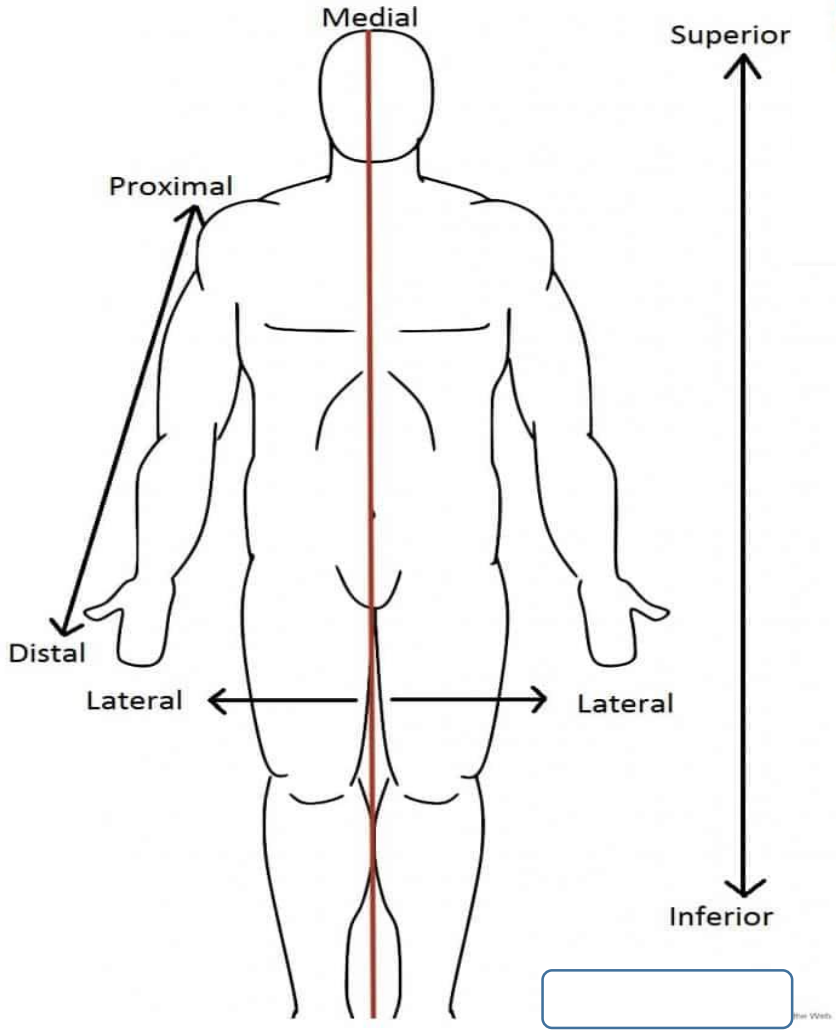
AL MUSTAQBAL UNIVERSITY

College of Pharmacy / First Year

ANATOMY

(L1) Basics &Terminology

Dr. Abdulhusein Mizhir Almaamuri



Basics and terminology

Anatomy is derived from the Greek *anatomē* "dissection“ " cut up, cut open" from *aná* "up", and *tomy,* cut, anatomy is the scientific study of the structure of organisms including their systems, organs and tissues. It includes the appearance and position of the various parts, the materials from which they are composed, and their relationships with other parts.

Anatomy is quite distinct from physiology and biochemistry, which deal respectively with the functions of those parts and the chemical processes involved.

The human body is a complex and intricate piece of engineering in which every structure plays a precise role. There are approximately 200 bones, 650 muscles, 79 organs, and enough blood vessels to circle the Earth twice!

HISTORY OF ANATOMY

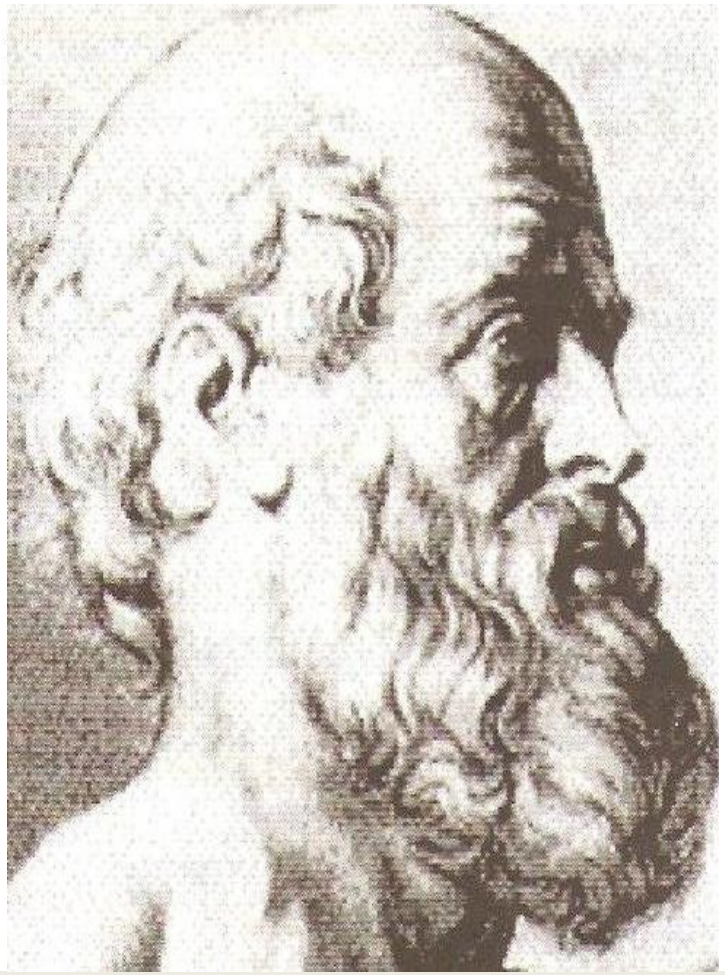
HIPPOCRATES(460-377BC)

- Greek physician
- Father of Medicine
- His name is memorialized in the *Hippocratic oath*
- Humoral theory :

Four body humors –

-blood
-phlegum
-yellow bile
-black bile

- Attributed diseases to natural causes .



HISTORY OF ANATOMY

HEROPHILUS (about 325BC)

- **Father of Anatomy**
- Performed:

-vivi-sections (dissections of living humans) and - dissections of human cadavers

- regarded brain as seat of intelligence
- described cerebrum, cerebellum, fourth ventricle
- first to identify nerves as sensory or motor.

GENERAL ANATOMY

Tome (Gr) → **To Cut**

Ana (Gr) → **Apart**

Tome (Gr) Ana (Gr) = Anatomy

Dissecare (Latin) → **To cut apart**

Dissecare (Latin) = Dissection

Ways to explore human anatomy:	
Regional anatomy	Organizes the body into defined parts: Upper limb, lower limb, trunk and back, thorax, abdomen and pelvis, head and neck, neuroanatomy
Systemic anatomy	Evaluates the body by defined systems: Integumentary, musculoskeletal, nervous, endocrine, circulatory, respiratory, digestive, urinary, reproductive, lymphatic systems
Microscopic anatomy	Looks at the microscopic structure of tissues and organs
Other methods	Clinical/applied anatomy, cross-section, medical imaging

The **anatomical position** is the standard reference orientation of the human body. It is used to provide a **clear and consistent** mechanism of describing the location of structures.

Description of the Anatomical Position

The standard anatomical position is described as

a person in the following orientation:

Standing upright and facing forward.

Mouth closed with neutral facial expression.

Arms straight, hands held by the hips with palms facing forward.

Feet together and parallel, toes pointing forward.

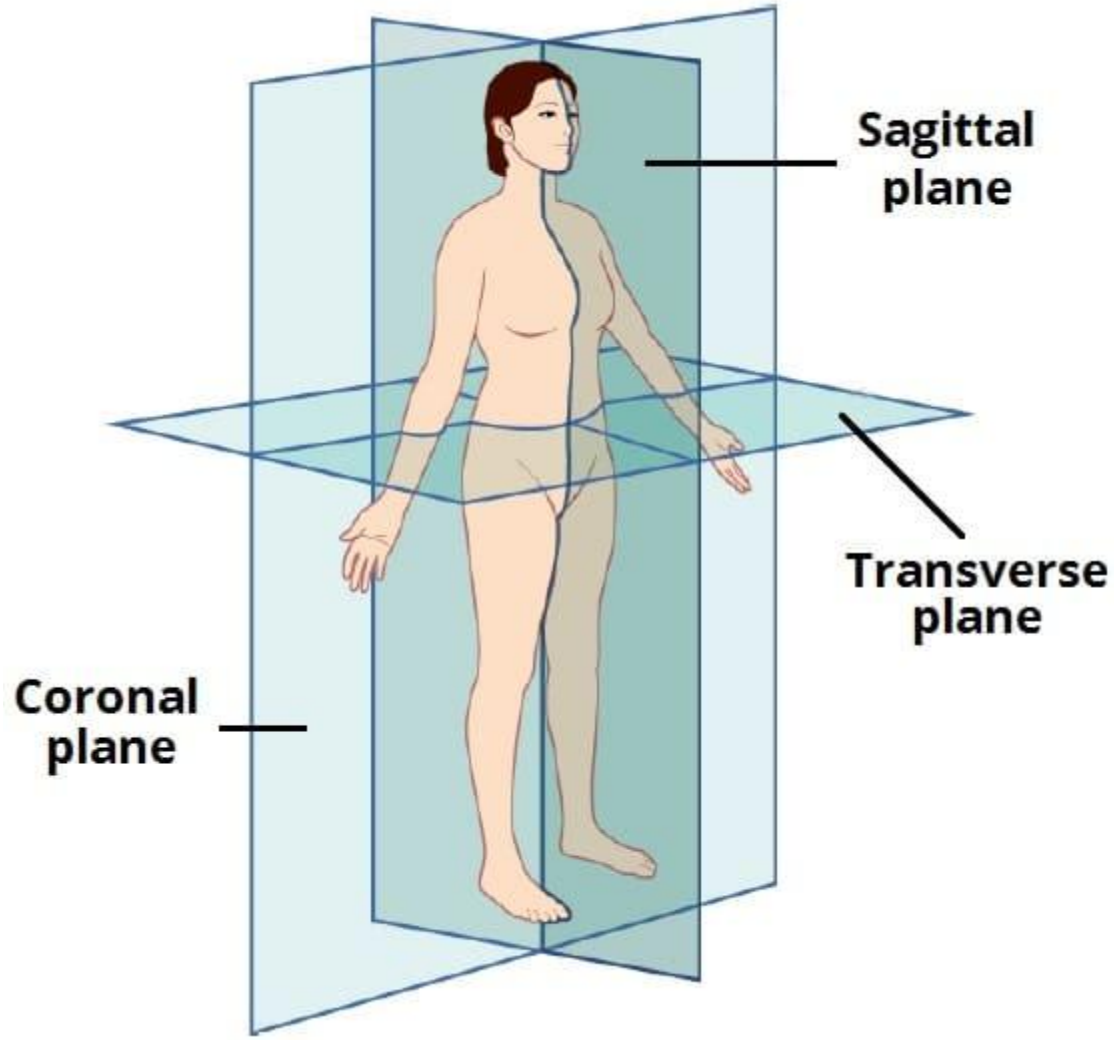
The **Anatomical Planes**:

are hypothetical planes used to describe the location of structures in human anatomy.

They are applied to the human body in the **anatomical position**.

The three most commonly used planes:

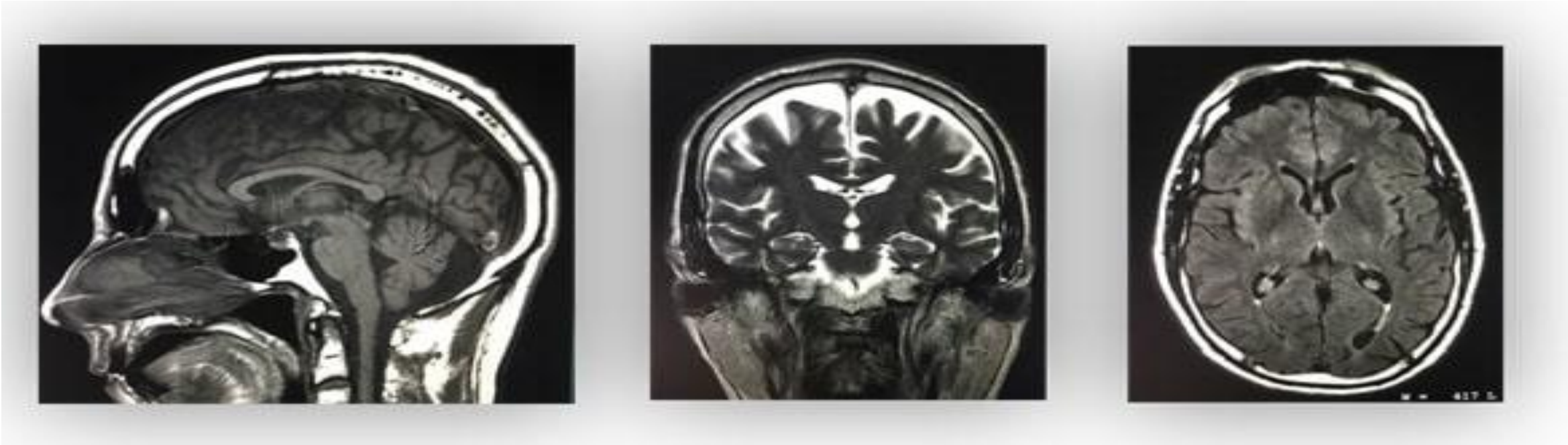
sagittal, **coronal** and **transverse**.



Sagittal Plane
The sagittal plane is a vertical plane which passes through the body **longitudinally**. It divides the body into a left section and a right section.
A specific sagittal plane is the **median sagittal plane** – which passes down the midline of the body, separating it into equal halves.

Coronal Plane
The coronal plane is a vertical plane which also passes through the body longitudinally – but **perpendicular** (at a right angle) to the sagittal plane.
It divides the body into a front (anterior) section and back (posterior) section.

Transverse Plane
The transverse plane is a **horizontal** plane. It is perpendicular to both the sagittal and coronal planes, and parallel to the ground.
It divides the body into an upper (superior) section and a lower (inferior) section.
Transverse planes are also known as **transaxial planes** or axial planes.



MRI scan of the cerebrum, demonstrating the three anatomical planes. Left to right: Sagittal, coronal and transverse

The **anatomical terms of location:**

are vital to understanding and using anatomy. They help to avoid any ambiguity that can arise when describing the location of structures.

Medial and Lateral

Imagine a line in the sagittal plane, splitting the right and left halves evenly. This is the midline. **Medial** means towards the midline, **lateral** means away from the midline.

Examples:

The eye is lateral to the nose.

The nose is medial to the ears.

The brachial artery lies medial to the biceps tendon

Anterior and Posterior

Anterior refers to the ‘front’, and **posterior** refers to the ‘back’. Putting this in context, the heart is posterior to the sternum because it lies behind it. Equally, the sternum is anterior to the heart because it lies in front of it.

Examples

Pectoralis major lies anterior to pectoralis minor.

The triceps are posterior to biceps brachii.

The patella is located anteriorly in the lower limb

Superior and Inferior

Superior means ‘higher’, **inferior** means ‘lower’. The head is superior to the neck; the umbilicus is inferior to the sternum.

Examples

The nose is superior to the mouth.

The lungs are superior to the liver.

The appendix is (usually) inferior to the transverse colon

Proximal and Distal

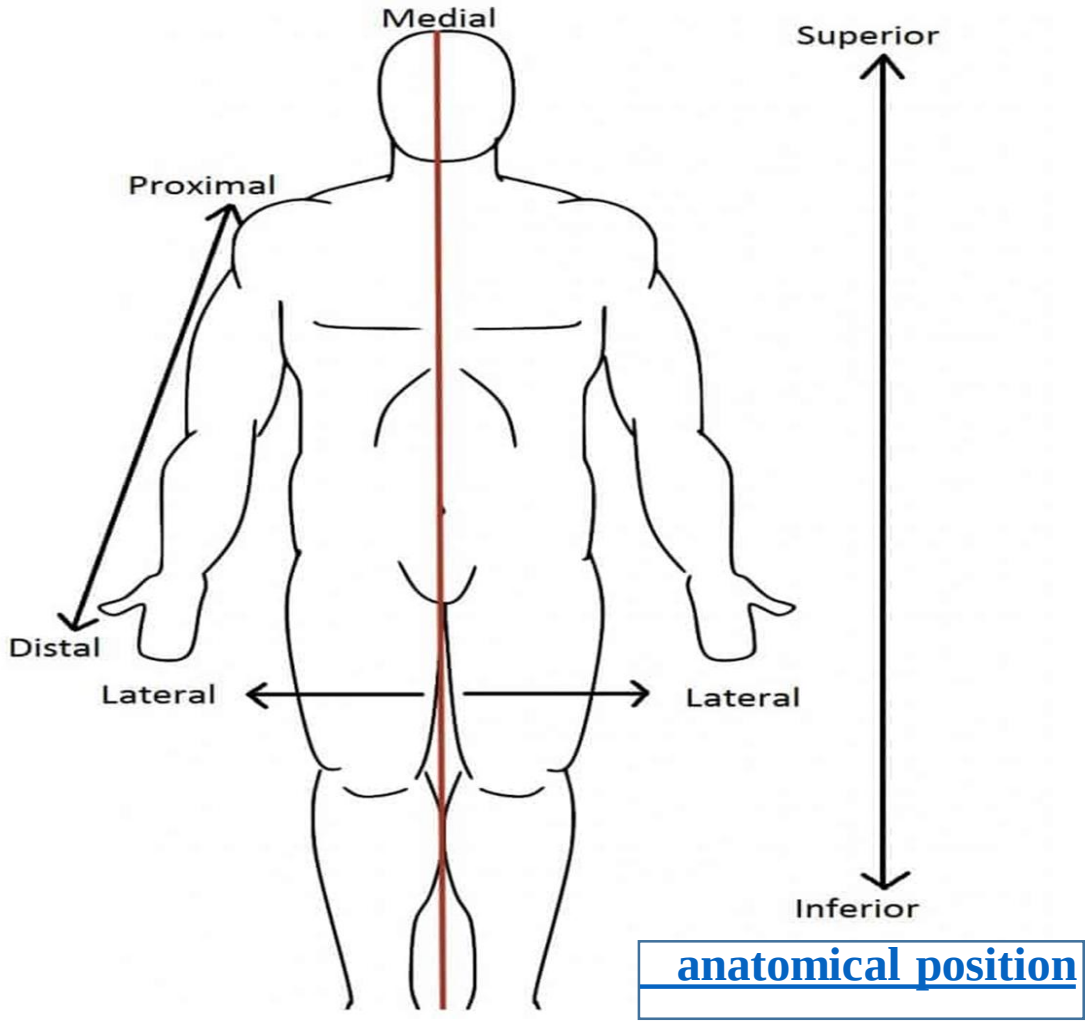
The terms **proximal** and **distal** are used in structures that are considered to have a beginning and an end (such as the upper limb, lower limb and blood vessels). They describe the position of a structure with reference to its origin – proximal means closer to its origin, distal means further away.

Examples:

The wrist joint is distal to the elbow joint.

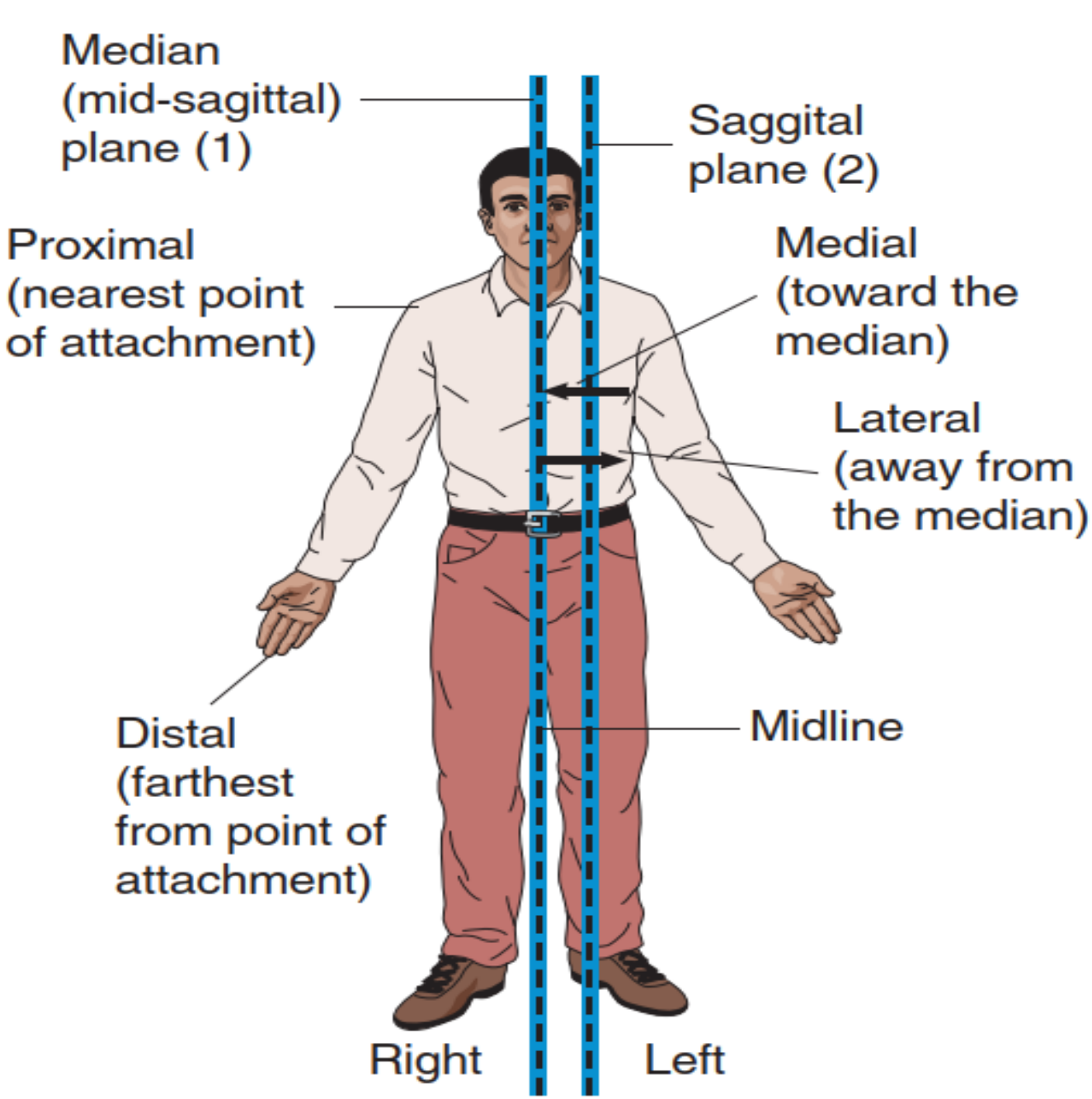
The scaphoid lies in the proximal row of carpal bones.

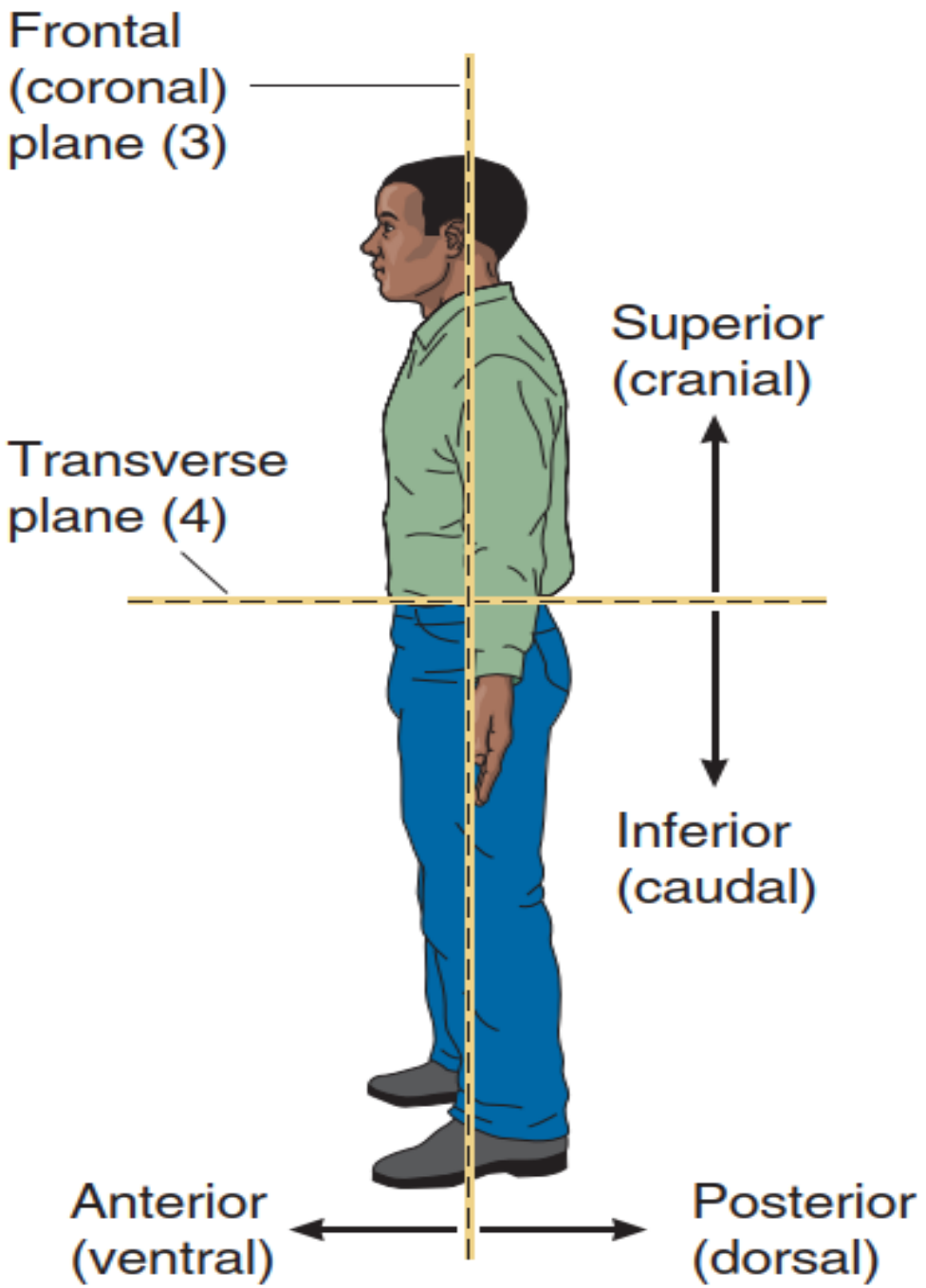
The knee joint is proximal to the ankle joint



anatomical position

Directional Term	Definition	Example
Superior	Towards the head or **upper** part of the body.	Pharynx is superior to larynx.
Inferior	Away from the head or **lower** part of the body.	Small intestine is inferior to stomach
Anterior	Nearer to or at the **front** of the body	Sternum is anterior to the heart.
Posterior	Nearer to or at the **back** of the body	Oesophagus is posterior to trachea.
Medial	**Nearer to the midline** of the body.	Ulna is medial to the radius.
Lateral	**Away from the midline** of the body.	The arms are lateral to the chest.
Intermediate	**Between** the two structures.	Transverse colon is intermediate to ascending colon and descending colon.
Proximal	situated **nearer to the point of attachment**.	Humerus is proximal to the radius.
Distal	situated **away from the point of attachment**.	Phalanges are distal to the carpels.
Superficial	**Toward** or on the **surface of the body.**	Ribs are superficial to lungs.
Deep	**Away** from the **surface of the bod**y.	Ribs are deep to the skin.


Median
(mid-sagittal)
plane (1)
Saggital
plane (2)
Proximal
(nearest point
of attachment)
Medial
(toward the
median)
Lateral
(away from
the median)
Distal
(farthest
from point of
attachment)
Midline
Right
Left


Frontal
(coronal)
plane (3)
Superior
(cranial)
Transverse
plane (4)
Inferior
(caudal)
Anterior
(ventral)
Posterior
(dorsal)

Terms of Regions

Cranial (cephalic)

Cervical

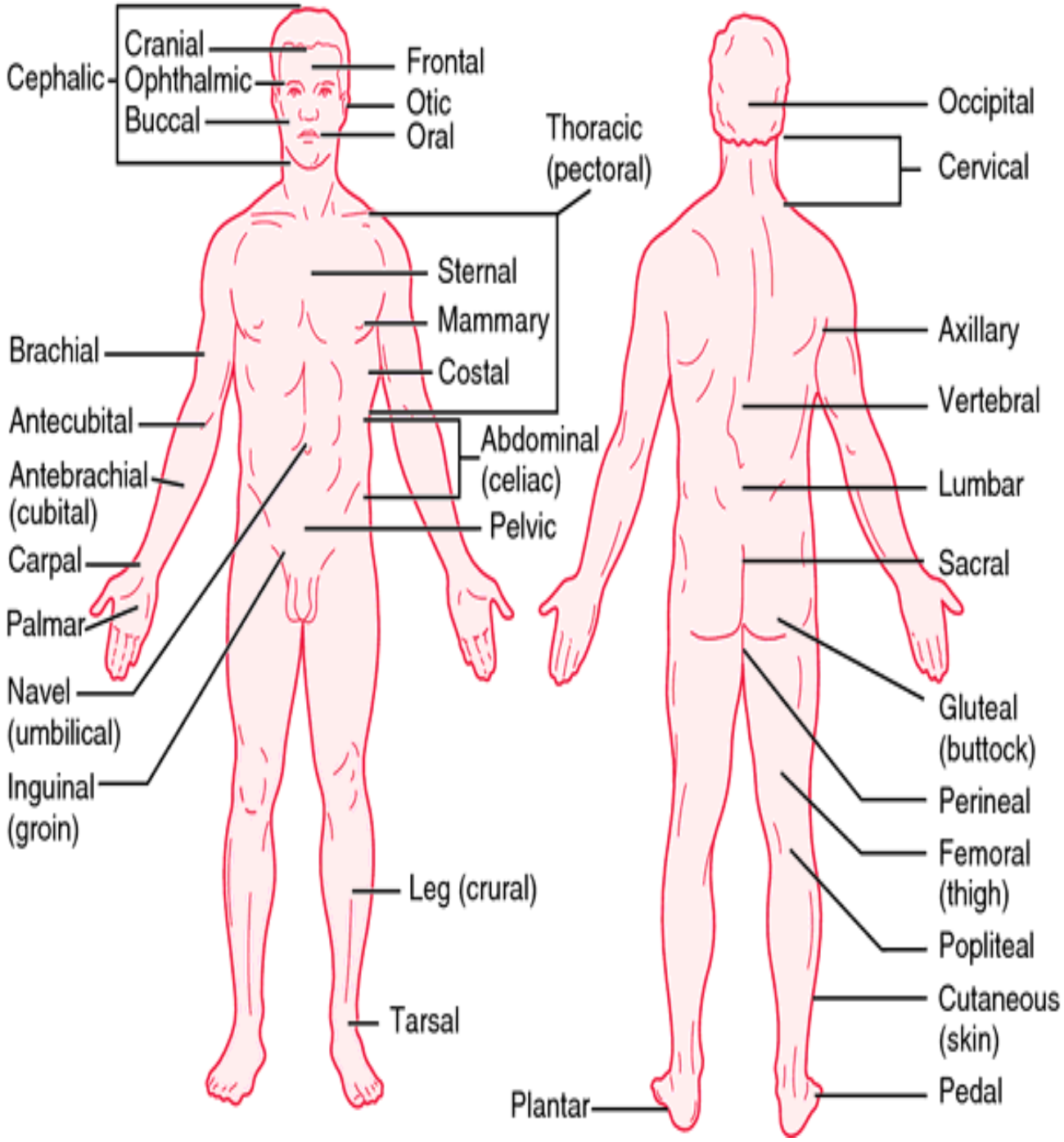
Thoracic

Abdominal

Pelvic

Plantar

Palmar



Body Cavities

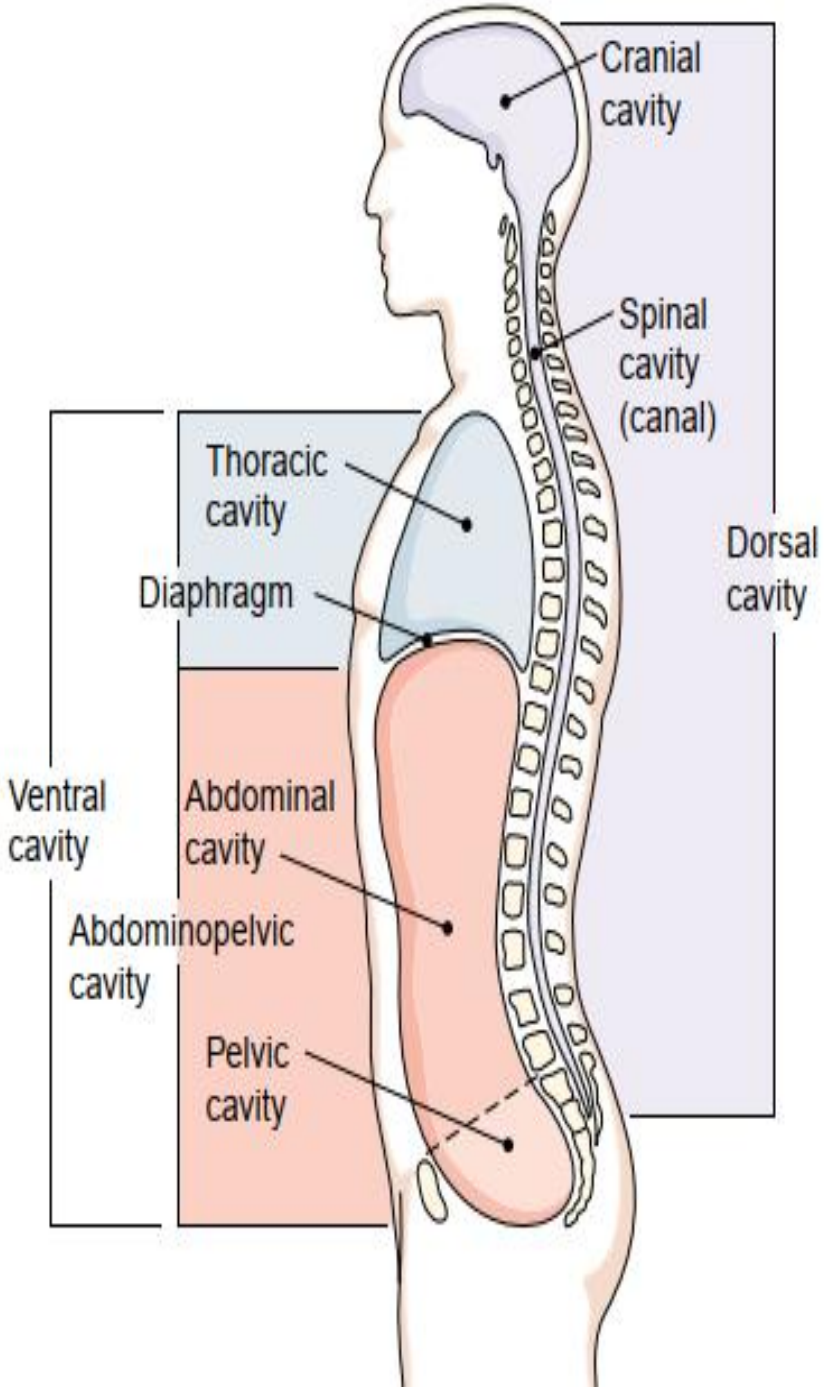
Internal organs are located within dorsal and ventral cavities.

The dorsal cavity contains the brain in the cranial cavity and the spinal cord in the spinal cavity (canal).

The uppermost ventral cavity, **the thoracic cavity**, is separated from the **abdominal cavity** by the diaphragm.

There is no anatomical separation between the **abdominal cavity** and **the pelvic cavity**, which together make up the **abdominopelvic** cavity.

The large membrane that lines the abdominopelvic cavity and covers the organs within it is the peritoneum



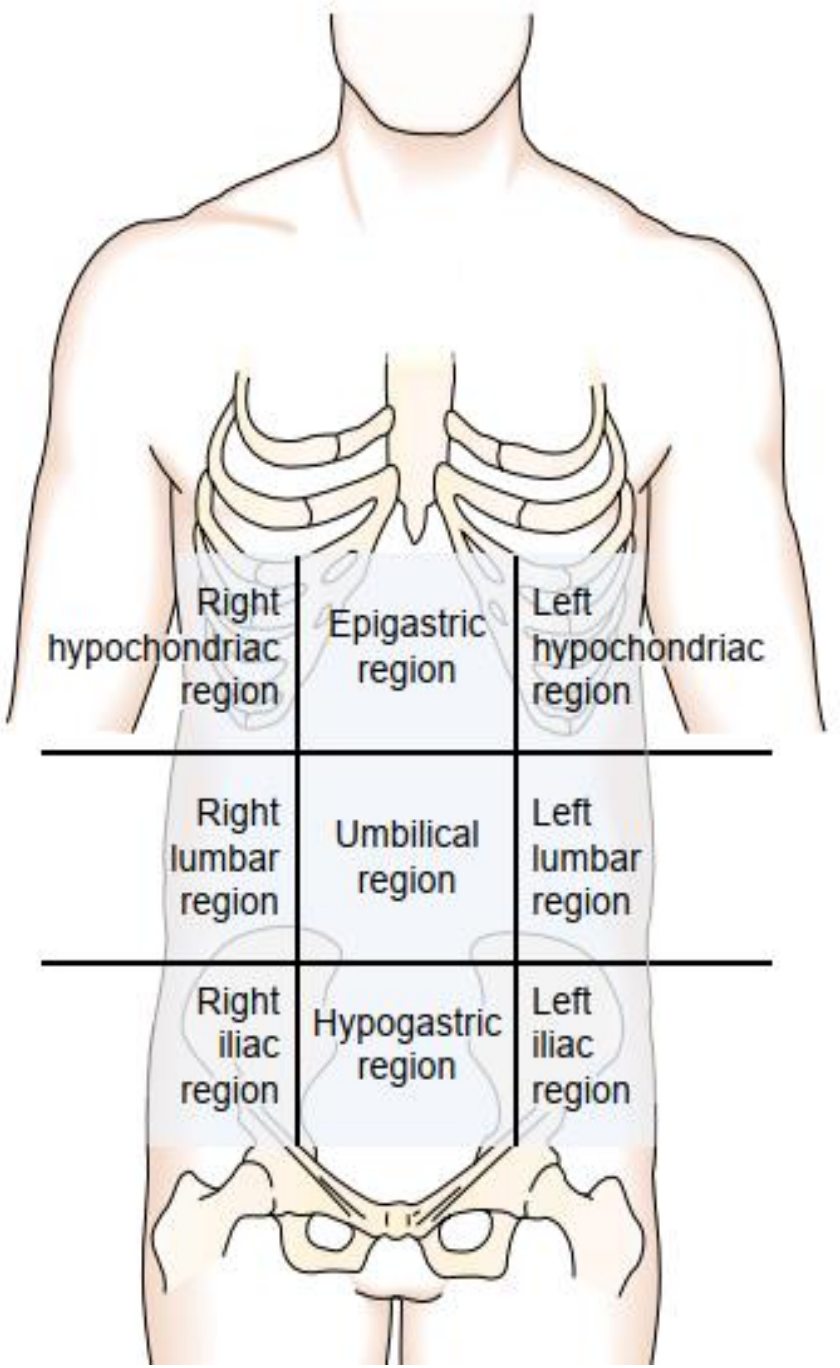
Body Regions

For orientation, the abdomen can be divided by imaginary lines into nine regions. The sections down the midline are the:

- **epigastric region,** located above the stomach
- **umbilical region**, named for the umbilicus, or navel
- **hypogastric region**, located below the stomach

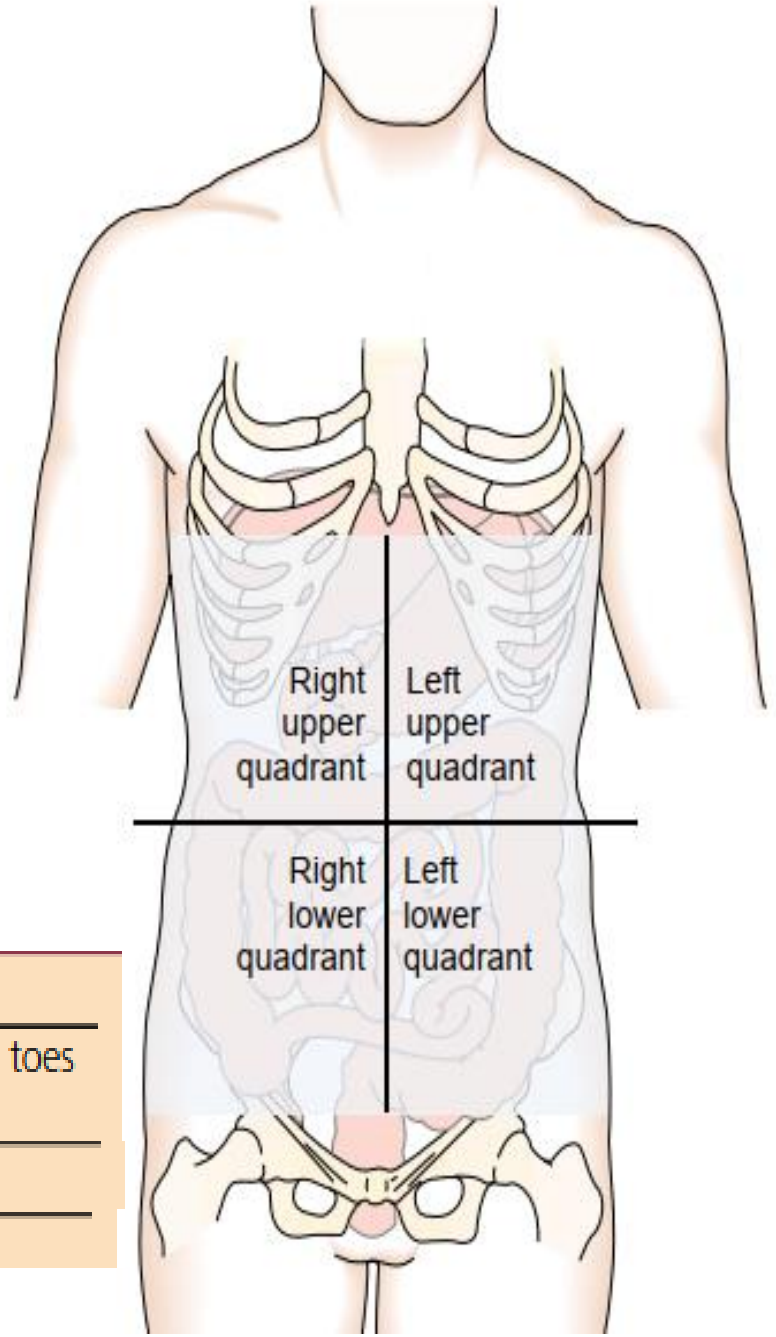
The lateral regions are the:

- right and left **hypochondriac regions**, named for their position near the ribs, near the cartilages (root chondr/o) of the ribs,
- right and left **lumbar regions**, which are located near the small of the back (lumbar region of the spine)
- right and **left iliac regions**, named for the upper bone of the hip, the ilium.



More simply, but less precisely, the abdomen can be divided by a single vertical line and a single horizontal line into four sections, designated:

the right upper quadrant **(RUQ),**
left upper quadrant **(LUQ**),
right lower quadrant **(RLQ),**
and left lower quadrant **(LLQ).**



Positions: In addition to the anatomical position, there are other standard positions in which the body is placed for examination or medical procedures. Like:

POSITION	DESCRIPTION
anatomical position	standing erect, facing forward, arms at sides, palms forward, legs parallel, toes pointed forward
supine*	lying face up
prone	lying face down

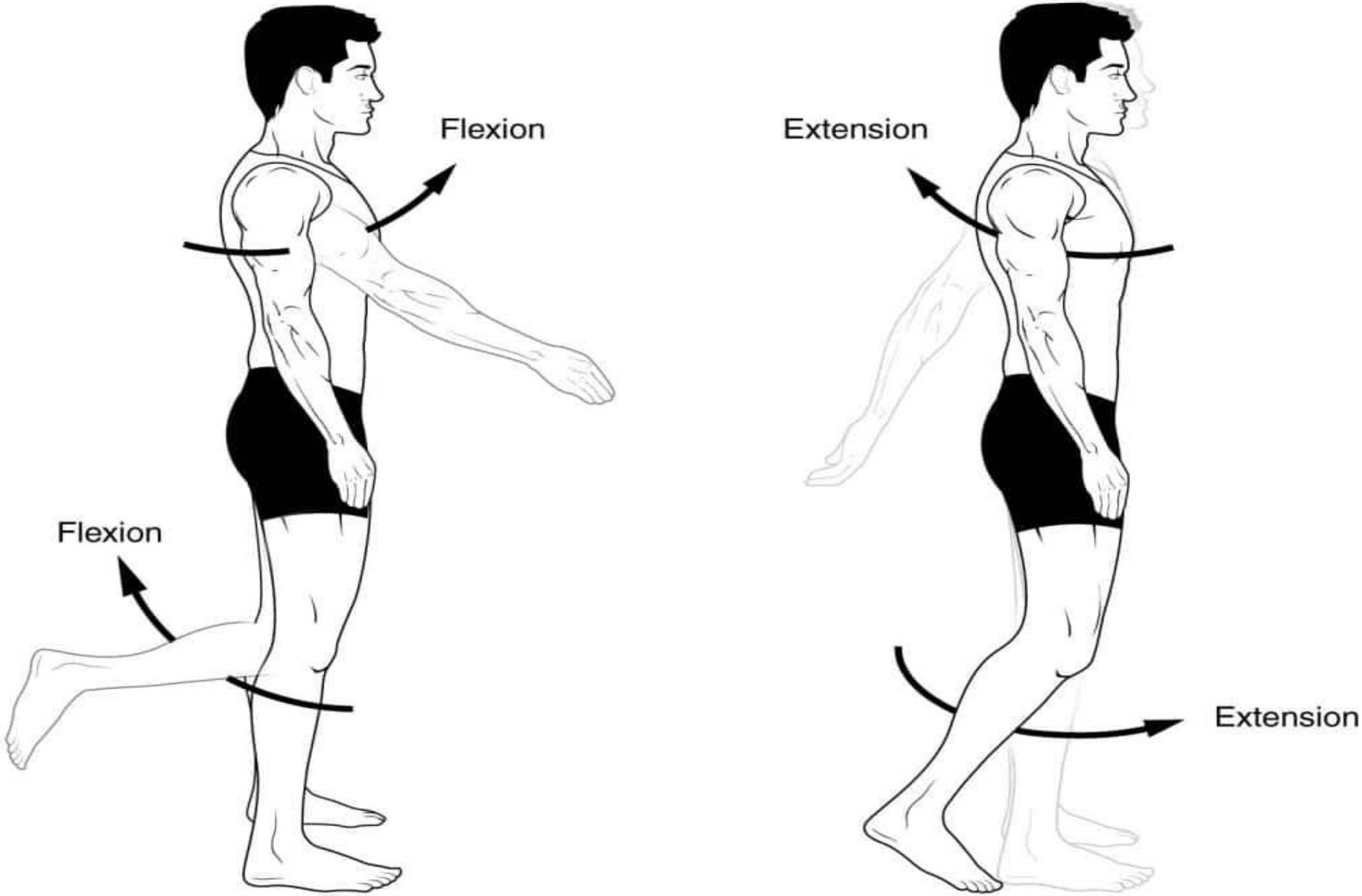
Anatomical terms of movement are used to describe the actions of muscles upon the skeleton. Muscles contract to produce movement at joints, and the subsequent movements can be precisely described using this terminology. Most movements have an opposite movement – also known as an **antagonistic** movement.

Flexion and Extension

Flexion and extension are movements that occur in the sagittal plane. They refer to increasing and decreasing the angle between two body parts:

Flexion refers to a movement that decreases the angle between two body parts. Flexion at the elbow is decreasing the angle between the ulna and the humerus. When the knee flexes, the ankle moves closer to the buttock, and the angle between the femur and tibia gets smaller.

Extension refers to a movement that increases the angle between two body parts. Extension at the elbow is increasing the angle between the ulna and the humerus. Extension of the knee straightens the lower limb.


Flexion
Flexion
Extension
Extension

Abduction and Adduction

Abduction and adduction are two terms that are used to describe movements towards or away from the midline of the body.

Medial and Lateral Rotation

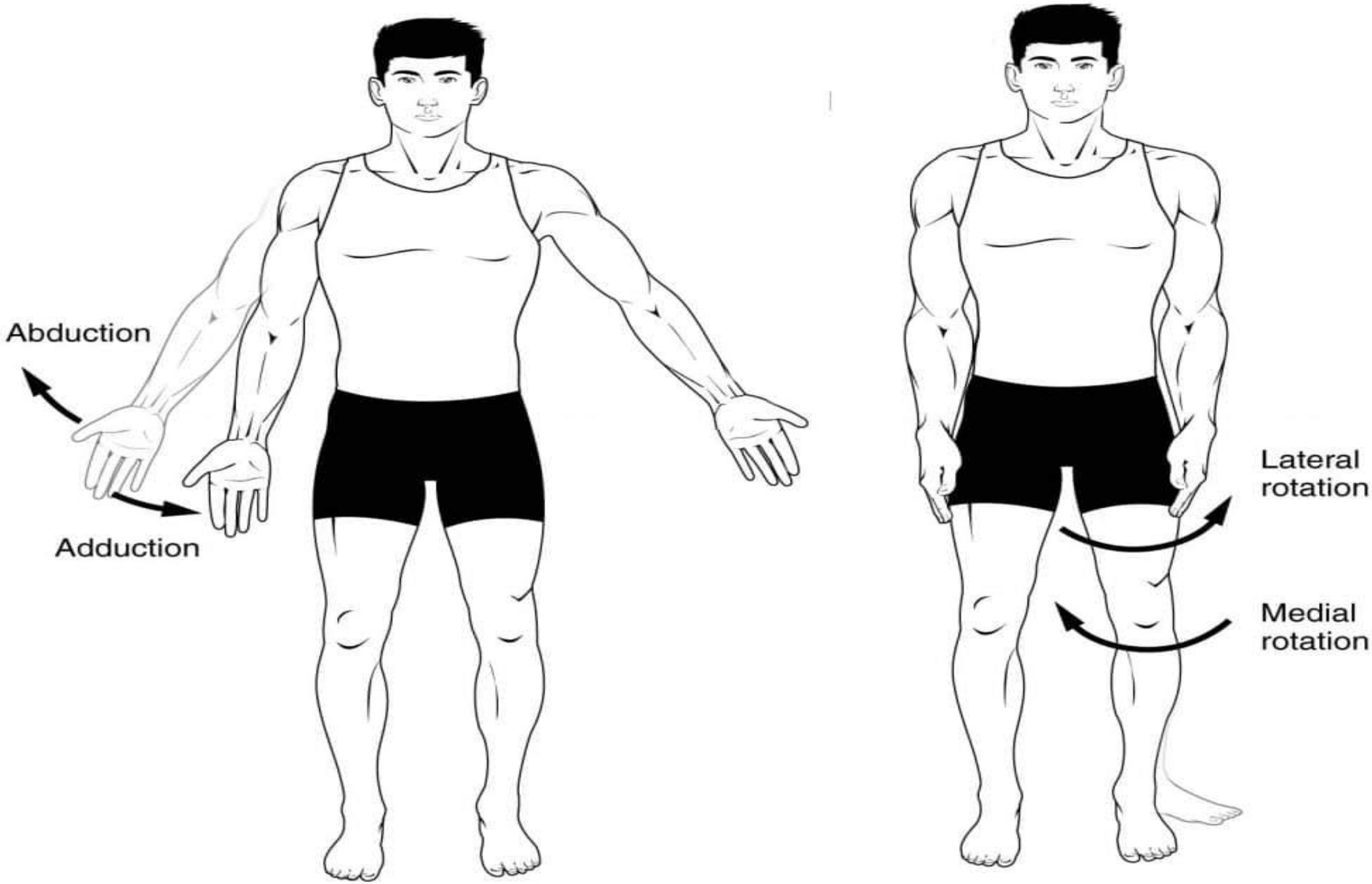
Medial rotation is a rotational movement towards the midline. It is sometimes referred to as internal rotation.

Lateral rotation is a rotating movement away from the midline.

Elevation and Depression

Elevation refers to movement in a superior direction (e.g. shoulder shrug).

Depression refers to movement in an inferior direction.


Abduction
Adduction
Lateral rotation
Medial rotation

THANK YOU!