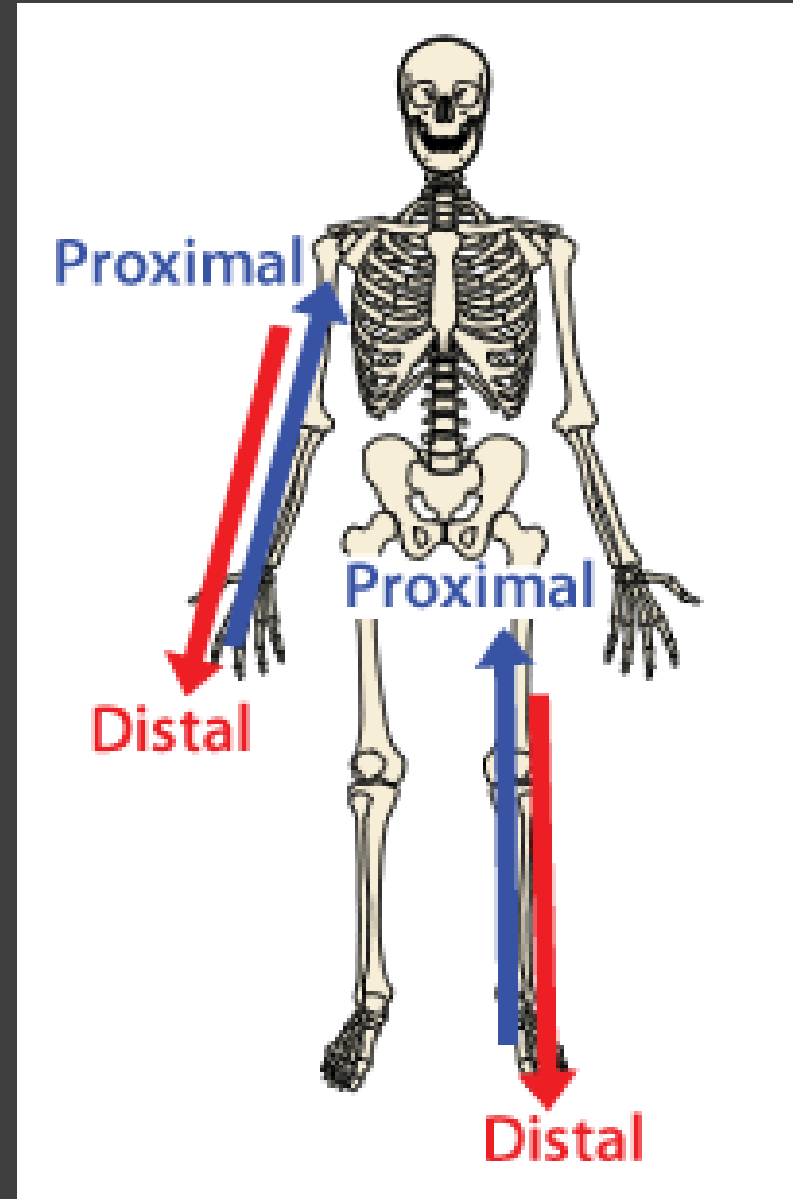
Terms of Laterality

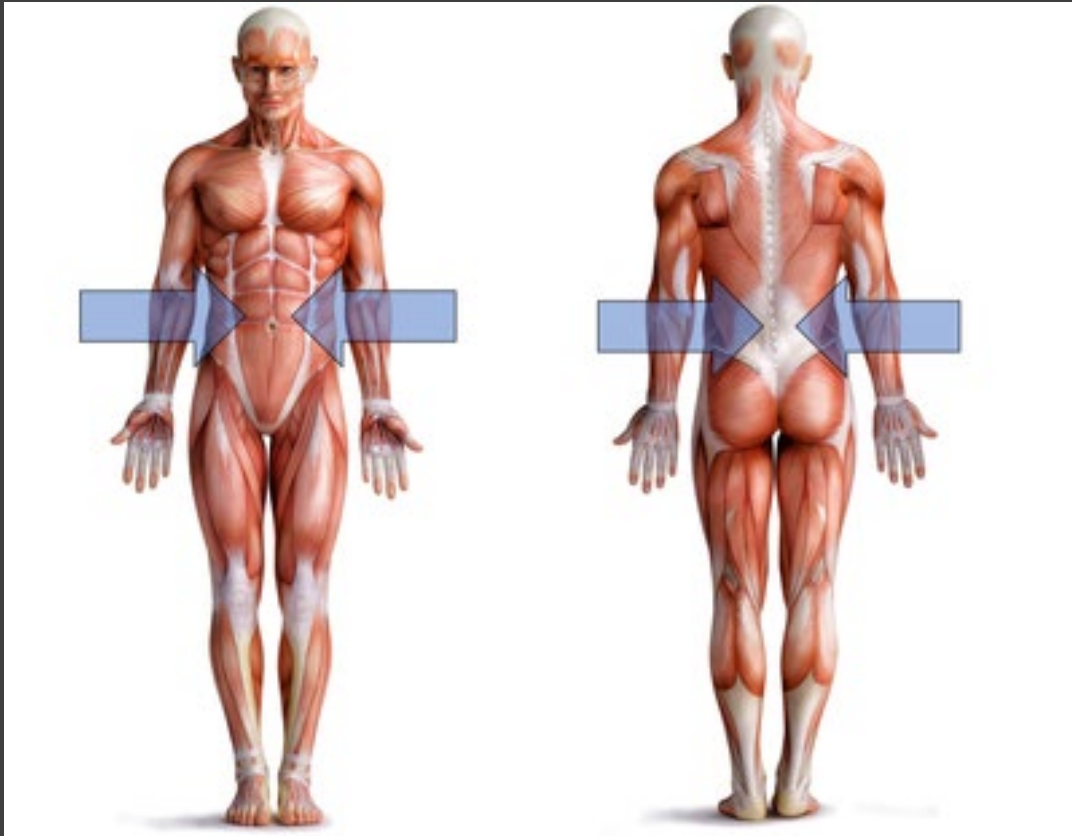


Unilateral: One Side
Bilateral: Two Sides
Ipsilateral: Same Side of Body
Contralateral: Opposite Side of Body

Proximal and Distal

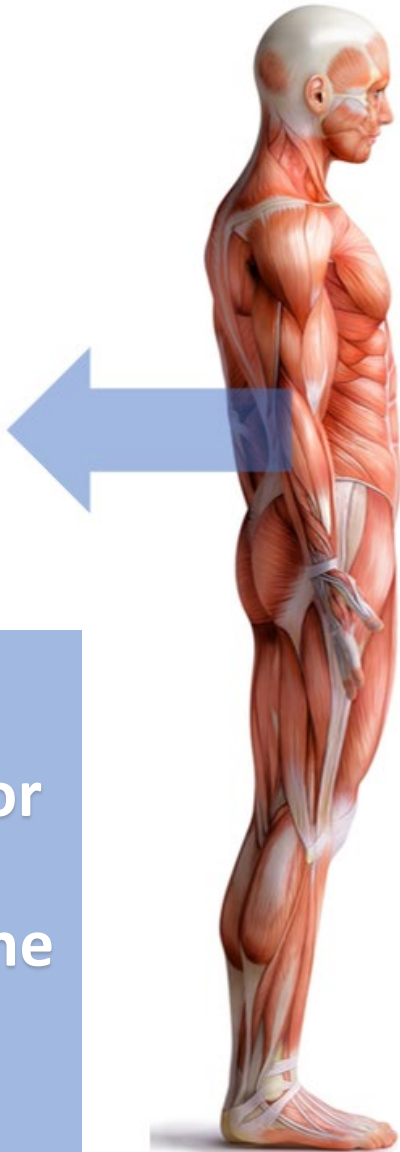
- Proximal means towards the trunk of the body.
- Distal means away from the trunk.
 - Proximal and distal are usually used when describing structures in the extremities.



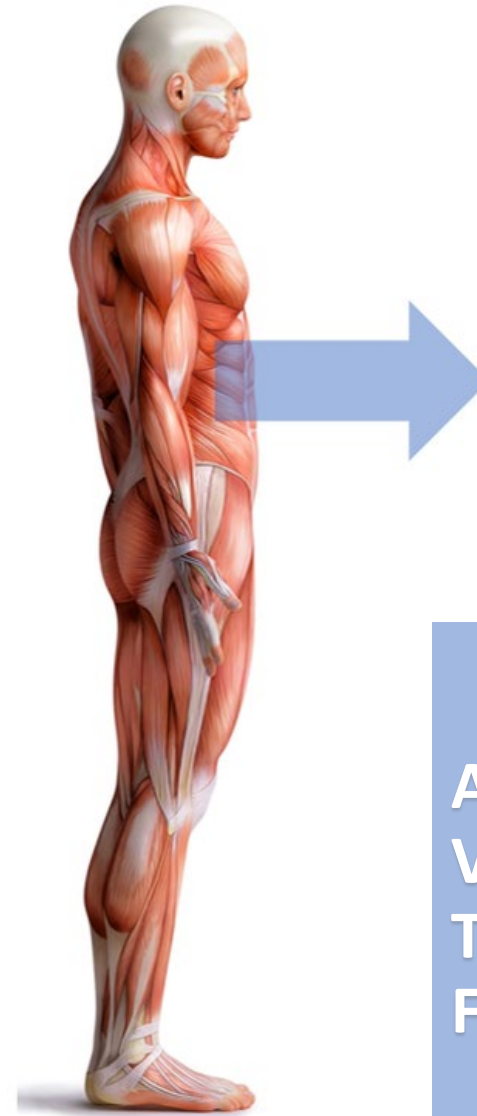


Medial = Towards
the MIDDLE

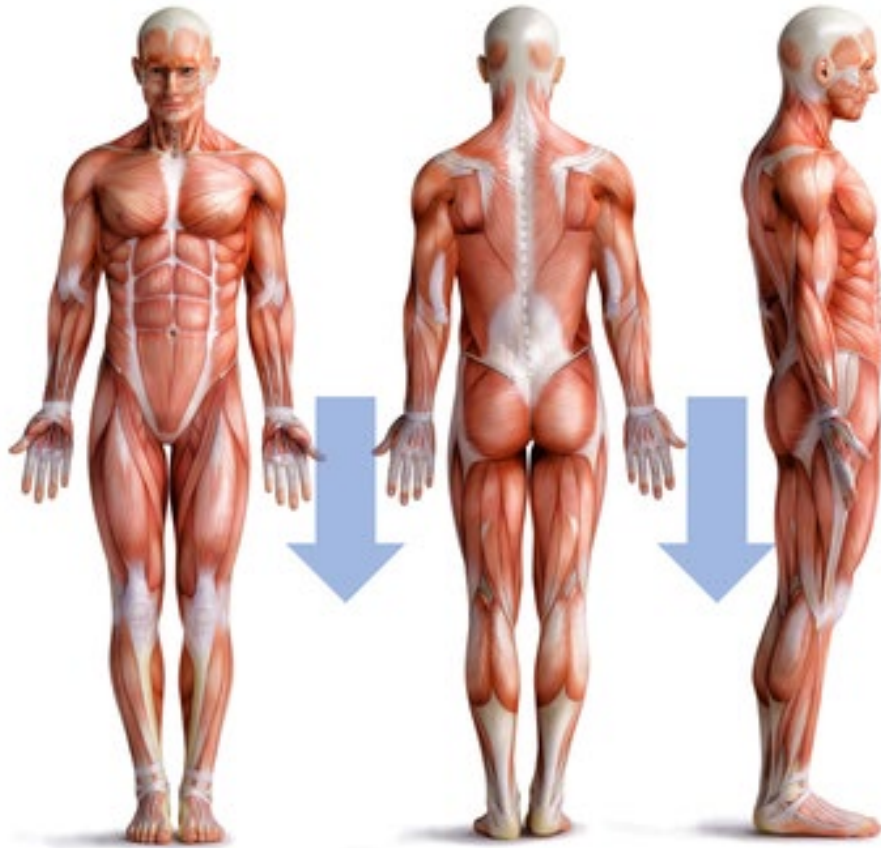
Lateral = Towards
the SIDES



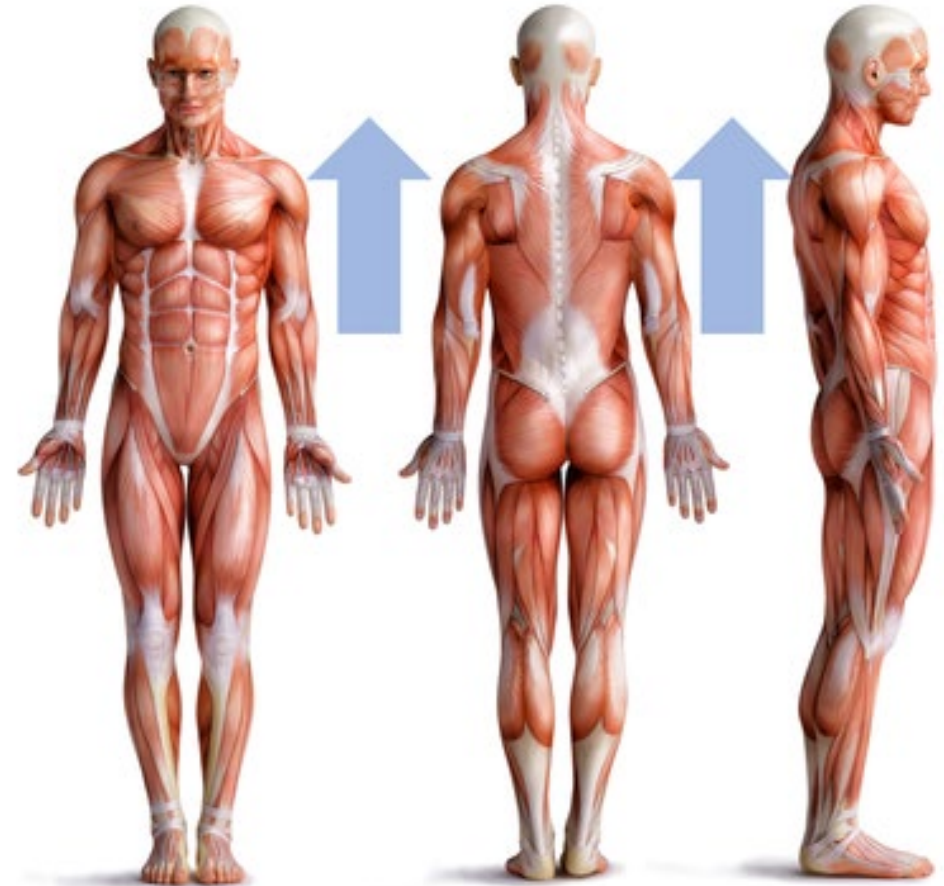
Posterior or
Dorsal =
Towards the
BACK



Anterior or
Ventral =
Towards the
FRONT



Inferior = Downward



Superior = Upward

Deep

Towards the Center



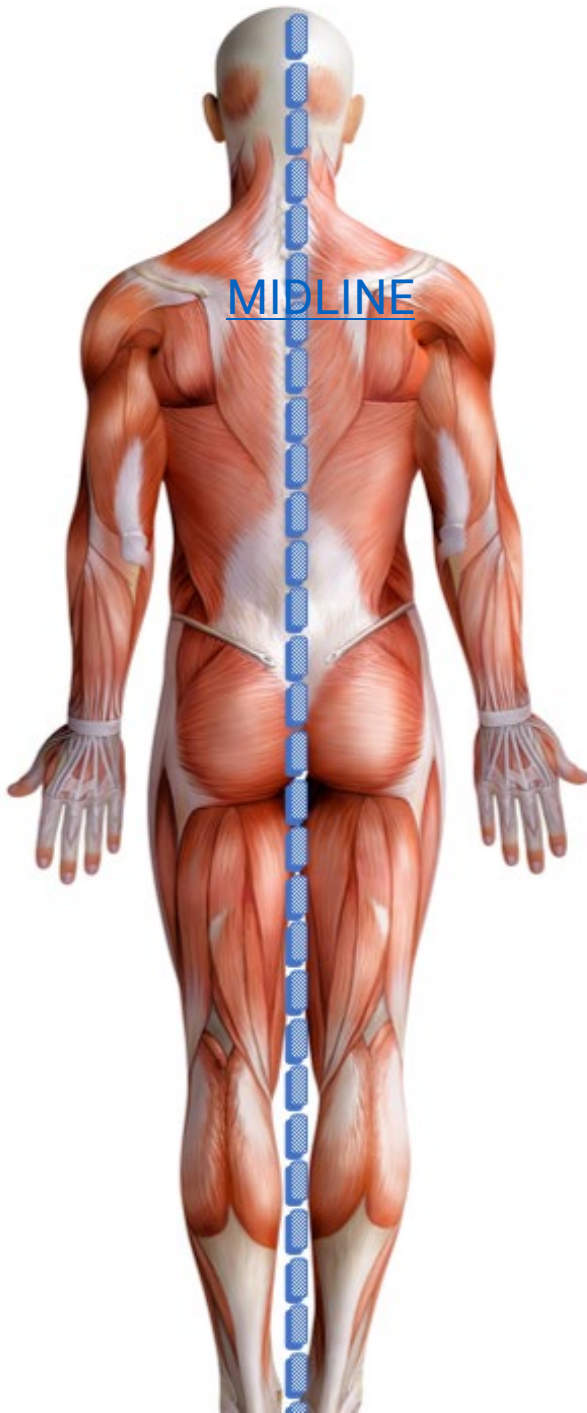
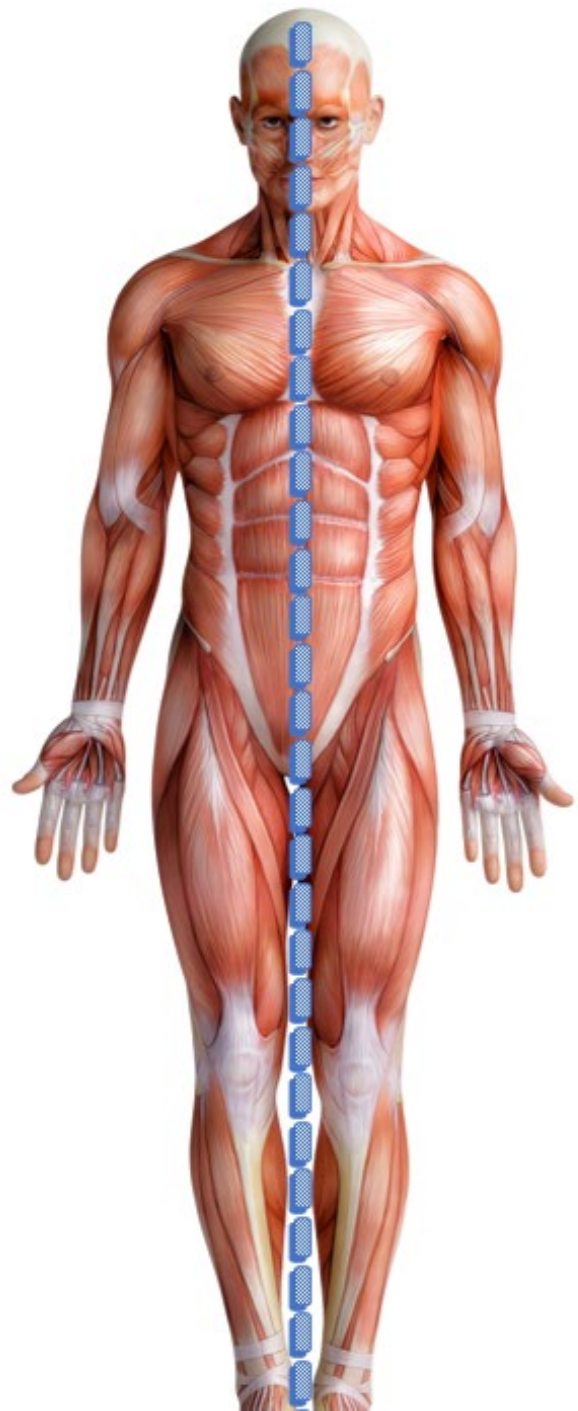
Superficial

Towards the Surface



DEEP – Far INSIDE / Far
BELOW THE SURFACE of
the body

SUPERFICIAL – Shallow /
NEAR the SURFACE of
the body



Midline – The imaginary line that runs down the center of the body

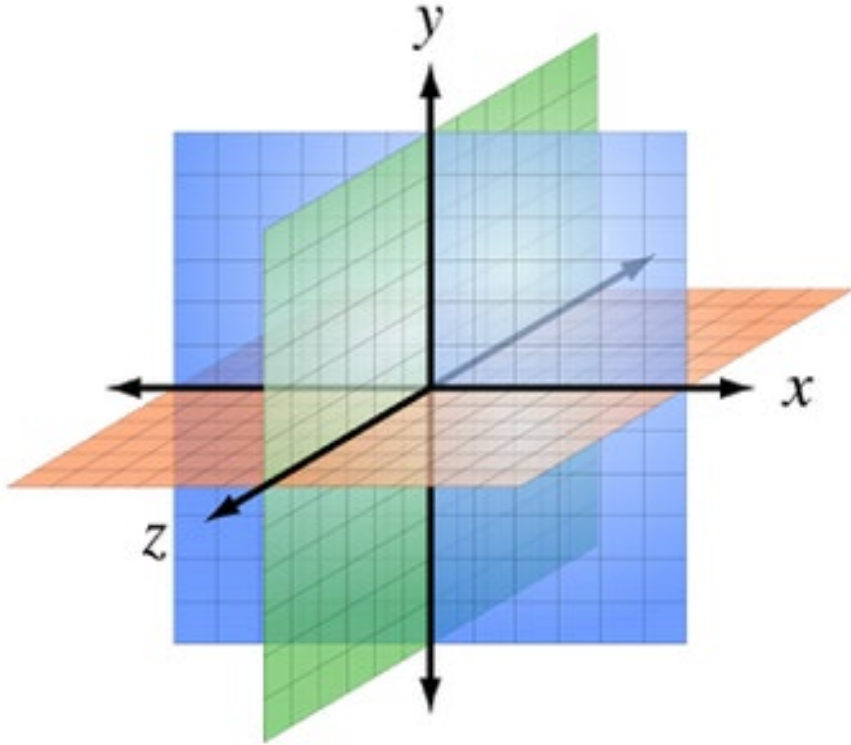
Anatomical Positions

www.ScientistCindy.com

Anatomic al Term	Description
Anterior	FRONT (or view from the front)
Posterior	BACK (or view from the back)
Midline	An imaginary line straight down the middle that divides the body into equal left and right halves
Lateral	AWAY FROM THE MIDLINE from midline (or view from the side)
Medial	CLOSER TO THE MIDLINE from midline (or view from the side)
Superior	ABOVE (or top view, looking down)
Inferior	BELOW (or top view, looking down)
Superficial	Close to the surface of the body
Deep	Away from the surface of the body
Proximal	CLOSER to the torso
Distal	FURTHER FROM to the torso

Anatomical Planes

Anatomical Planes

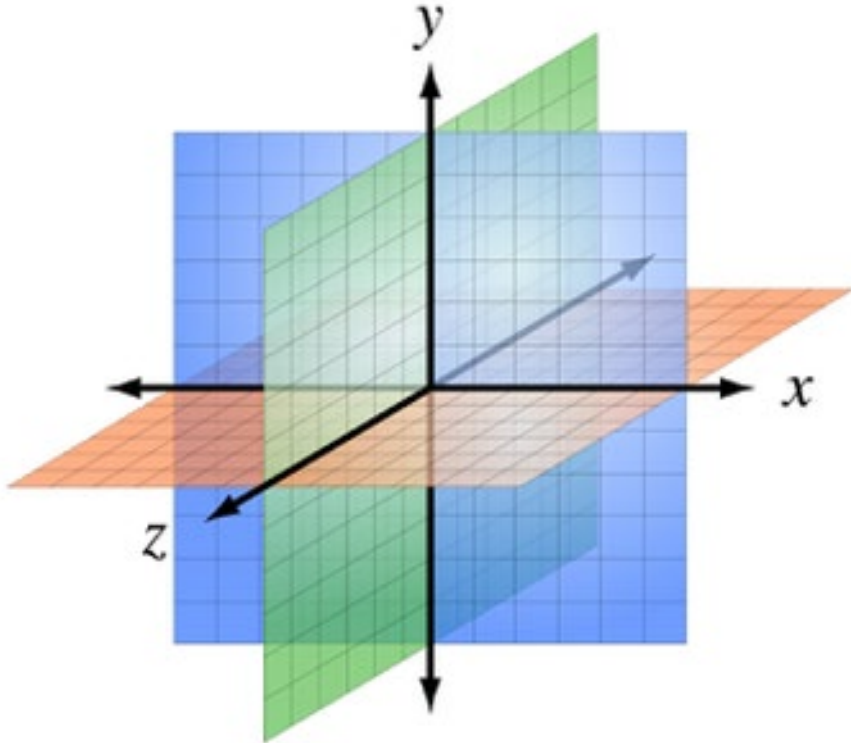


The X, Y, Z Cartesian Coordinate System

IMAGE: <https://i.stack.imgur.com/PNwDU.png>

- Since humans (*and all tangible matter humans know of*) are not flat, we need to add a 3rd dimension to our Cartesian Coordinate system. Adding the 'Y' dimension, gives us depth.
- This is important because we can superimpose the human form on this 3-dimensional grid and pinpoint with utmost accuracy any point inside the human body.

Anatomical Planes



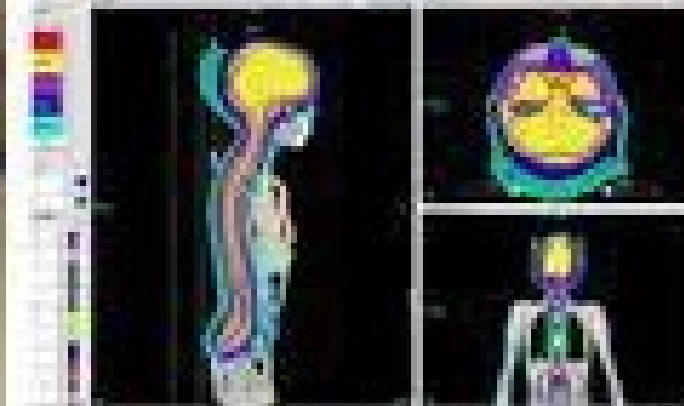
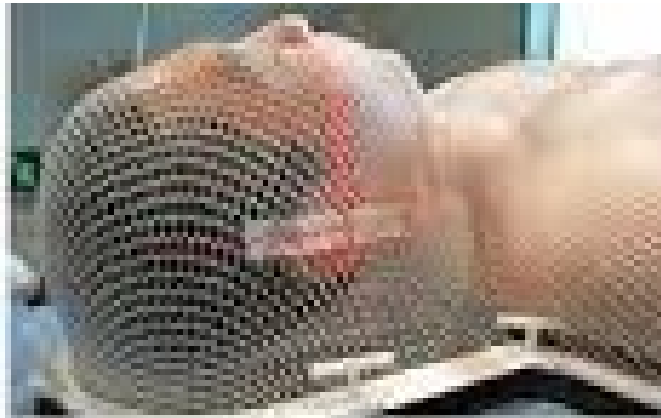
The X, Y, Z Cartesian Coordinate System

IMAGE: <https://i.stack.imgur.com/PNwDU.png>

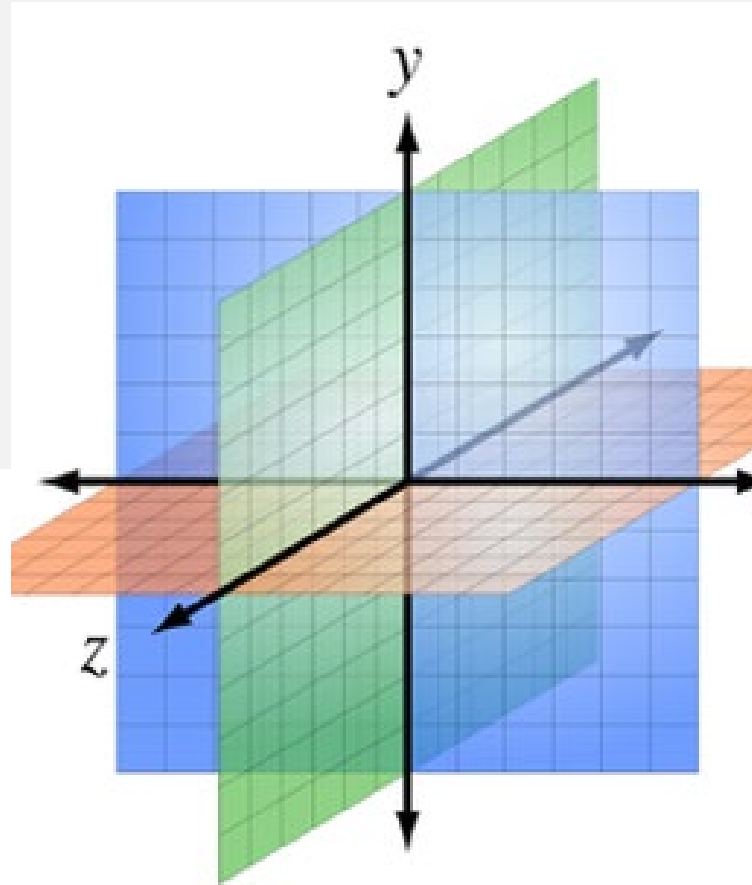
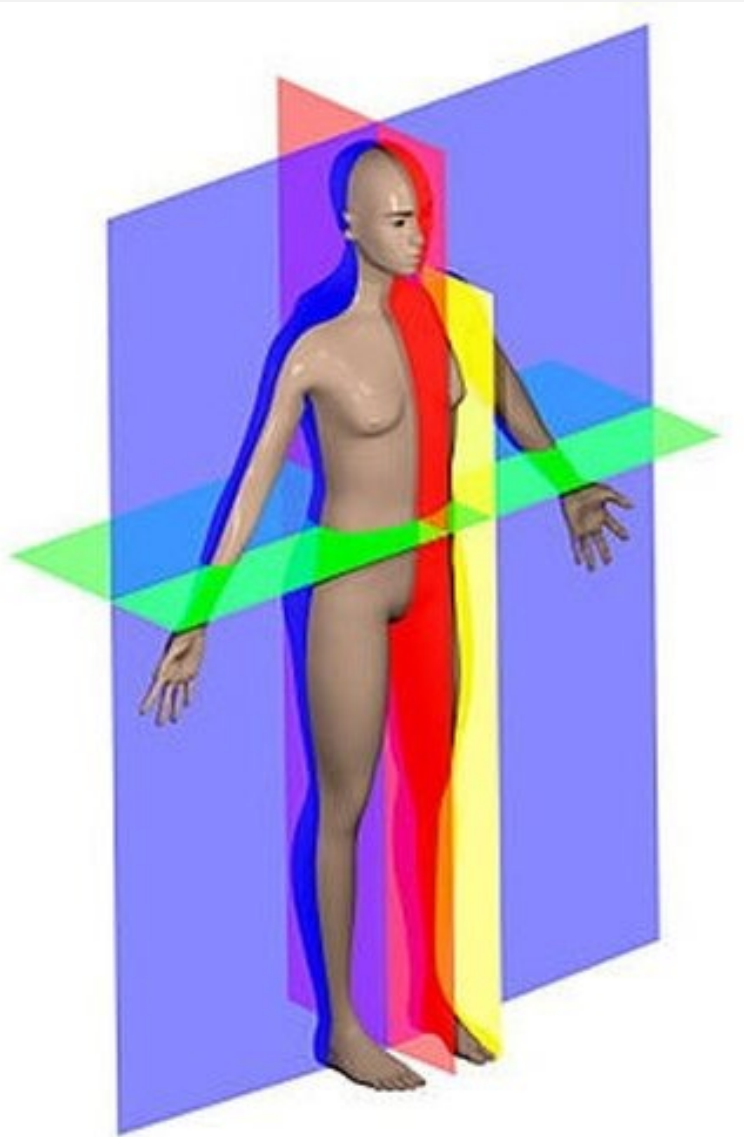
- https://youtu.be/Xk_sAi9mgxg

Sheldon Expresses his Favorite Spot as a Position on a 4-Dimensional Cartesian Coordinate System.
(The 4th Dimension, for those of you wondering, is the dimension of time.)

How are anatomical planes used?



- Being able to pinpoint any specific point in a person's body is necessary for such advances in cancer treatments such as tomotherapy.
- MRI and CT Scan images are used along with sophisticated computer software to accurately calculate the precise location in need of attention.
- Afterwards, a computer can guide and direct electron beams (or other radiation) to kill the affected tissue while preserving the healthy surround tissue.

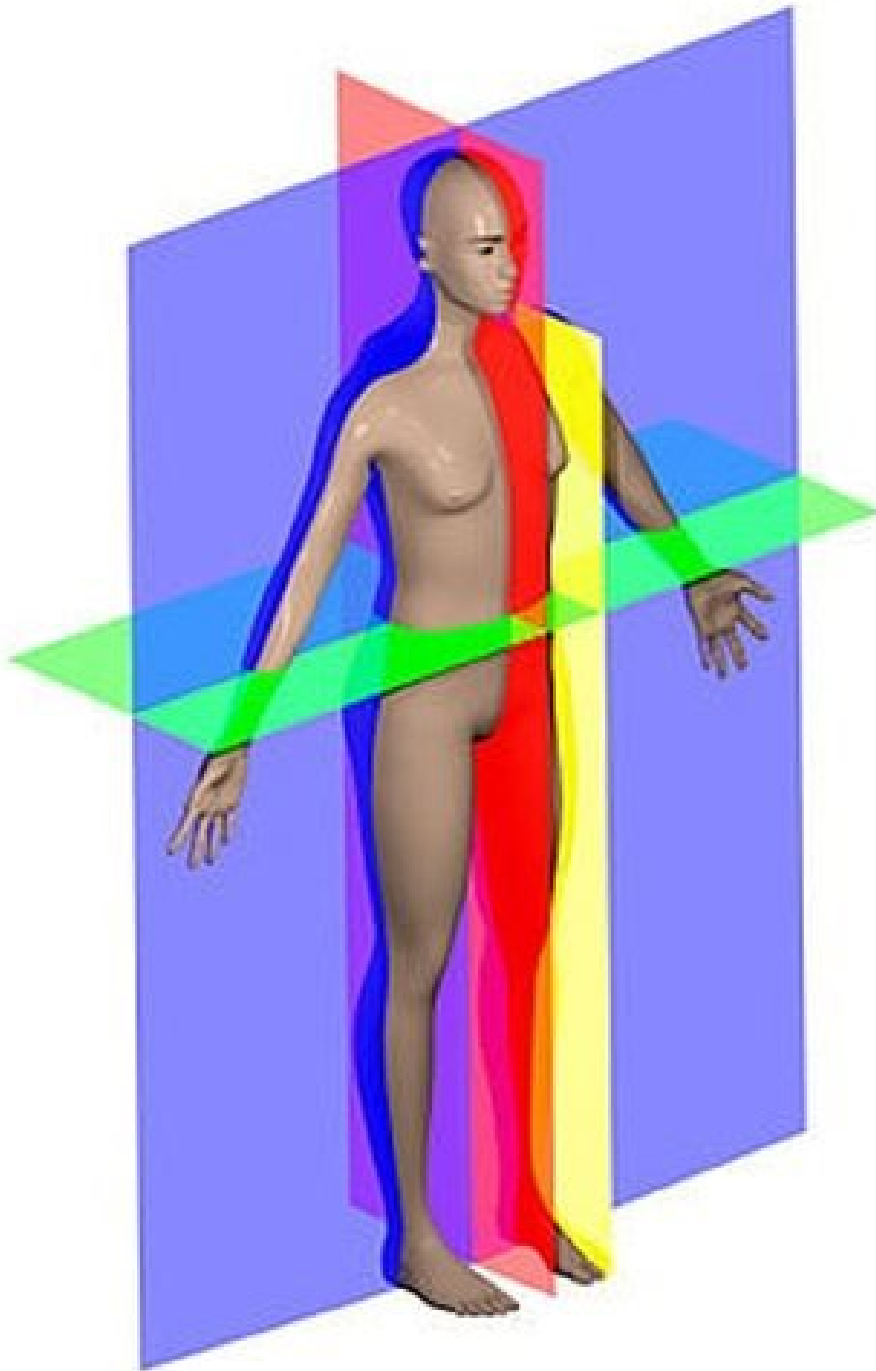


The X, Y, Z Cartesian Coordinate Sys

IMAGE: <https://i.stack.imgur.com/PNwDU.png>

Anatomical Planes

- If we orient our human on the grid, in the anatomical position, the body would be facing forward, the head and feet would be located along the 'Y' axis and the arms would be located along the 'X' axis.



Anatomical Planes

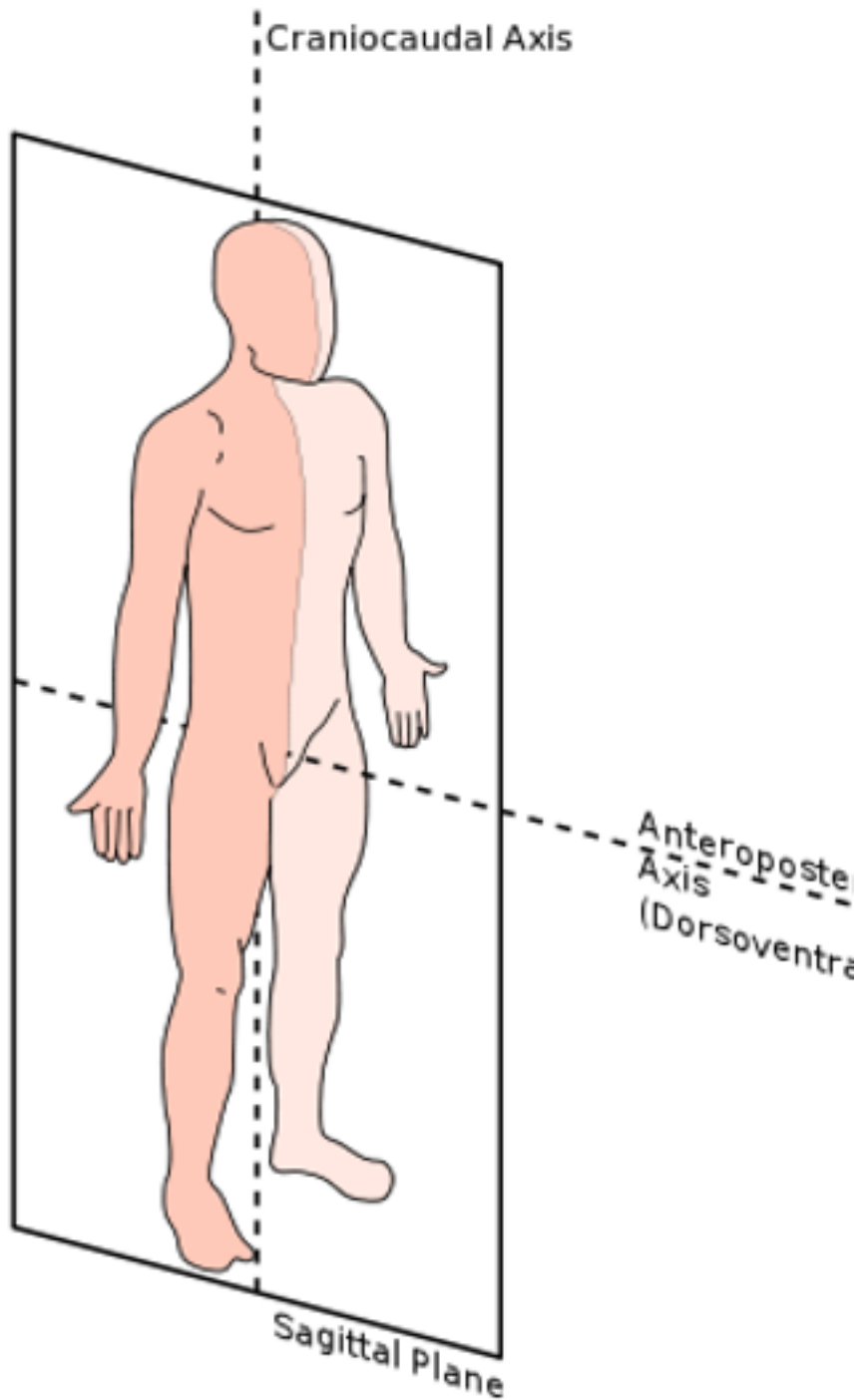
- The plane shown in BLUE/PURPLE is the coronal plane.

The plane shown in GREEN is the transverse plane (also called a cross section).

The plane shown in RED and the plane shown in YELLOW are both sagittal planes, but they can also be referred to as...

The plane shown in RED is the sagittal plane that is exactly at the midline and it can be more specifically referred to as the midsagittal plane.

The plane shown in YELLOW is called a parasagittal plane. When a sagittal plane is moved either right or left from the midline, it is considered a parasagittal plane.

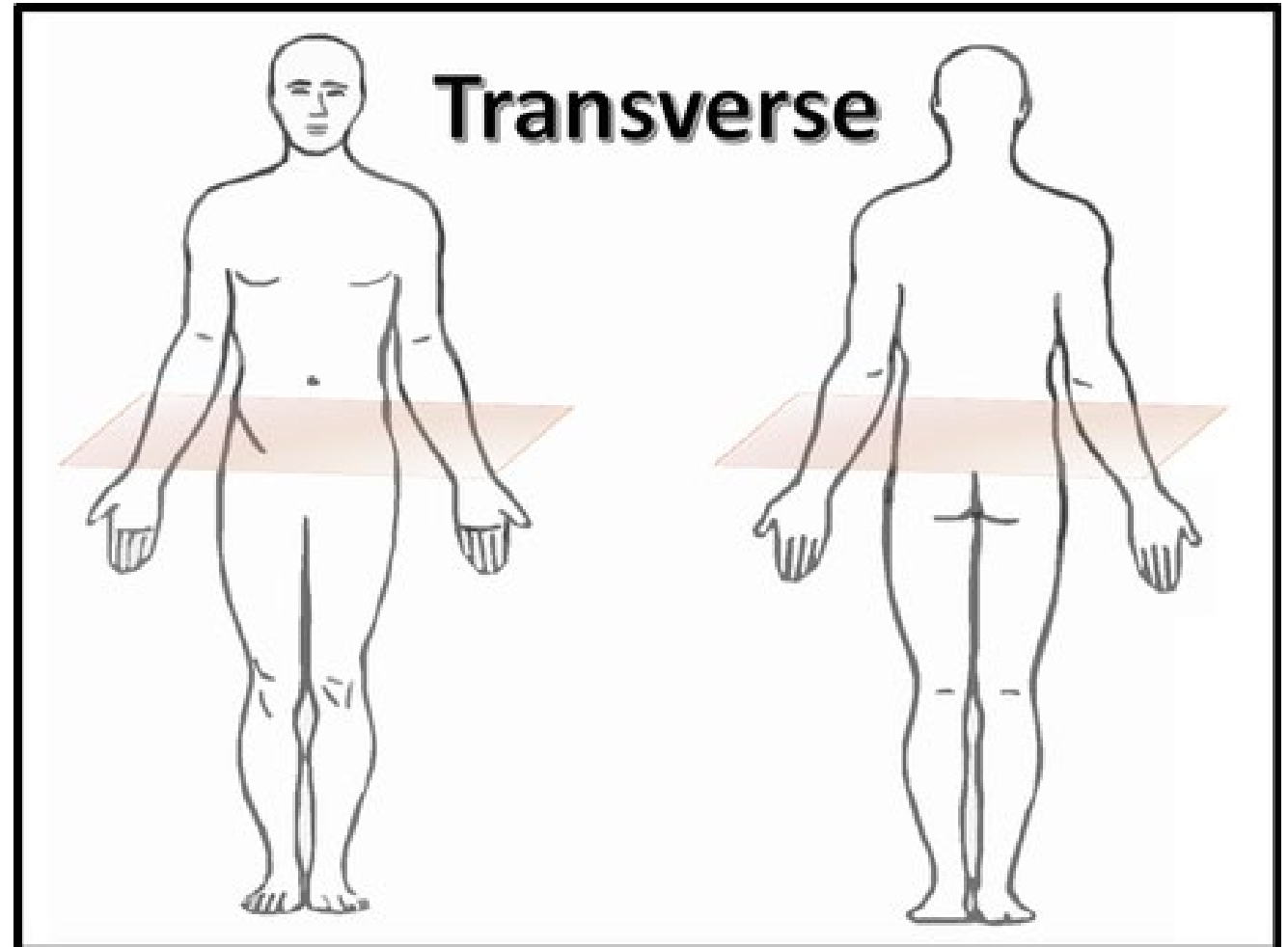


The Sagittal Plane

- The sagittal plane runs vertically through the body dividing the body into the left (sinister) and right (dexter) sides .

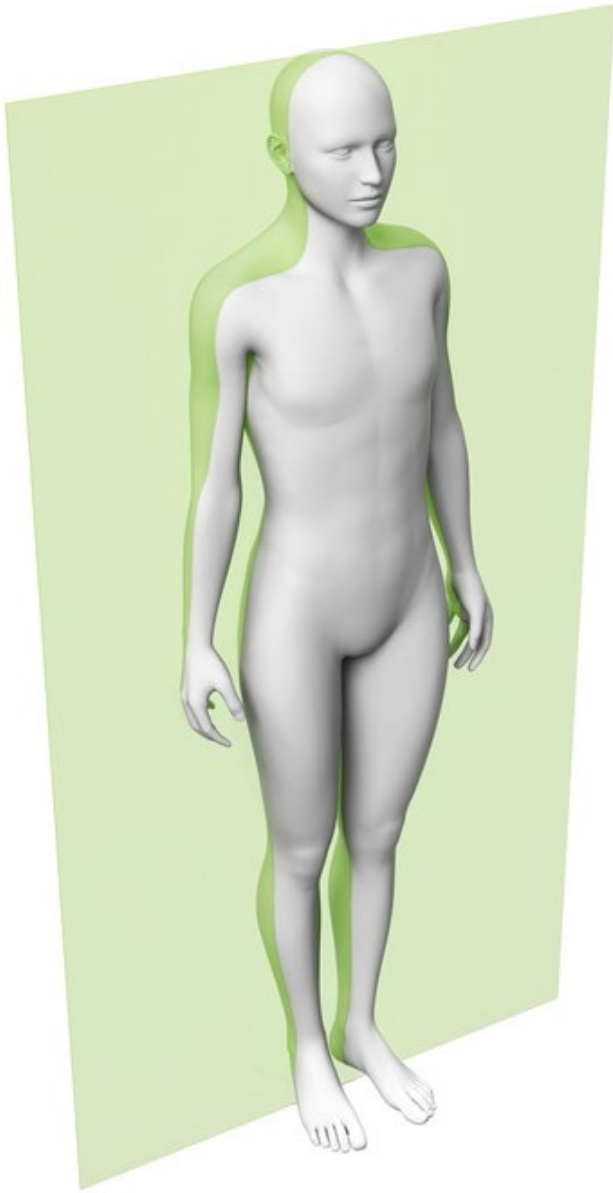
The Transverse Plane

- The transverse plane separates the body horizontally. A "transverse section" can also be called a "cross-section" of the body. This plane separates the superior (*or upper*) part of the body from the inferior (*or lower*) part of the body.



The coronal plane

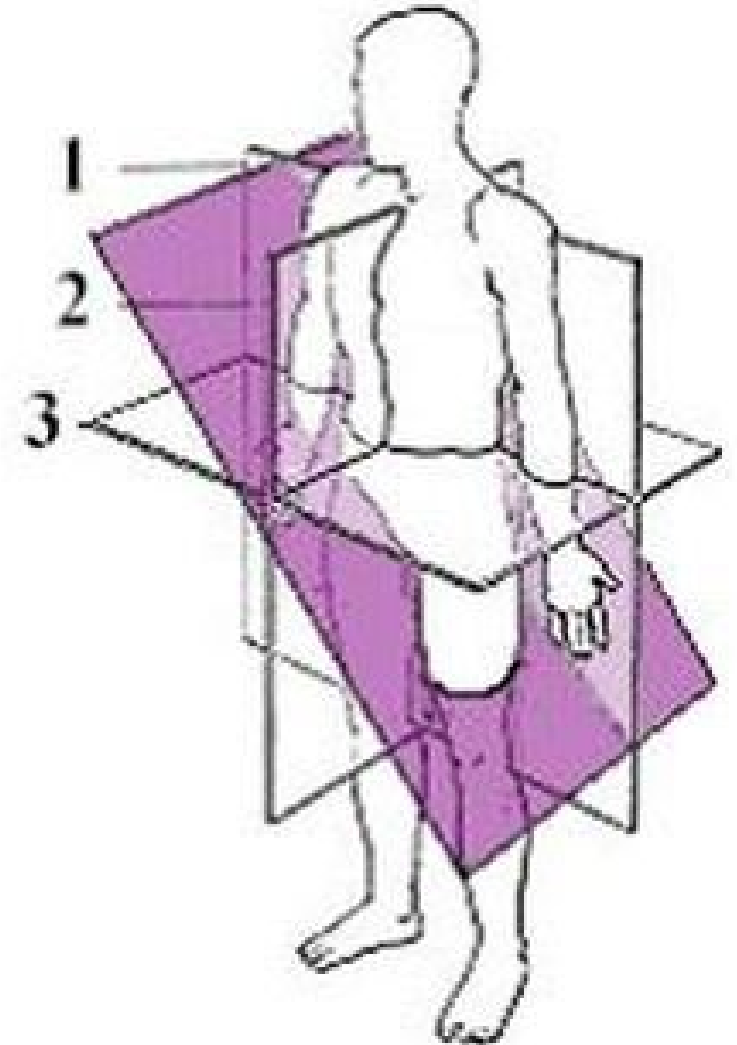
- The **coronal plane** (also known as the **frontal plane**) divides the body into front (ventral or anterior) portion of the body) and *back (posterior or dorsal)* portion of the body.



Oblique sections

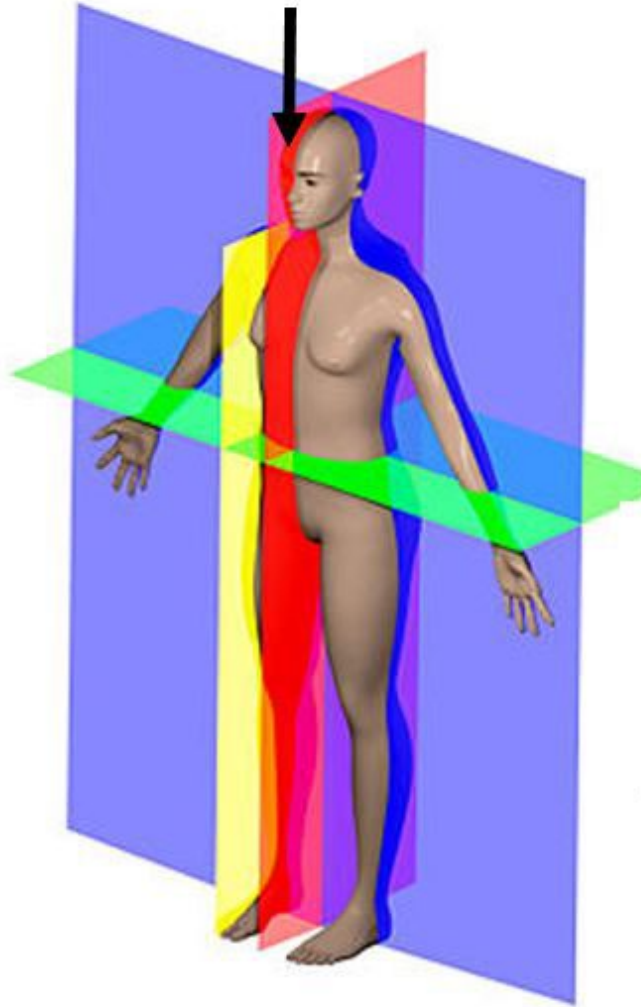
- Oblique sections are not very useful in most situations in medicine.
- It is rare to see this type of section done in histology or when using imaging techniques. However, this term can be used to characterize the angle of a wound.

An Oblique Section would be Diagonal

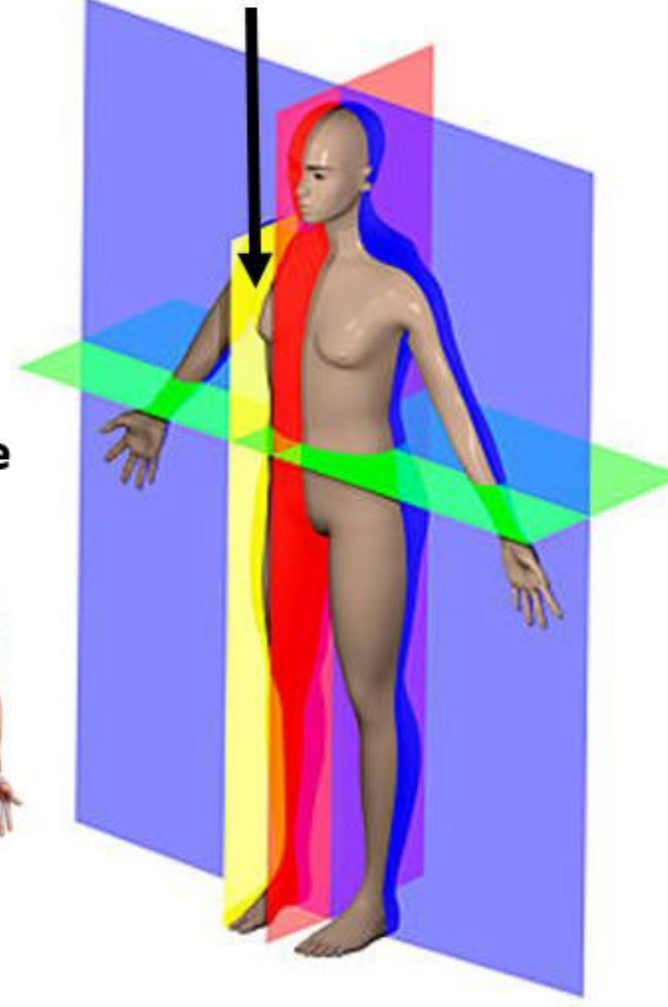


Special Types of Sagittal Planes

Midsagittal Plane
Shown in RED

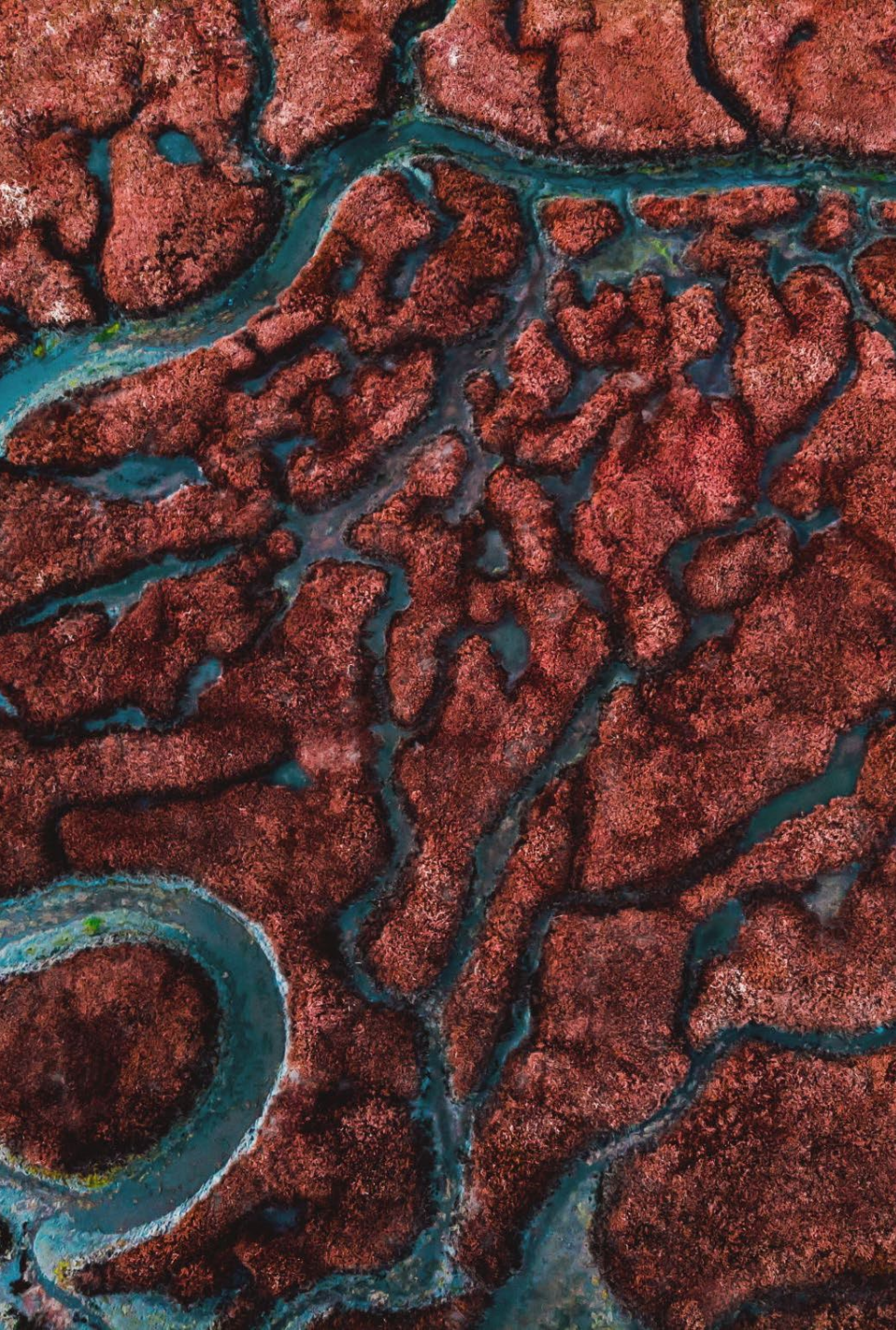


Parasagittal Plane
Shown in YELLOW



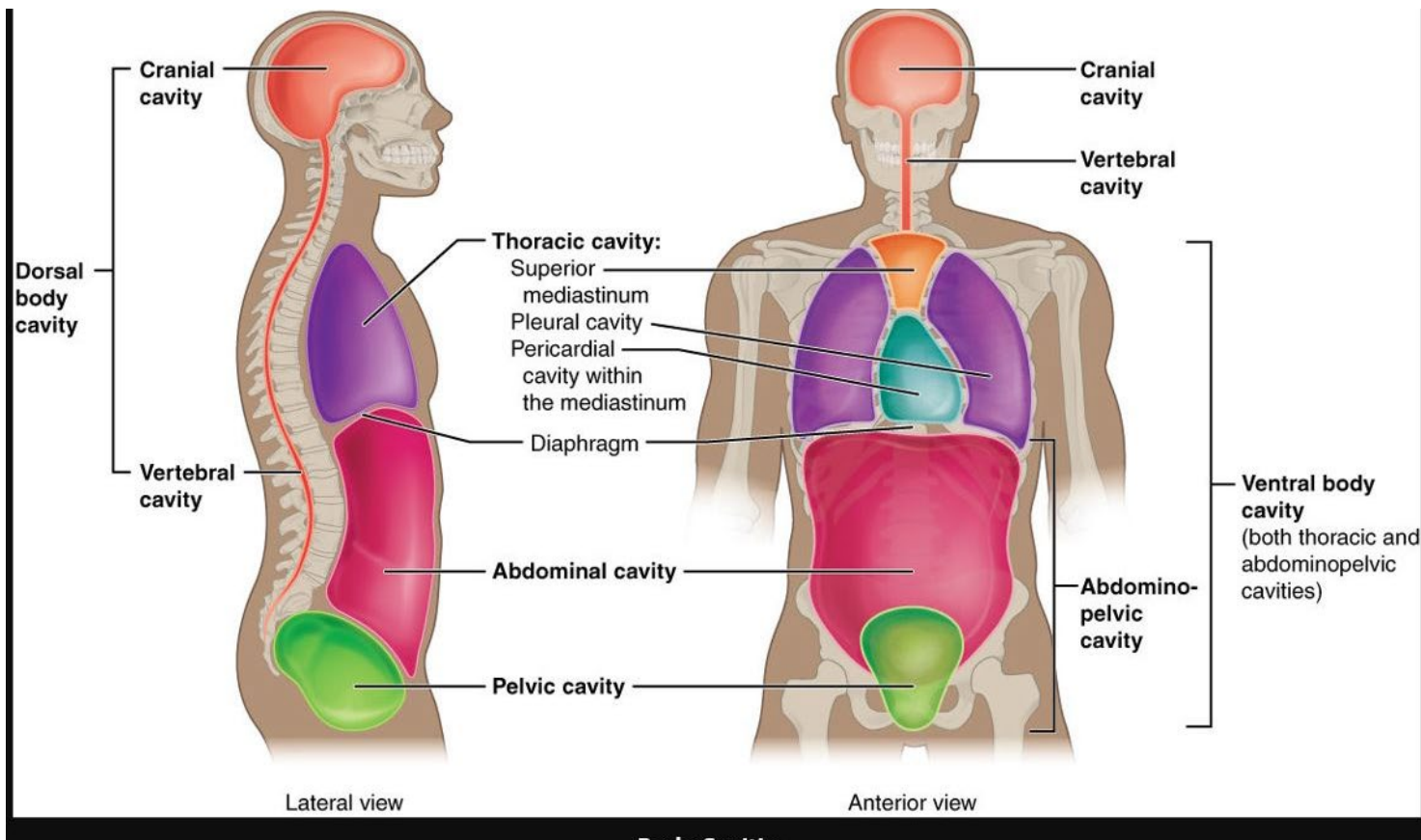
Midline





Body Cavities and Membranes

- ***What Do We Mean By "Body Cavity"?***
- Before we begin our discussion of body cavities and membranes, it is important to know what a cavity is in the first place!
- In anatomy you learn that the human body is, in a sense, a glorified tube. (*I can almost hear you GASP!*) OK, a tube is an over simplification, but the premise holds true.
 - The inside and the outside of your *tube* is covered with epithelial tissue.
 - This *tube* has some specialized regions that are made up of concave regions (also lined with epithelium) that are connected to the outside.
 - You also have fluid-filled chambers inside of your body that is NOT connected to the outside.
 - All of these regions are considered **CAVITIES**.

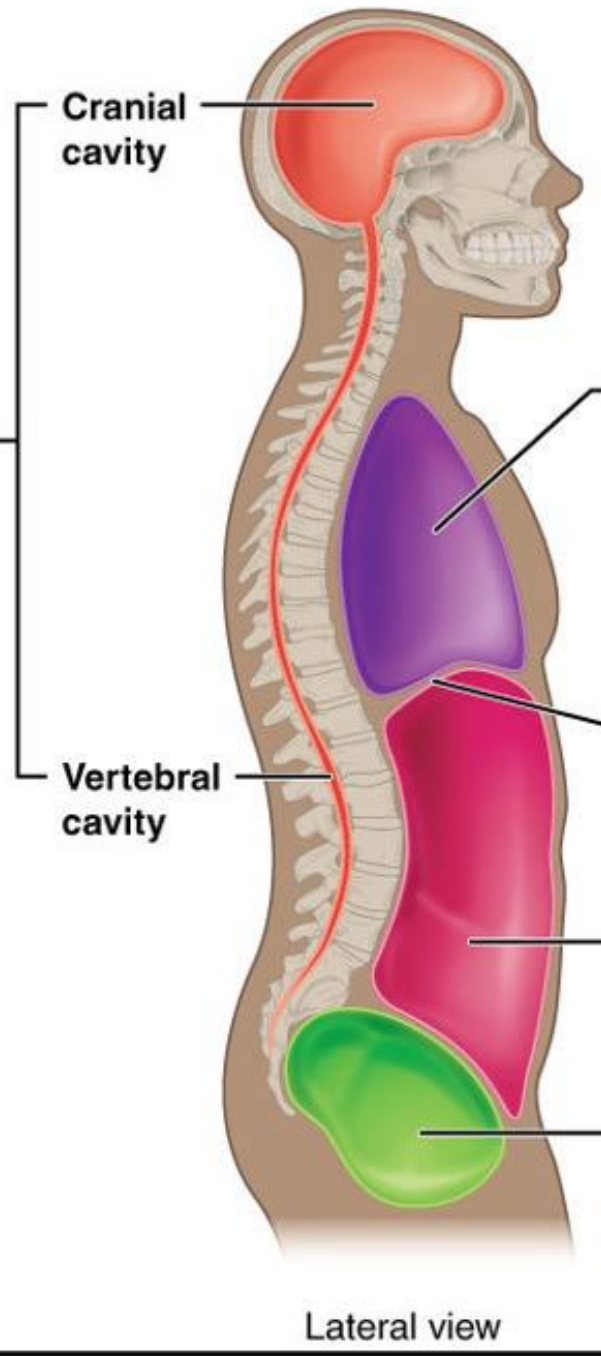


- The definition of a body cavity - a body cavity is considered to be any fluid-filled space in the body, other than vessels (blood and lymph).
- **The human body has 2 main body cavities.**
 - **the dorsal (or posterior) cavity**
 - **The ventral (or anterior) cavity**

Body Cavities

The Dorsal Cavity

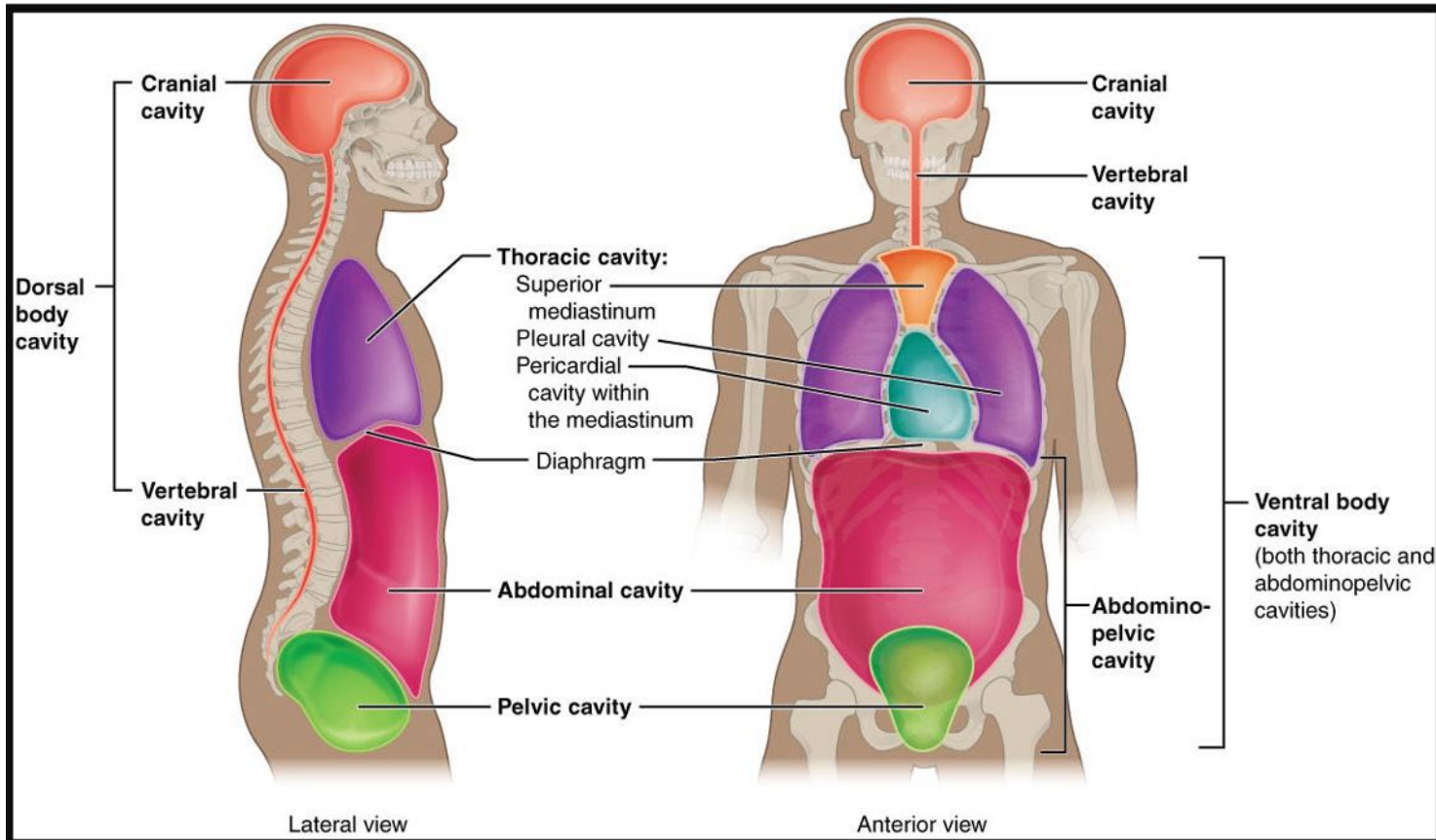
Dorsal
body
cavity



- 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 (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.

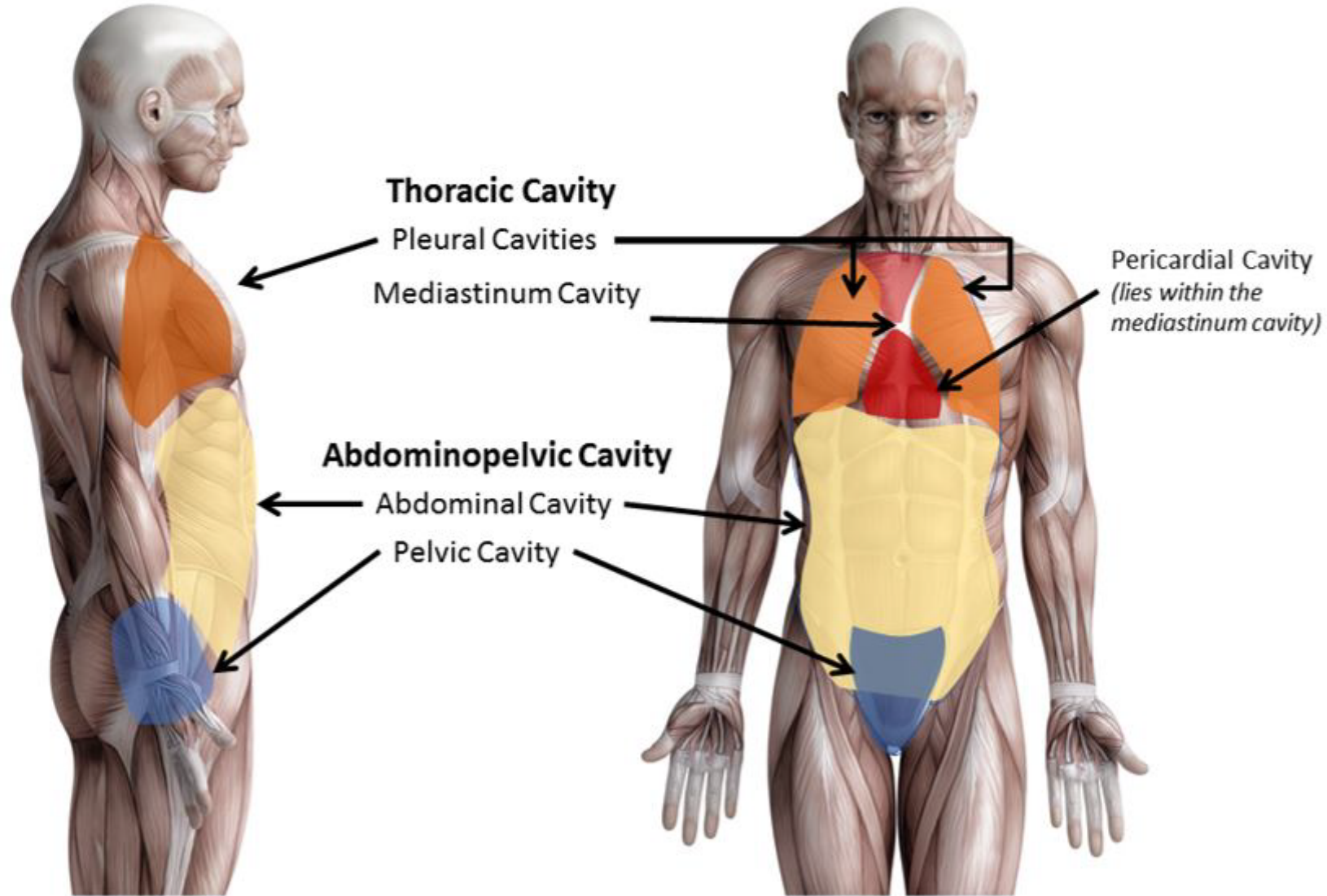
The **ventral cavity** of the human body is divided into two main regions; the **thoracic cavity**, and the **abdominopelvic cavity**, each of which have additional subdivisions.

The thoracic cavity and the abdominal cavity are separated by the **diaphragm**.

The Ventral Cavity

The Ventral (Anterior) Body Cavity

- The ventral cavity has 2 main divisions; the **thoracic cavity** and the **abdominopelvic cavity**, which are physically separated by the **diaphragm**.
- **Thoracic Cavity** - is divided into the **pleural cavities** that hold the lungs and **mediastinum** which is the cavity that lies in between the pleural cavities. There is another chamber that lies within the mediastinum chamber that houses the heart, called the **pericardial chamber**.
- The **Abdominopelvic Cavity** is divided into the **abdominal cavity** and the **pelvic cavity**.



Subdivisions of the Thoracic Cavity

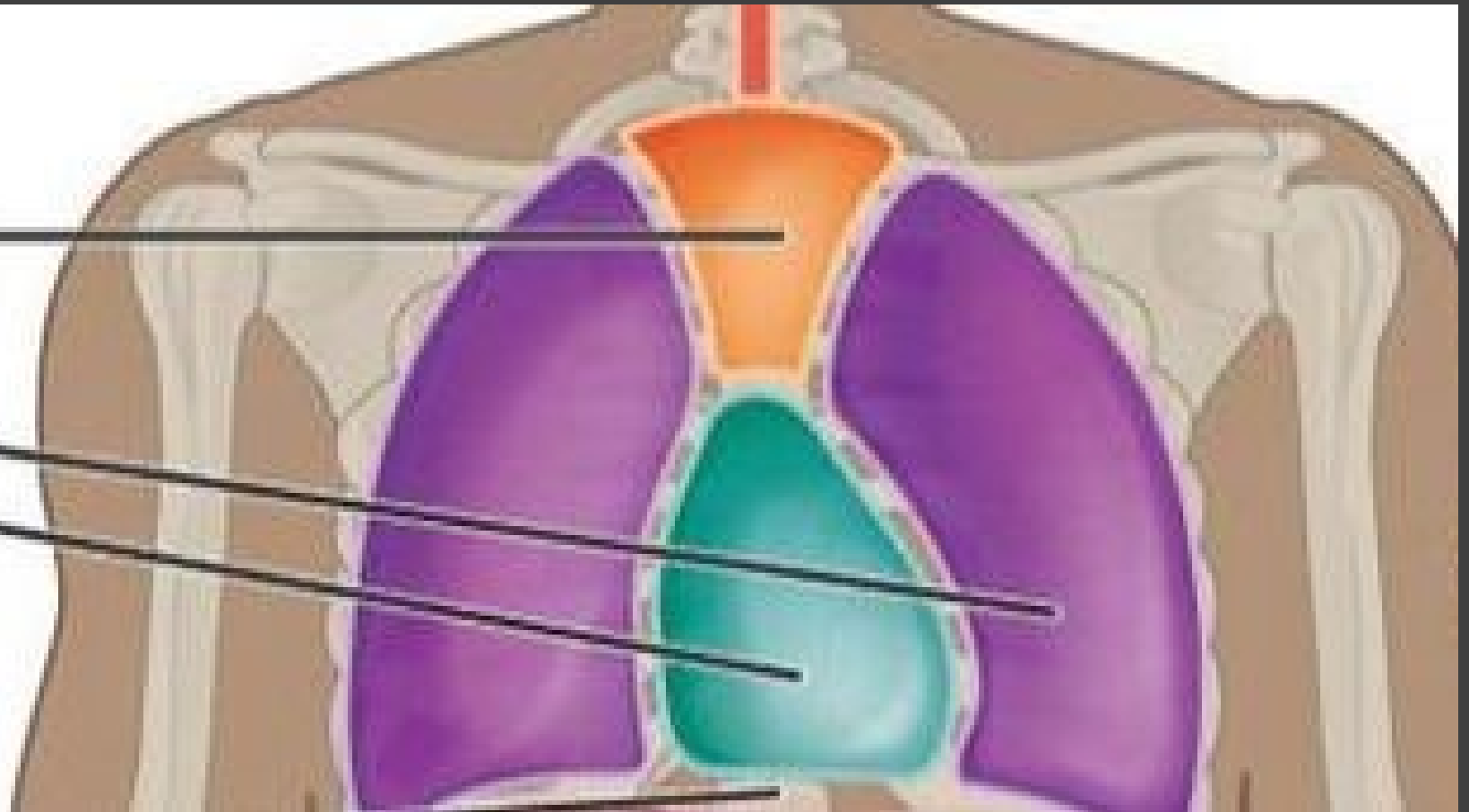
- *The thoracic cavity is separated into three chambers; the left and right **pleural cavities** and the **mediastinum**.*

Thoracic cavity:

Superior —————
mediastinum

Pleural cavity —————

Pericardial —————
cavity within
the mediastinum



Subdivisions of the Thoracic Cavity

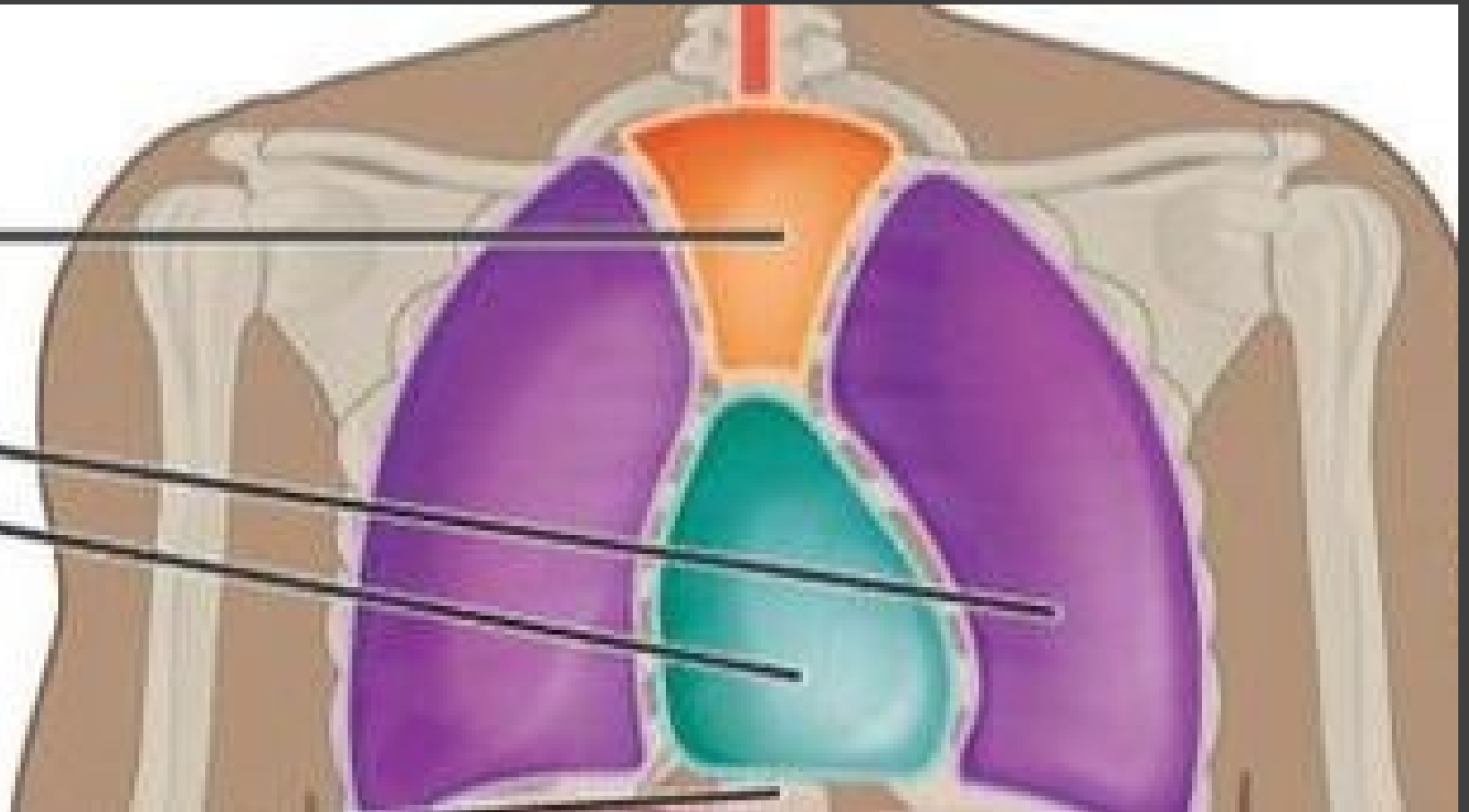
- The **thoracic cavity** is the cavity of the chest area. This cavity lies underneath the rib cage and houses many important organs and structures of cardiovascular, respiratory and lymphatic systems.
- The two arguably most notable organs of the thoracic cavity are the **heart** and the **lungs**.

Thoracic cavity:

Superior ———
mediastinum

Pleural cavity

Pericardial
cavity within
the mediastinum

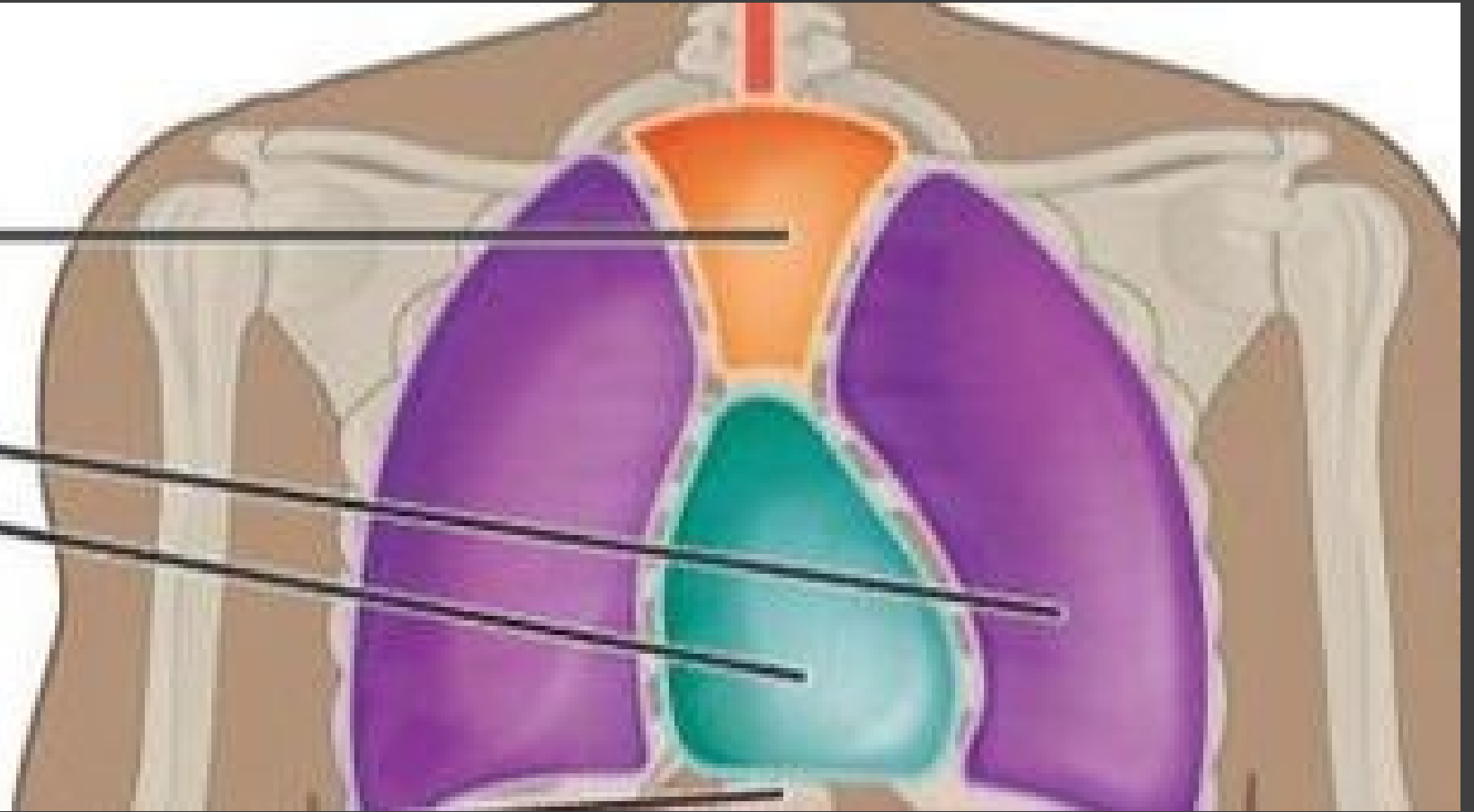


Thoracic cavity:

Superior
mediastinum

Pleural cavity

Pericardial
cavity within
the mediastinum



Subdivisions of the Thoracic Cavity

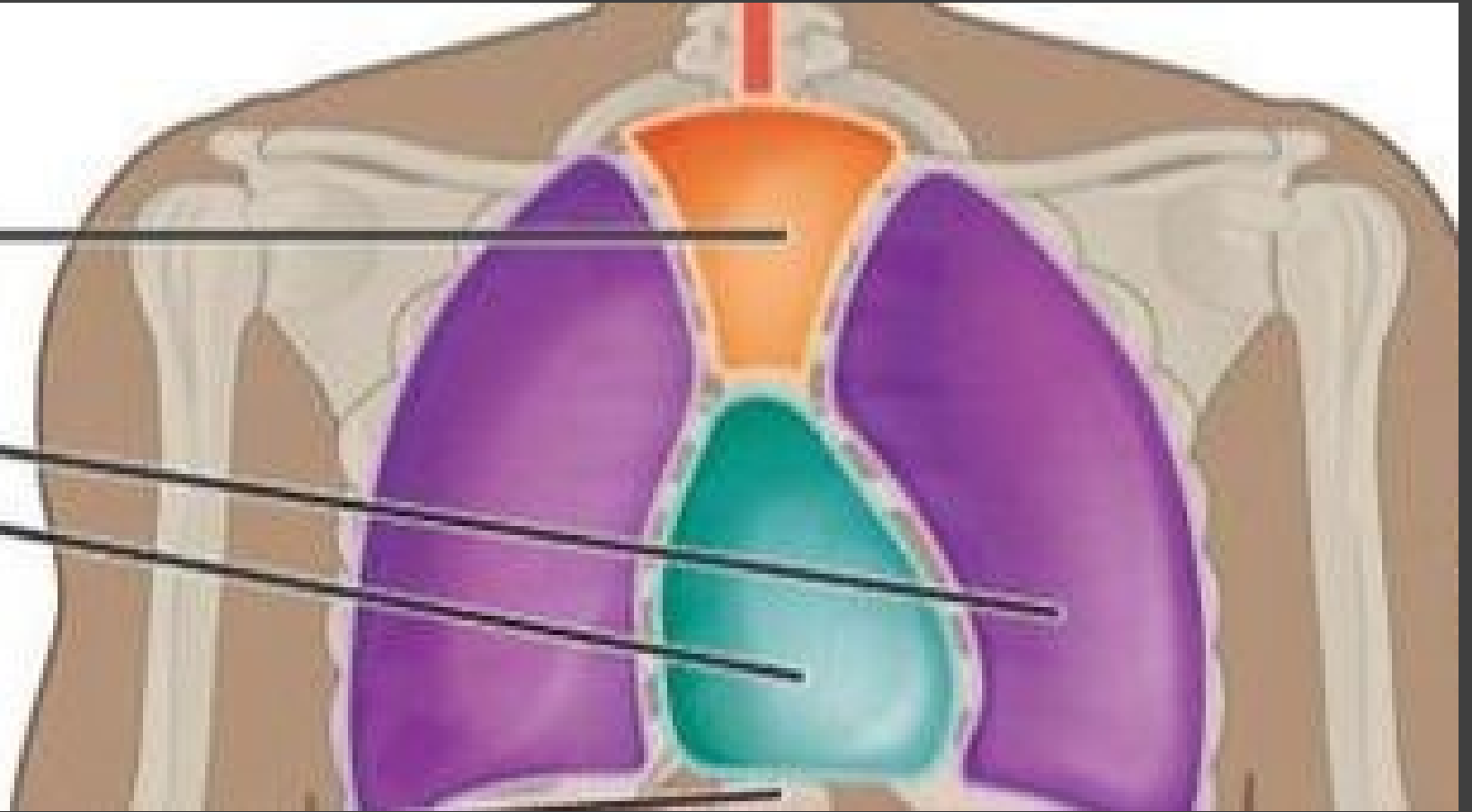
- **The Pleural Cavity**
The left lung is in the left portion of the pleural cavity and the right lung is in the right portion of the pleural cavity.

Thoracic cavity:

Superior ———
mediastinum

Pleural cavity ———

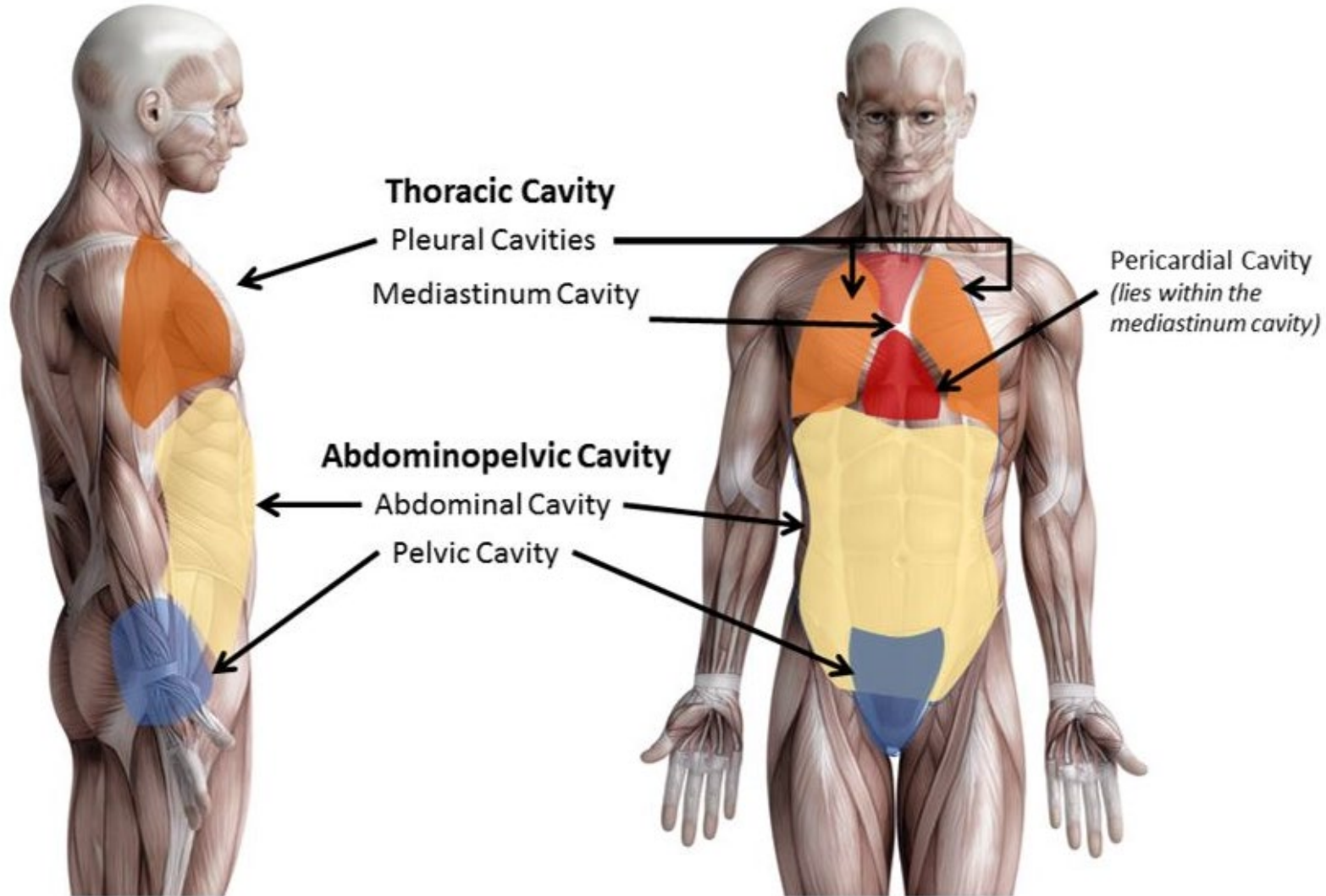
Pericardial ———
cavity within
the mediastinum



Subdivisions of the Thoracic Cavity

- **The Mediastinum Cavity** is space between the 2 pleural cavities.
- It holds the **pericardial cavity** which contains the heart.

Subdivisions of the Abdominopelvic Cavity



The Abdominopelvic Cavity
The abdominopelvic cavity is divided into 2 areas; the **abdominal cavity** and the **pelvic cavity**.

The Abdominal Cavity
The abdominal cavity contains digestive organs., including the stomach, the liver, the kidneys, the small intestines, etc.

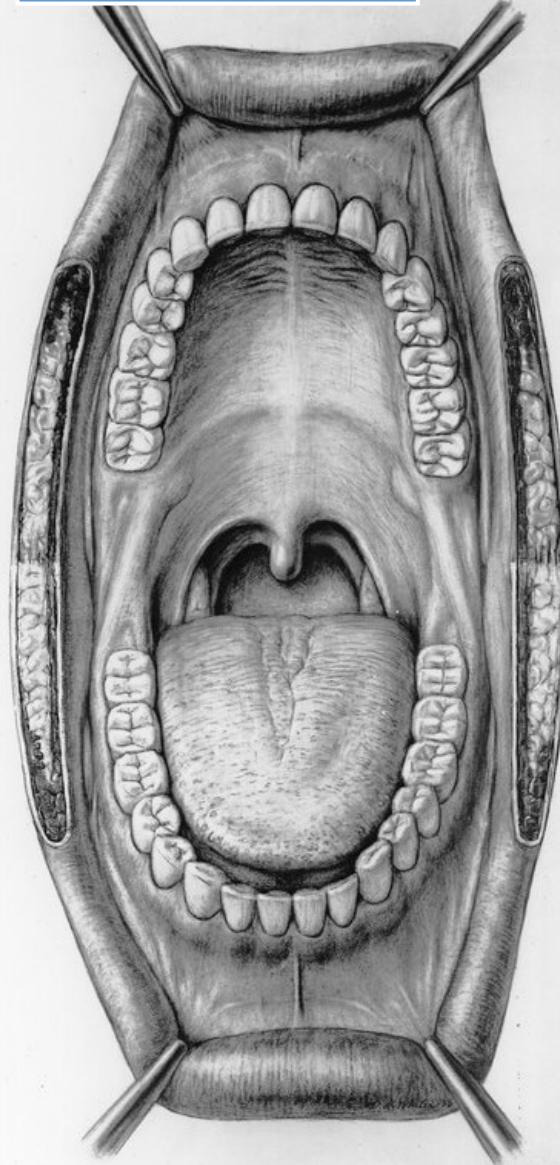
The Pelvic Cavity
The pelvic cavity contains the internal reproductive organs, the urinary bladder and the rectum.



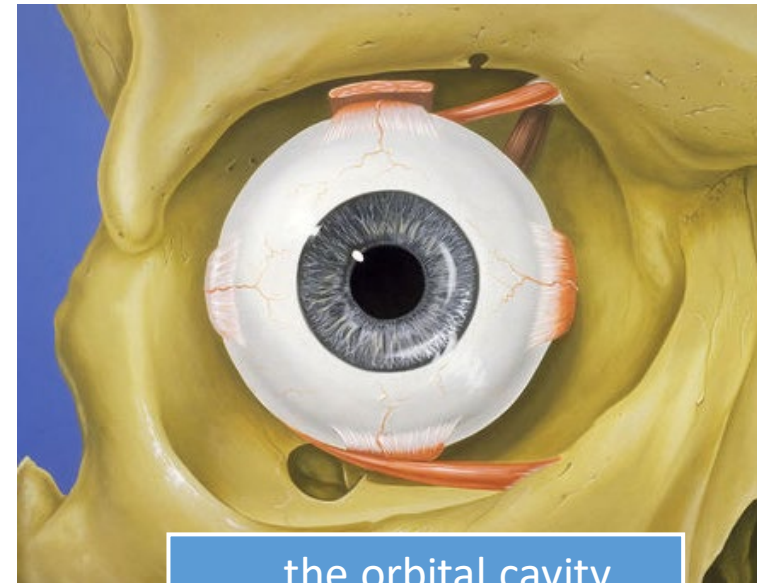
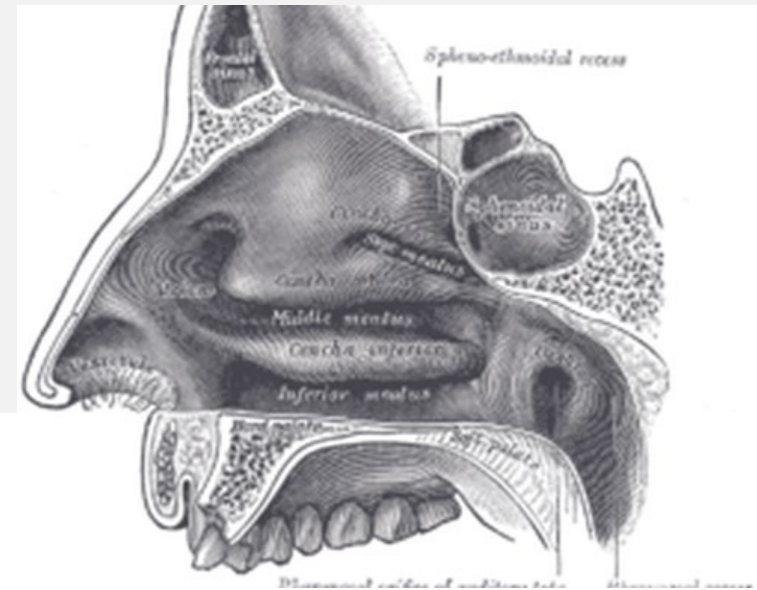
Other Body Cavities

- There are other body cavities in addition to the dorsal and ventral cavities. These other cavities, however, are accessible from the outside of the body.
- This includes the
 - oral cavity – the cavity of the mouth
 - the nasal cavity – the cavity of the nose
 - the orbital cavity – the cavity of the eye

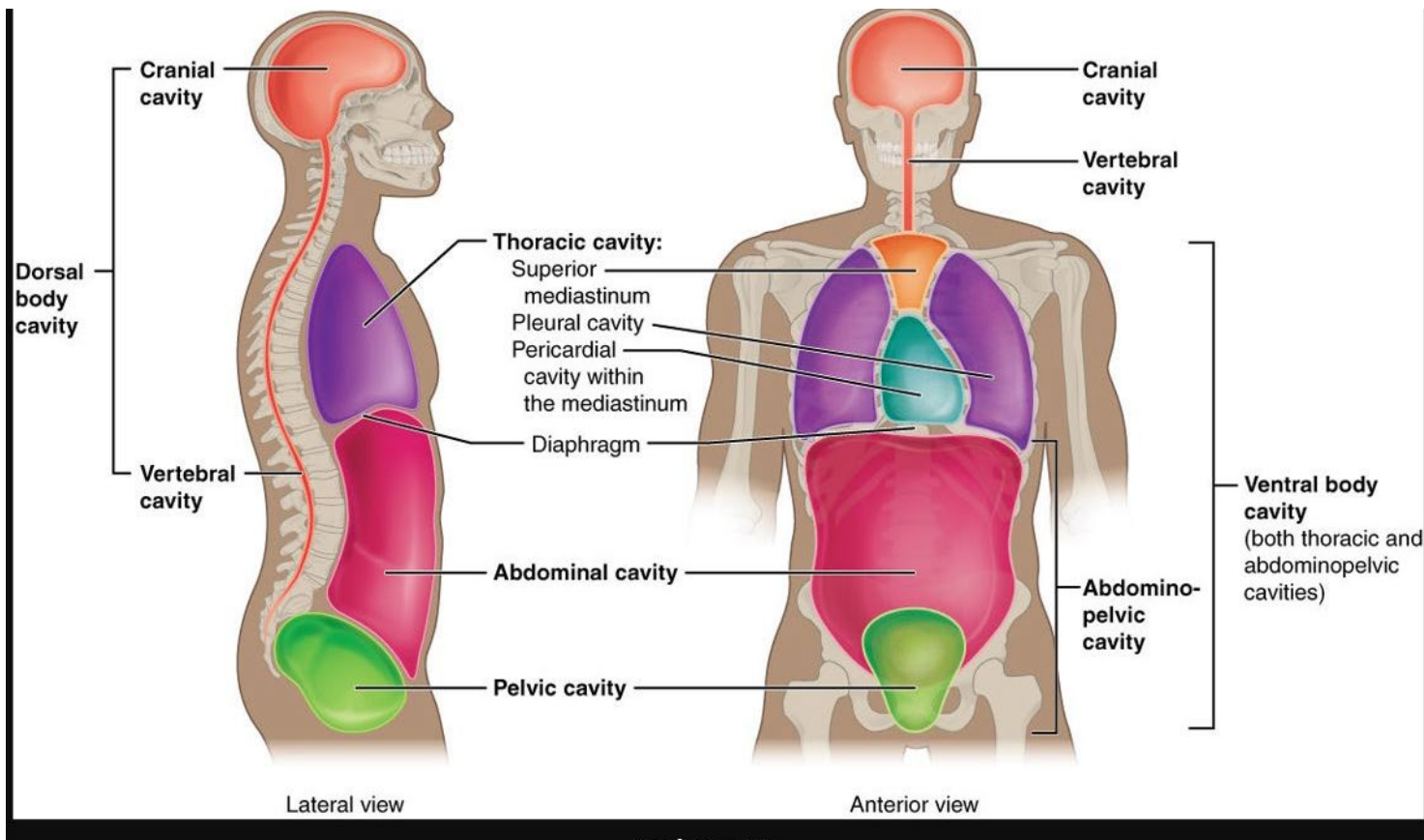
oral cavity



the nasal cavity



the orbital cavity



- The Dorsal (or Posterior) Cavity
 - The Cranial Cavity
 - The Vertebral (or Spinal) Cavity
- The Ventral (or Anterior) Cavity
 - The Thoracic Cavity
 - The Abdominopelvic Cavity

Body Cavities

Anatomical Regions of the Human Body

Head and Neck Anatomical Regions

Cephalic Region
(Head Area)

Cephalic Region
(Head Area)

Occipital Region
(Back of Head Area)

Frontal Region
(Forehead Area)

Otic Region
(Ear Area)

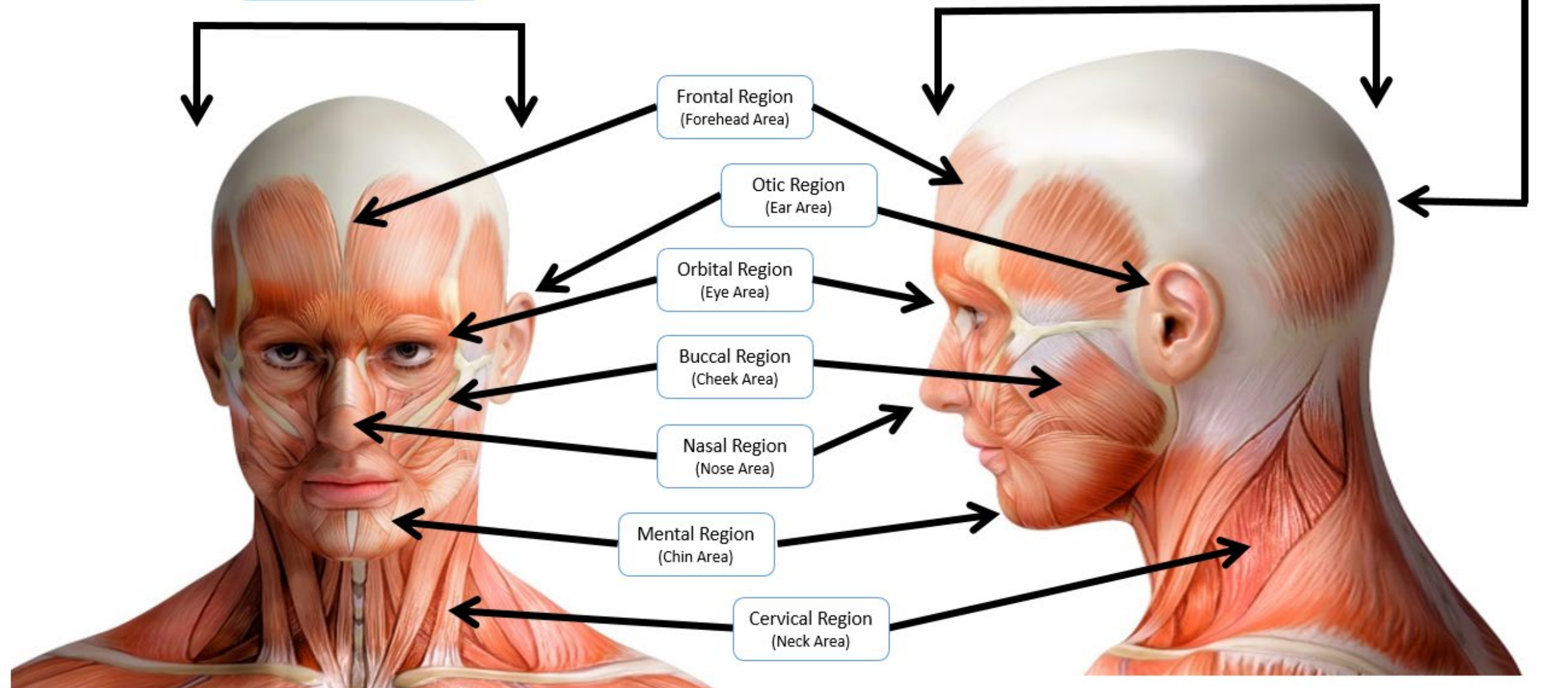
Orbital Region
(Eye Area)

Buccal Region
(Cheek Area)

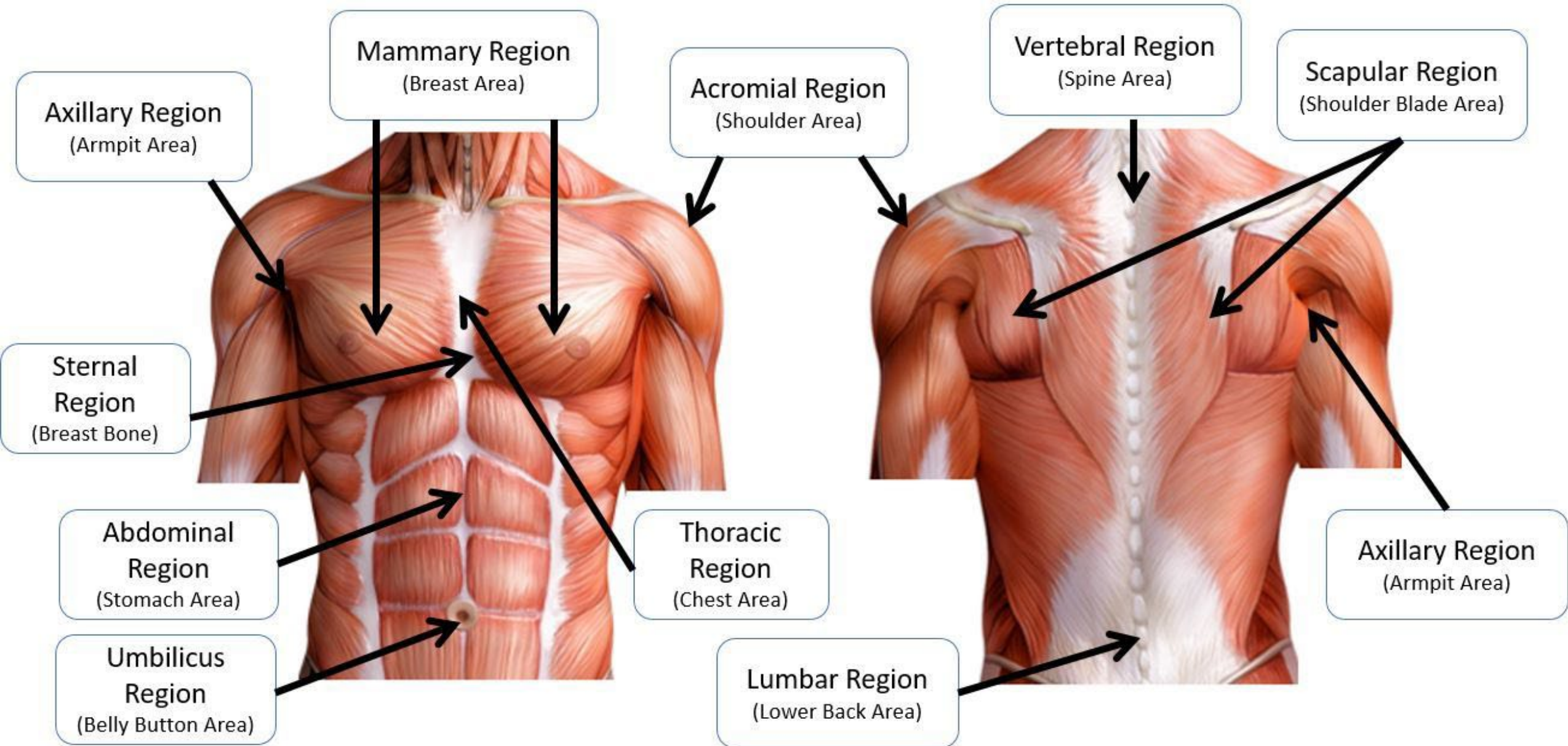
Nasal Region
(Nose Area)

Mental Region
(Chin Area)

Cervical Region
(Neck Area)



Thorax Anatomical Regions

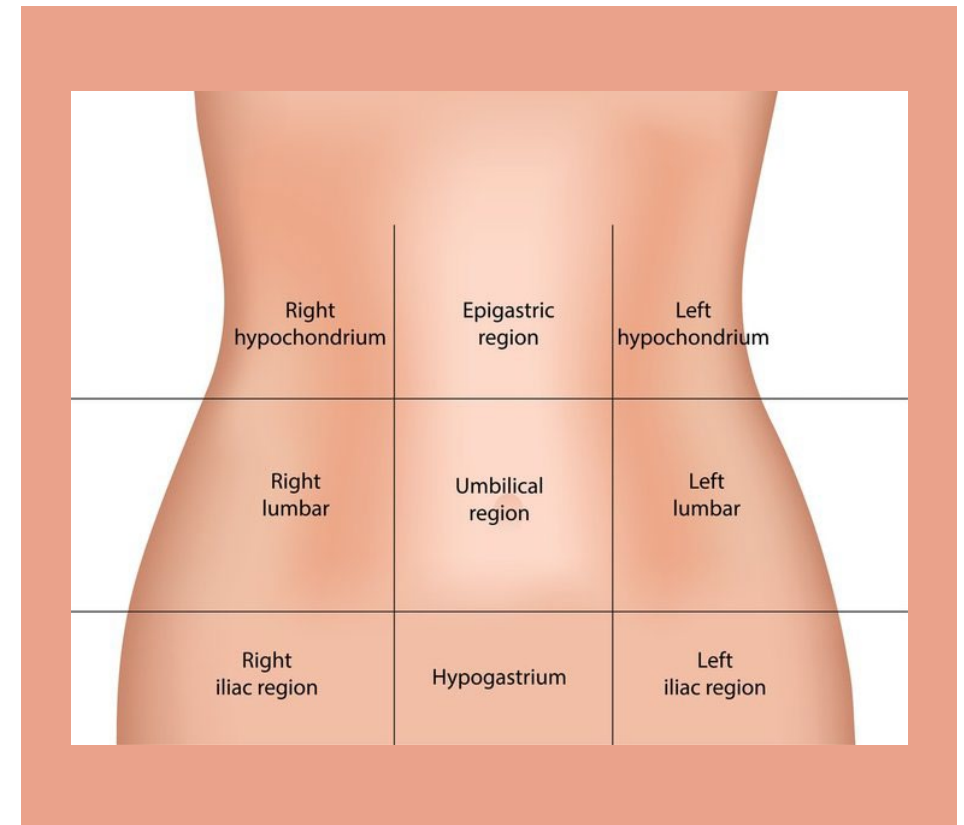


In anatomy, the regions of the abdominal area are broken up into 9 regions.

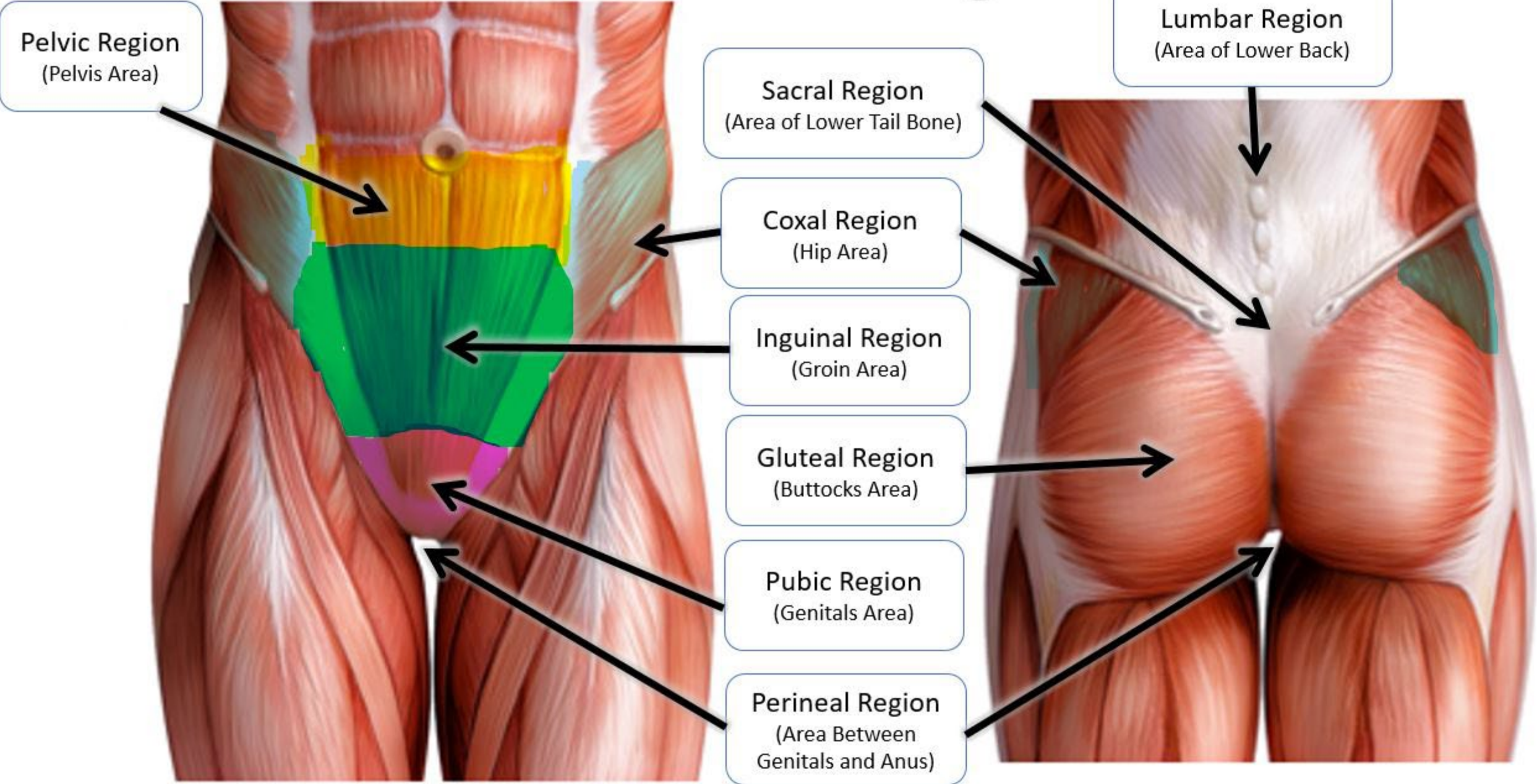
- **The Right and Left Hypochondriac (Hypochondrium) (Hypochondrial) Regions**

Knowing the language is the best way to remember anatomical terminology.

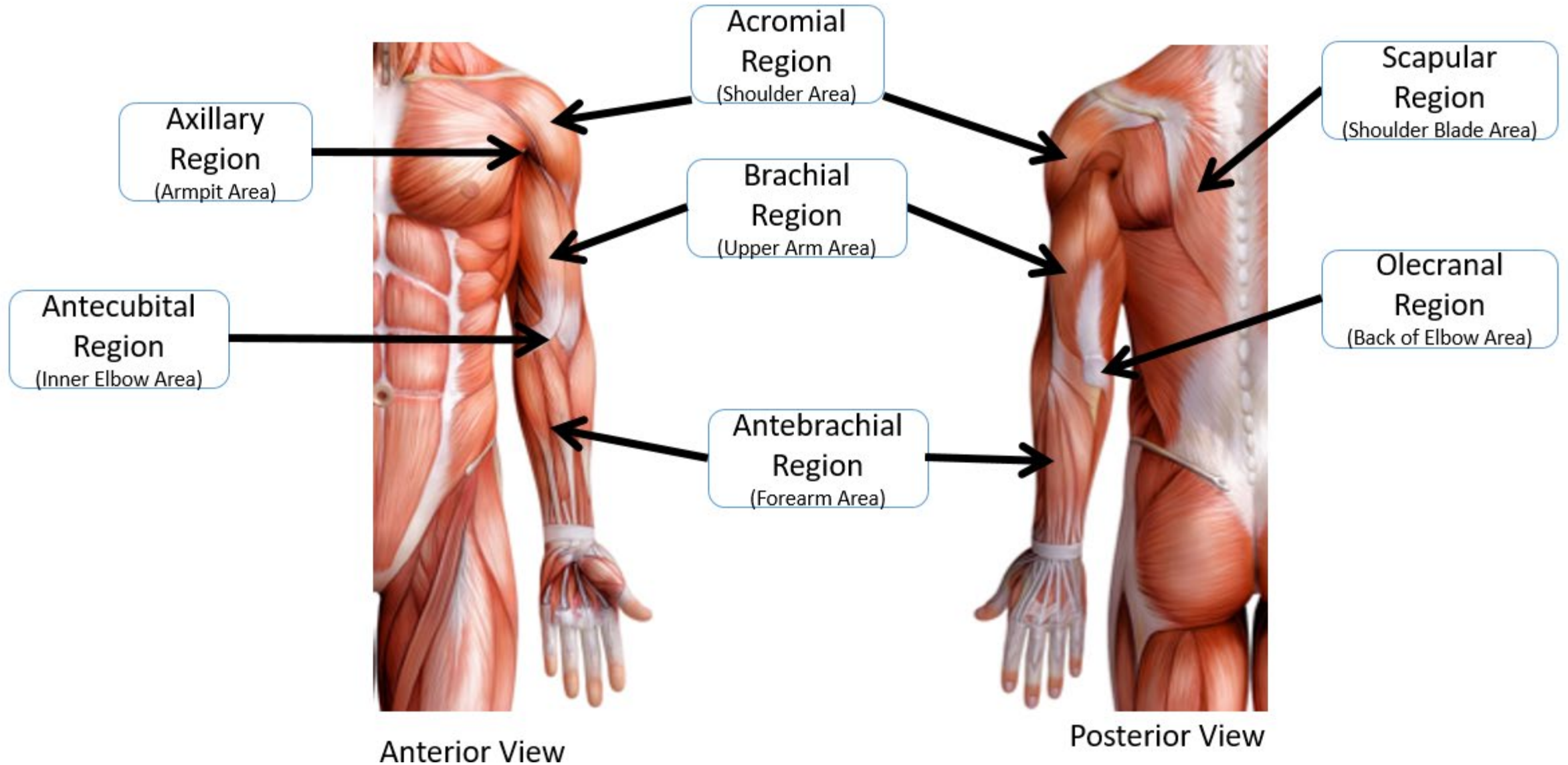
- Hypochondriac (hypochondrium) (hypochondrial) is a term derived from the Greek word **hypochondros** which means "*abdomen*" or "*below the cartilage*".
- The right and left hypochondriac regions are the two regions of the abdomen that lie below the right and left rib cage, respectively.



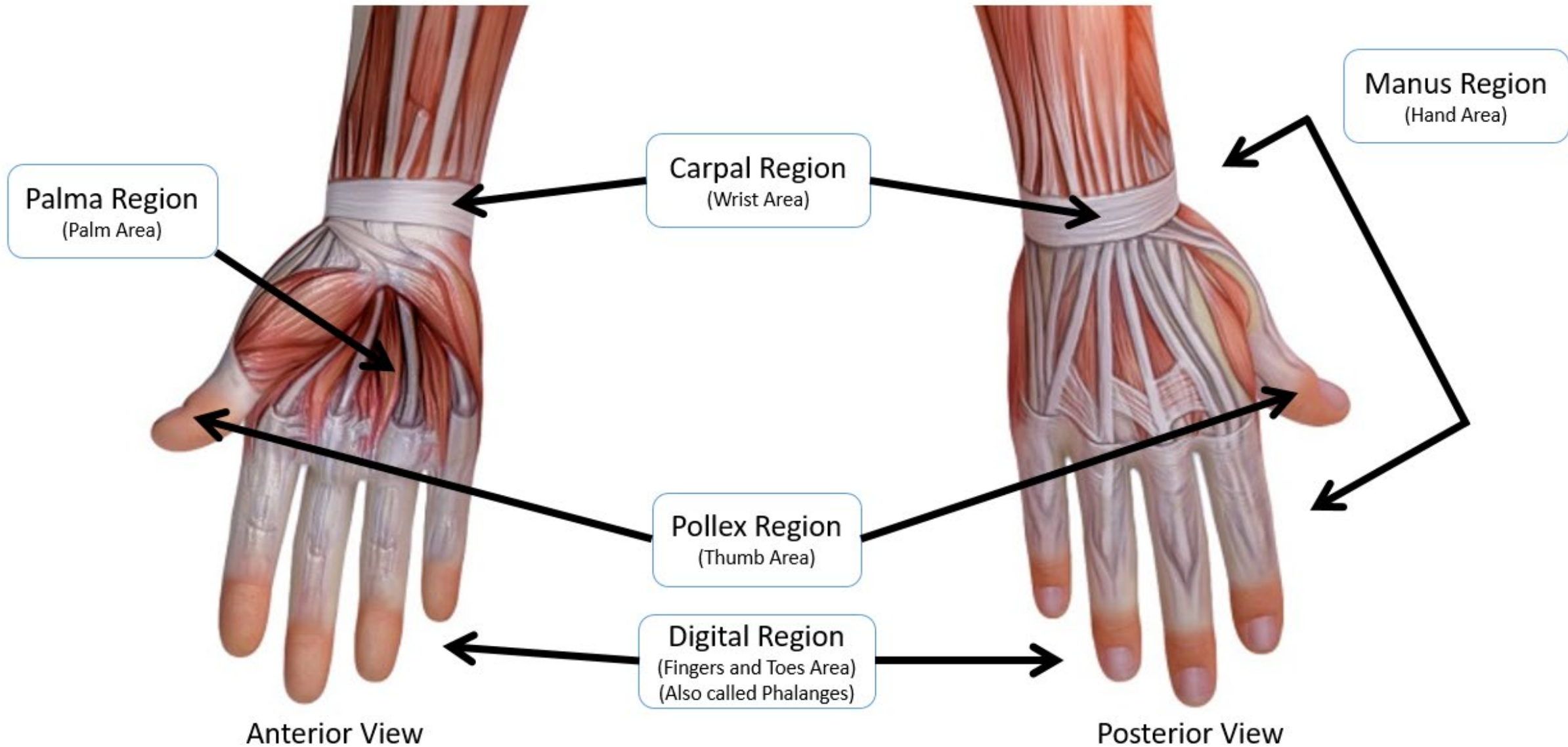
Pelvic Anatomical Regions



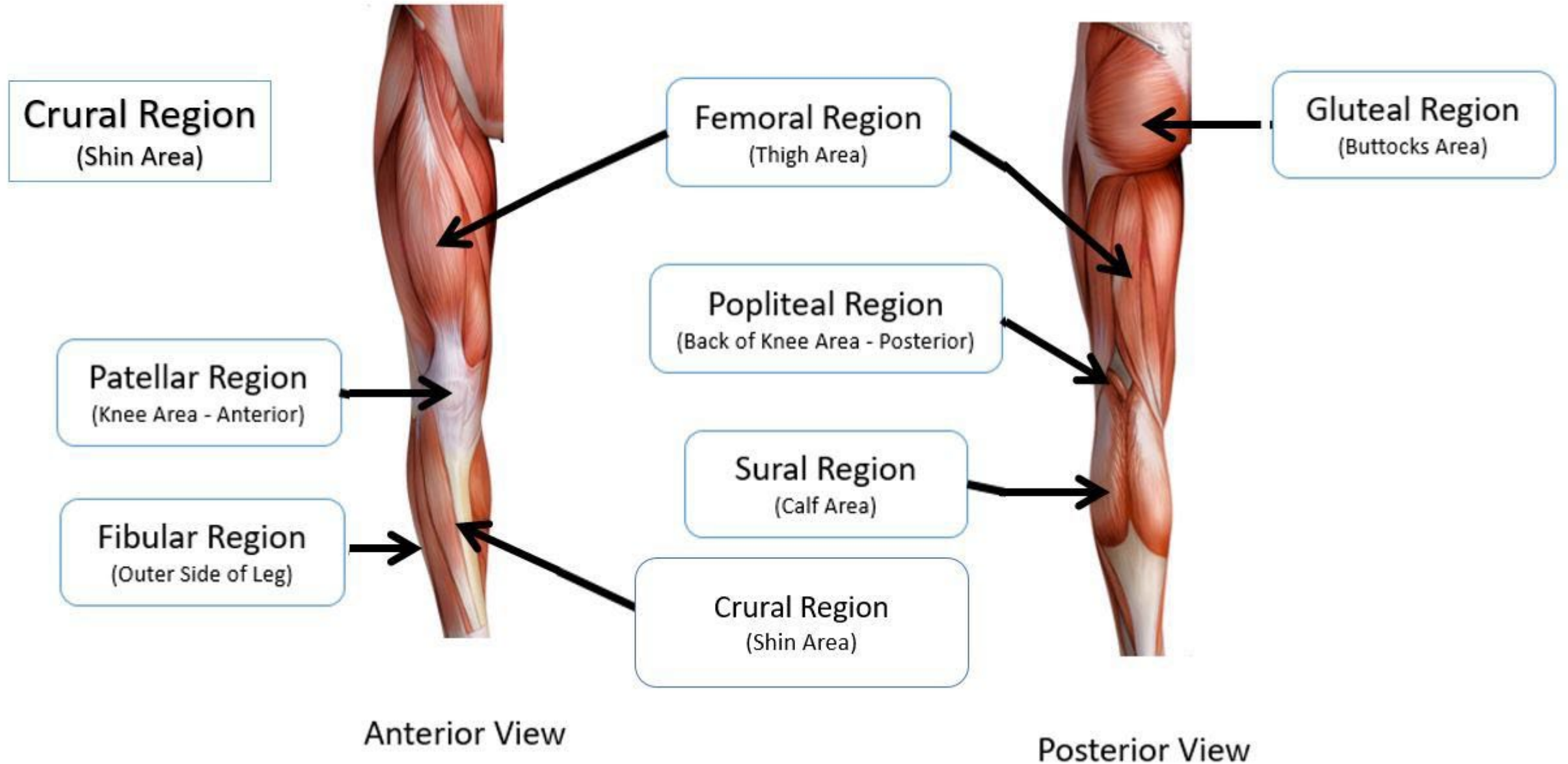
Arm Anatomical Regions



Hand Anatomical Regions



Leg Anatomical Regions



Foot Anatomical Regions

