Medical Terminology
Body Structure
2nd Lecture

Prepared and Presented by:

Lecturer Dr/ Ayad AbdelSalam

Teaching of Medical Terminology
College of Technology & Health Sciences
Radiology Techniques Department

The Cell

The body can be studied from its simplest to its most complex level, beginning with the cell, **the basic unit** of living organisms. Cells carry out **metabolism**, the sum of all of the physical and chemical activities that occur in the body. Providing the energy for metabolic reactions is the chemical **ATP** (adenosine triphosphate), commonly described as the energy compound of the cell.

The main categories of **organic compounds** in the body are:

- **Proteins,** which include the enzymes, some hormones, and structural materials.
- **Carbohydrates,** which include sugars and starches. The main carbohydrate is the sugar glucose, which circulates in the blood to provide energy for the cells.
- **Lipids,** which include fats. Some hormones are derived from lipids, and adipose (fat) tissue is designed to store lipids.

Within the cytoplasm that fills the cell are subunits called **organelles**, each with a specific function. All body functions derive from the activities of billions of specialized cells. The nucleus is the control region of the cell

Tissues

Cells are organized into four basic types of tissues that perform specific functions:

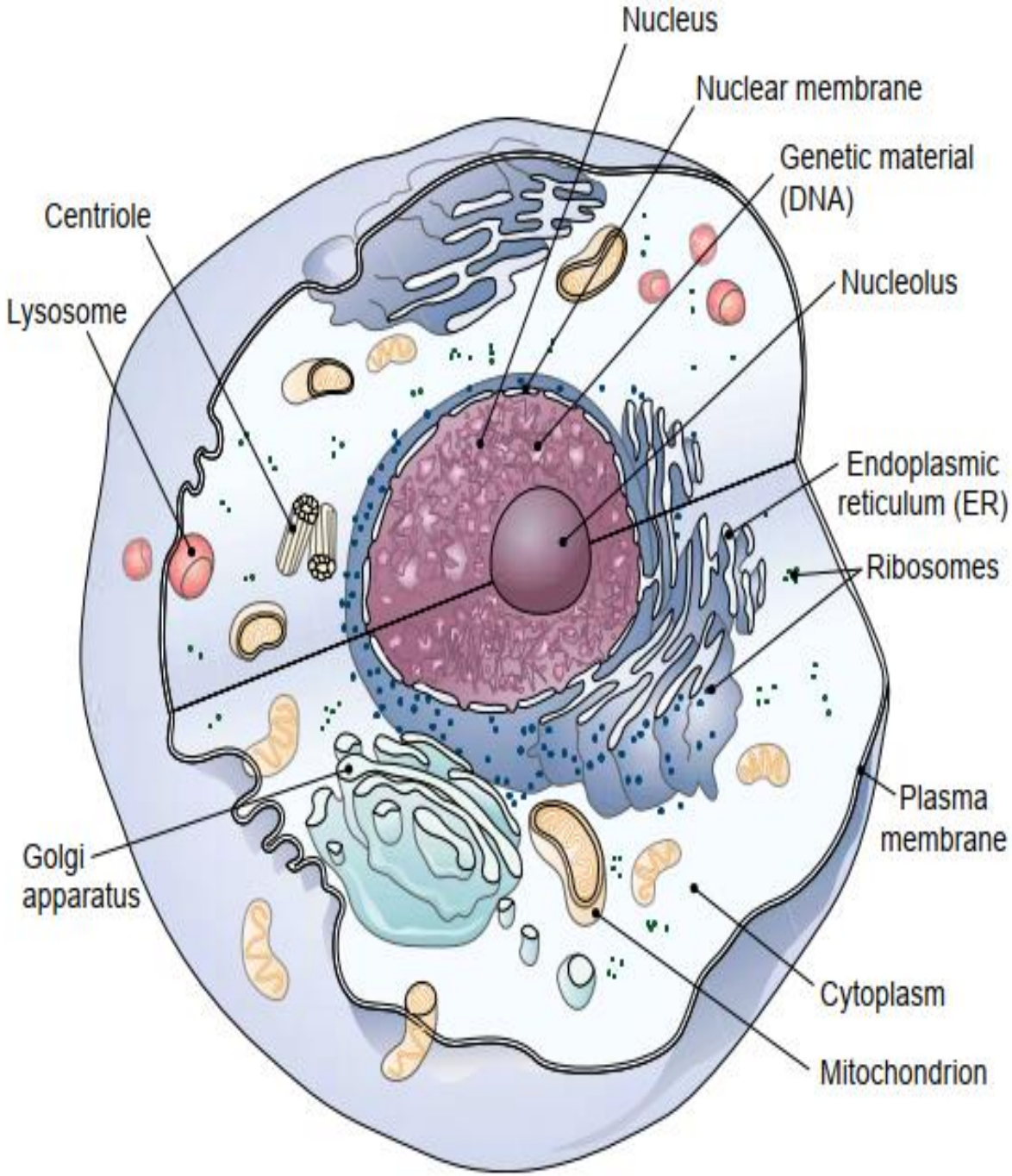
• **Epithelial tissue** covers and protects body structures and lines organs, vessels, and cavities.

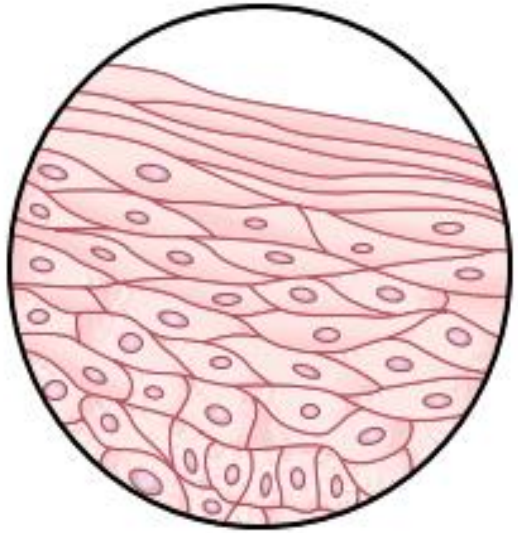
• **Connective tissue** supports and binds body structures. It contains fibers and other nonliving material between the cells. Included are adipose (fat) tissue, cartilage, bone, and blood.

• **Muscle tissue** (root my/o) contracts to produce movement. There are three types of muscle tissue:

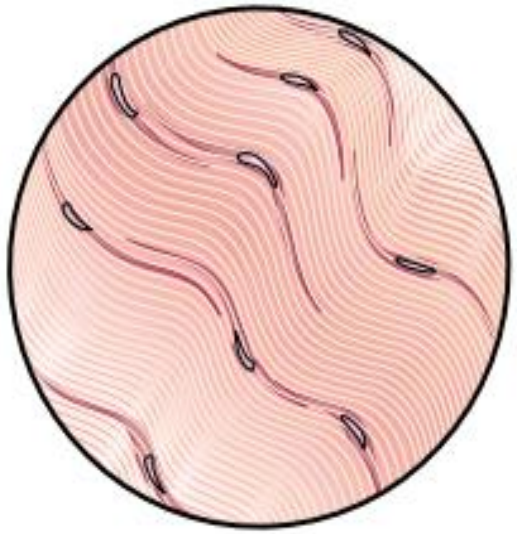
- Skeletal or voluntary muscle moves the skeleton.
- Cardiac muscle forms the heart. It functions without conscious control and is described as involuntary.
- Smooth, or visceral, muscle forms the walls of the abdominal organs; it is also involuntary.

• **Nervous tissue** (root neur/o) makes up the brain, spinal cord, and nerves. It coordinates and controls body responses by the transmission of electrical impulses..

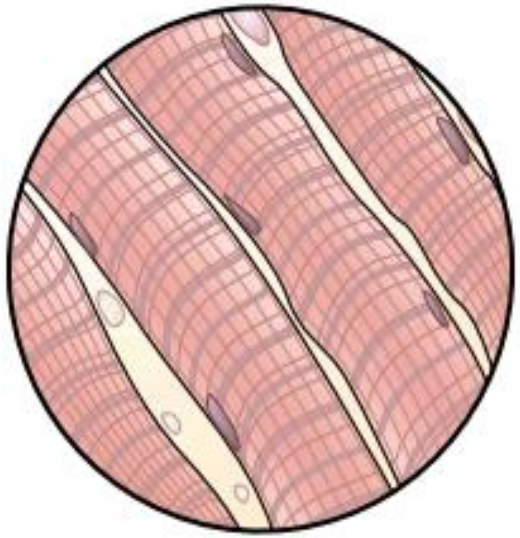




Epithelial tissue



Connective tissue



Muscle tissue

Nervous tissue

Organs

Tissues are arranged into organs, which serve specific functions. Two or more tissues combine to form an organ. Examples of cells and tissues grouped together to perform a certain function are the kidneys, heart, lungs, and liver. Internal organs are often referred to as viscera.

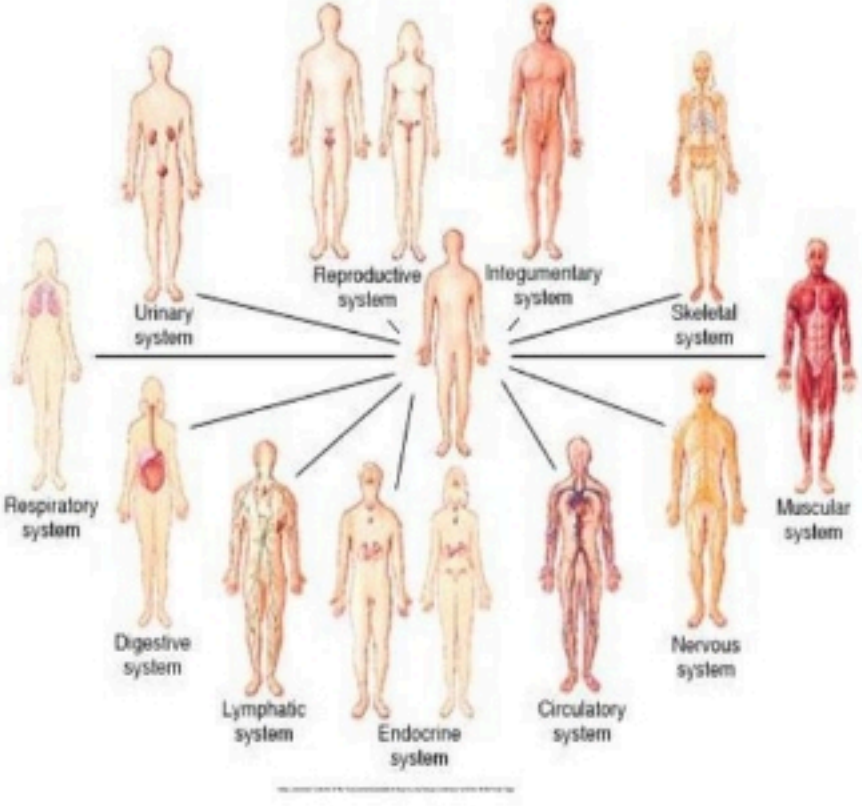
SYSTEMS

The organs, in turn, are grouped into systems. Organs do not function independently. They work in combinations to form a system, which performs a function or a related group of functions. Systems of the body may be identified in a variety of ways. Bear in mind, however, that the body functions as a whole, no system is independent of the others. They work together to maintain the body's state of internal stability, termed **homeostasis**. (Relative constancy or equilibrium in the internal environment of the body, which is maintained by the ever-changing processes of feedback and regulation in response to external or internal changes.

B. The 11 Human Body Systems

The 11 human body systems are as follows:

1. Nervous system
2. **Respiratory** system
3. Excretory system
4. Muscular system
5. **Endocrine** system
6. Lymphatic (immune) system
7. **Integumentary** system
8. Digestive system
9. **Skeletal** system
10. Circulatory system
11. Reproductive system



Element	Meaning	Word Analysis
COMBINING FORMS		
Cellular Structure		
cyt/o	cell	cyt/o/logist (sī-TŎL-ō-jĭst): specialist in the study of the formation, structure, and function of cells *-logist:* specialist in the study of
hist/o	tissue	hist/o/logy (hĭs-TŎL-ō-jē): study of the microscopic structures of tissues *-logy:* study of
nucle/o	nucleus	nucle/ar (N̄Ū-klē-ăr): pertaining to the nucleus *-ar:* pertaining to, relating to
adipose ĂD-ĭ-pōs *adip:* fat *-ose:* pertaining to, relating to		Fatty; pertaining to fat

Directional Terms

In describing the location or direction of a given point in the body, it is always assumed that the subject is in the **anatomical position**, that is, upright, with face front, arms at the sides with palms forward, and feet parallel, as shown in the small diagram.

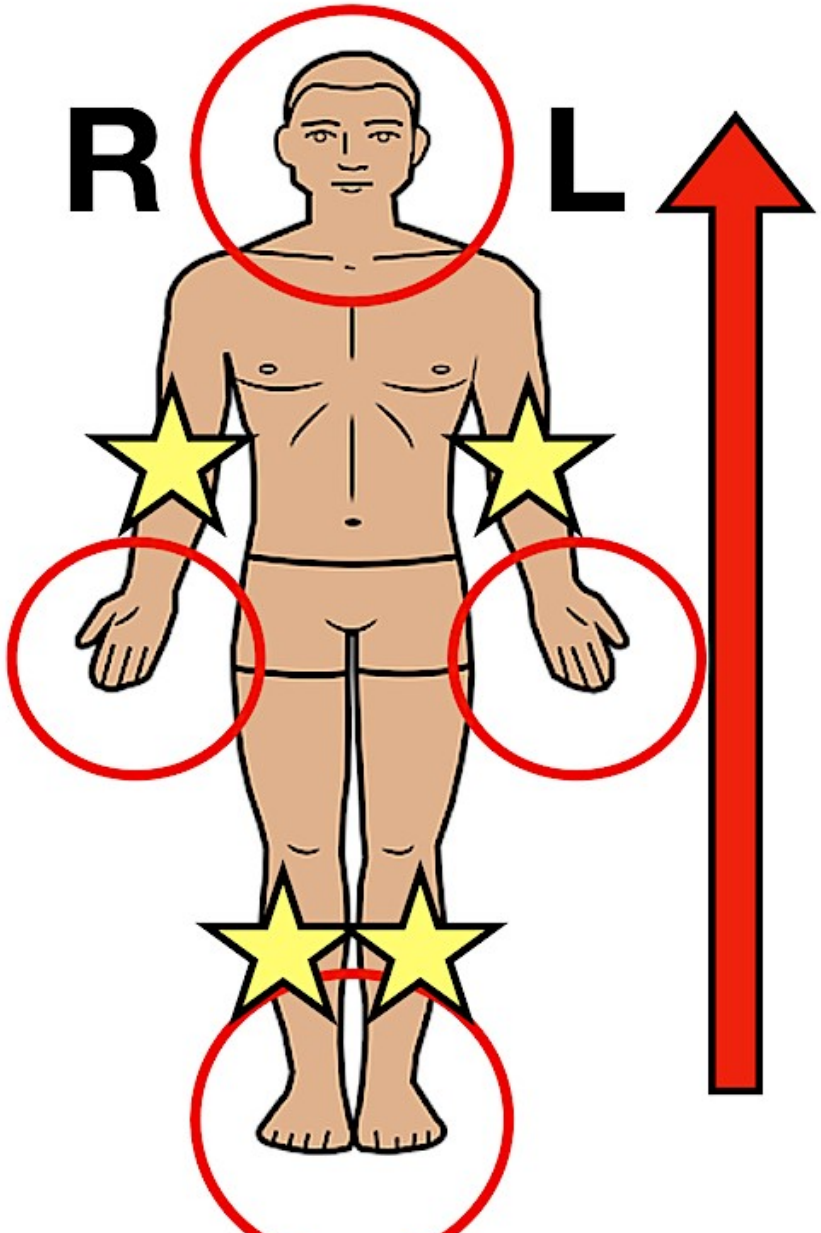
Planes of Section, that is, directions in which the body can be cut.

A frontal plane, also called a **coronal plane**, is made at right angles to the midline and divides the body into anterior and posterior parts.

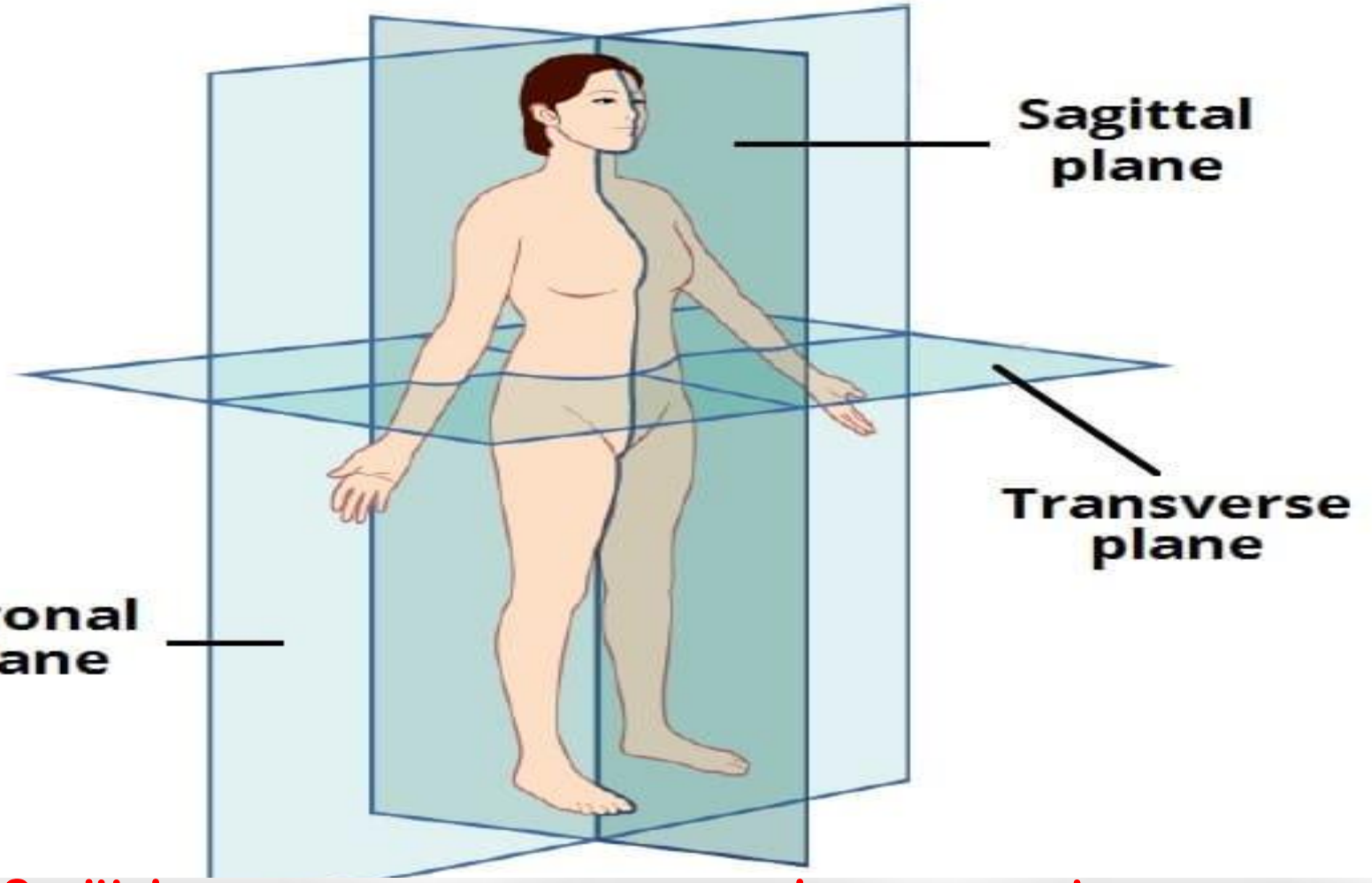
A sagittal (vertical) **plane** passes from front to back and divides the body into right and left portions. If the plane passes through the midline, it is a **medial plane**.

A transverse plane passes horizontally, dividing the body into superior and inferior parts.

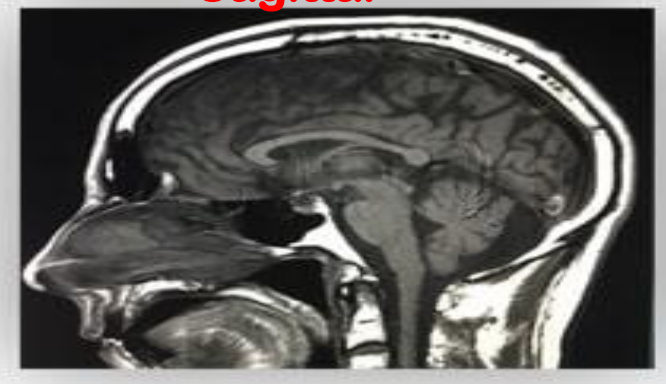
Anatomical Position

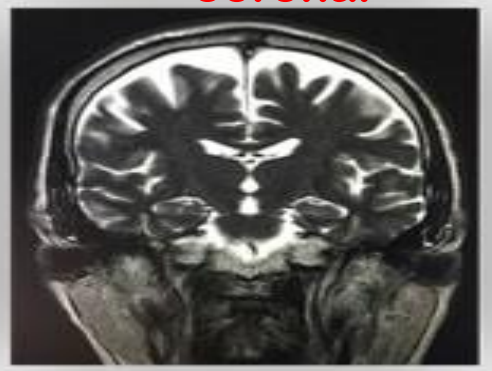


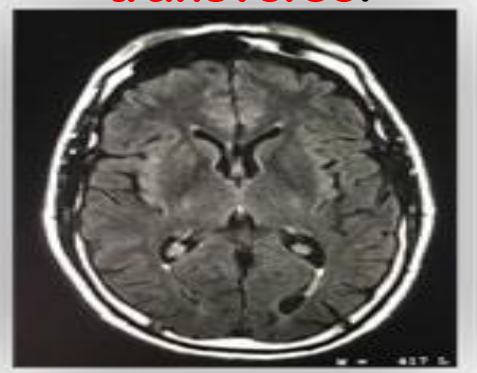
- Standing upright
- Head and eyes directed straight ahead
- Upper limbs at the sides
- Upper limbs slightly away from trunk
- Palms facing forward
- Thumbs pointing away from body
- Lower limbs parallel
- Feet flat on the ground and facing forward



Sagittal coronal transverse.







The anatomical terms of location

Medial and Lateral

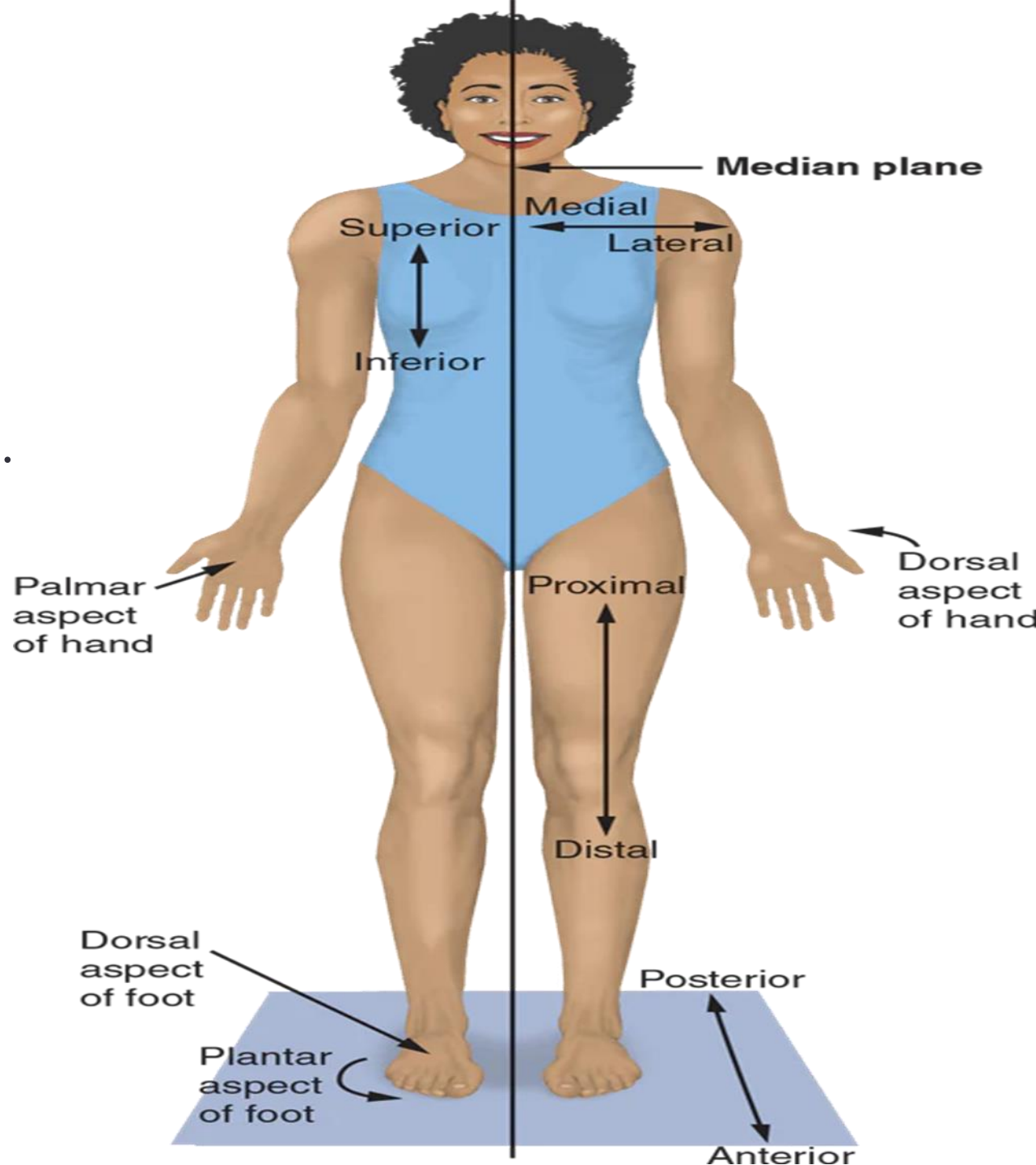
Imagine a line in the sagittal plane, splitting the right and left halves evenly. This is the midline. **Medial** means towards the midline, **lateral** means away from the midline.

Examples:

- *The eye is lateral to the nose.*
- *The nose is medial to the ears*

Superior and Inferior

Superior (Cranial) means ‘higher’,
Inferior (Caudal) means ‘lower’.
The head is superior to the neck;
the umbilicus is inferior to the sternum.



Anterior and Posterior

Anterior (Frontal) refers to the ‘front’, and **posterior (dorsal)** 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.

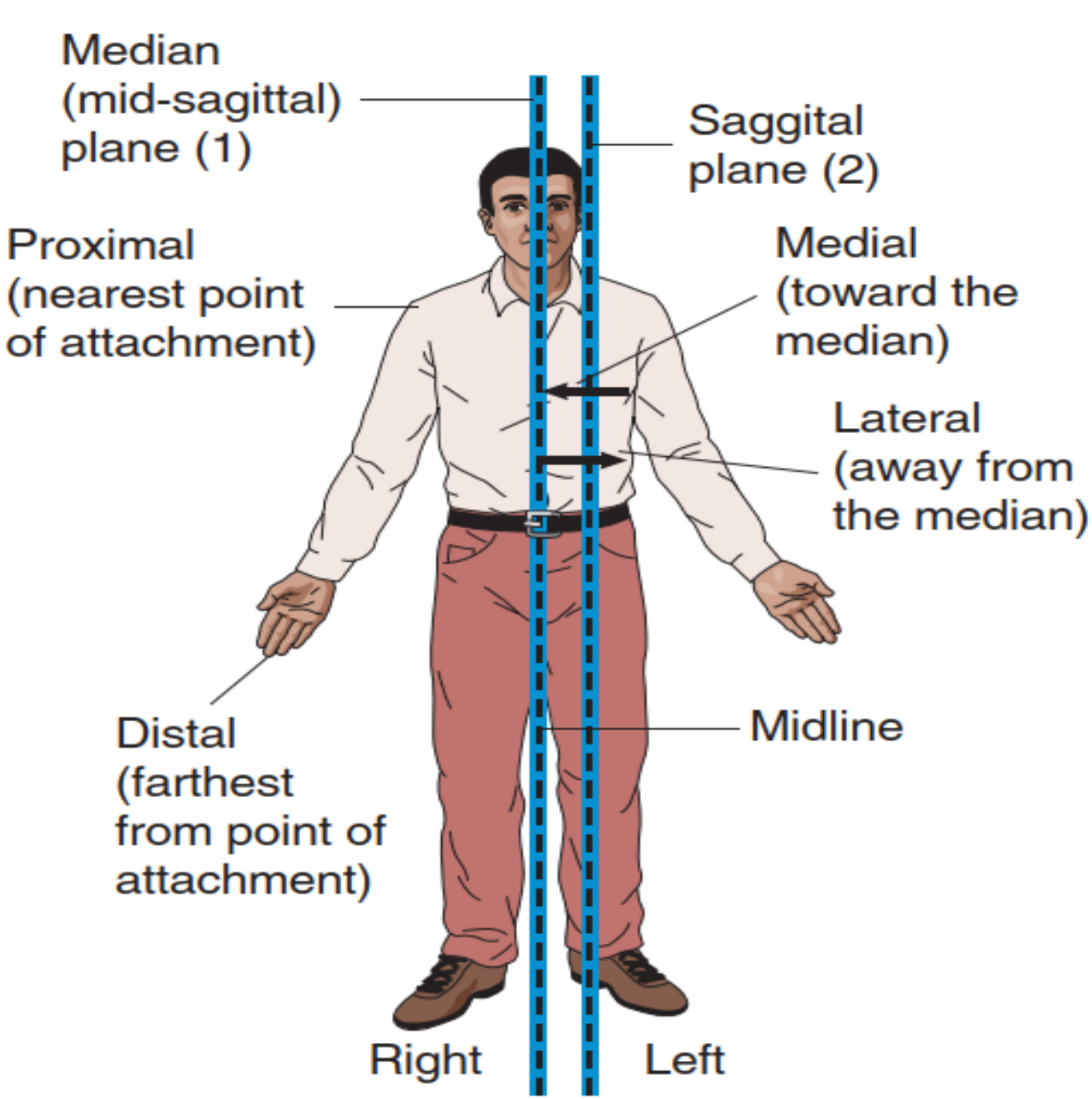
Proximal and Distal

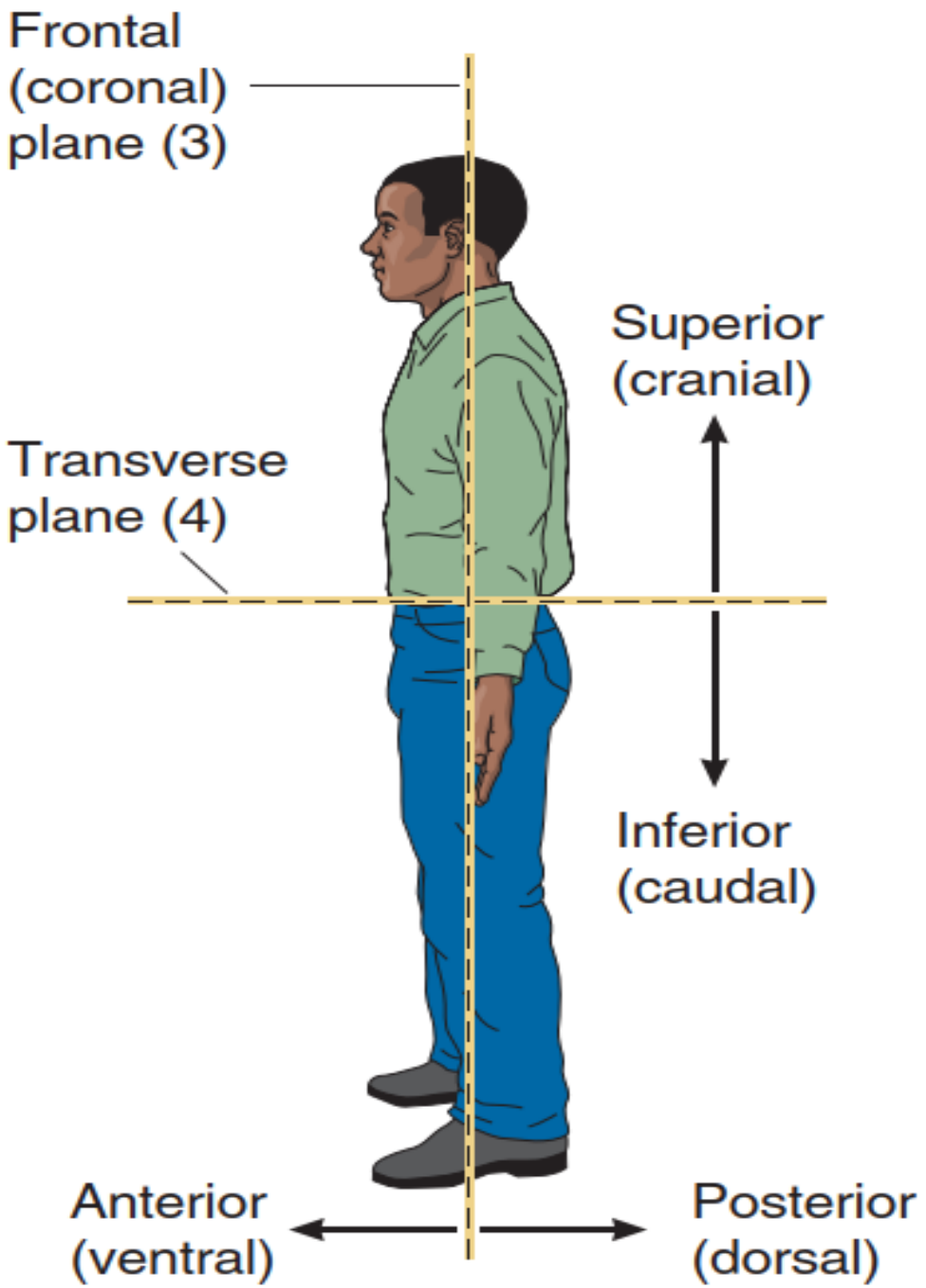
The terms **proximal** and **distal** are used in structures that are considered to have a beginning and an end (such as the upper limb, lower limb and blood vessels). They describe the position of a structure with reference to its origin – proximal means closer to its origin, distal means further away.

Examples:

The wrist joint is distal to the elbow joint.

The knee joint is proximal to the ankle joint.


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)

Body Cavities

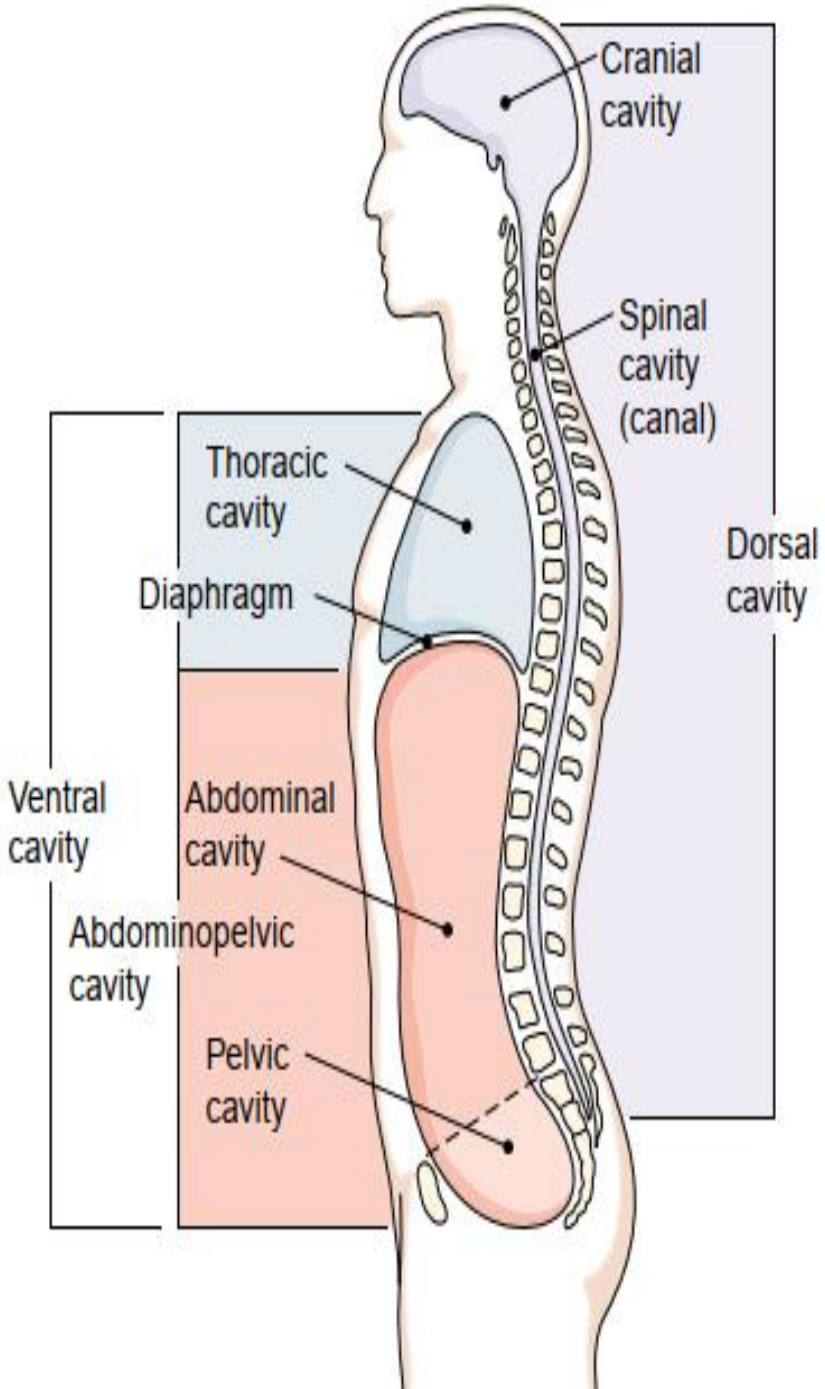
Internal organs are located within dorsal and ventral cavities.

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



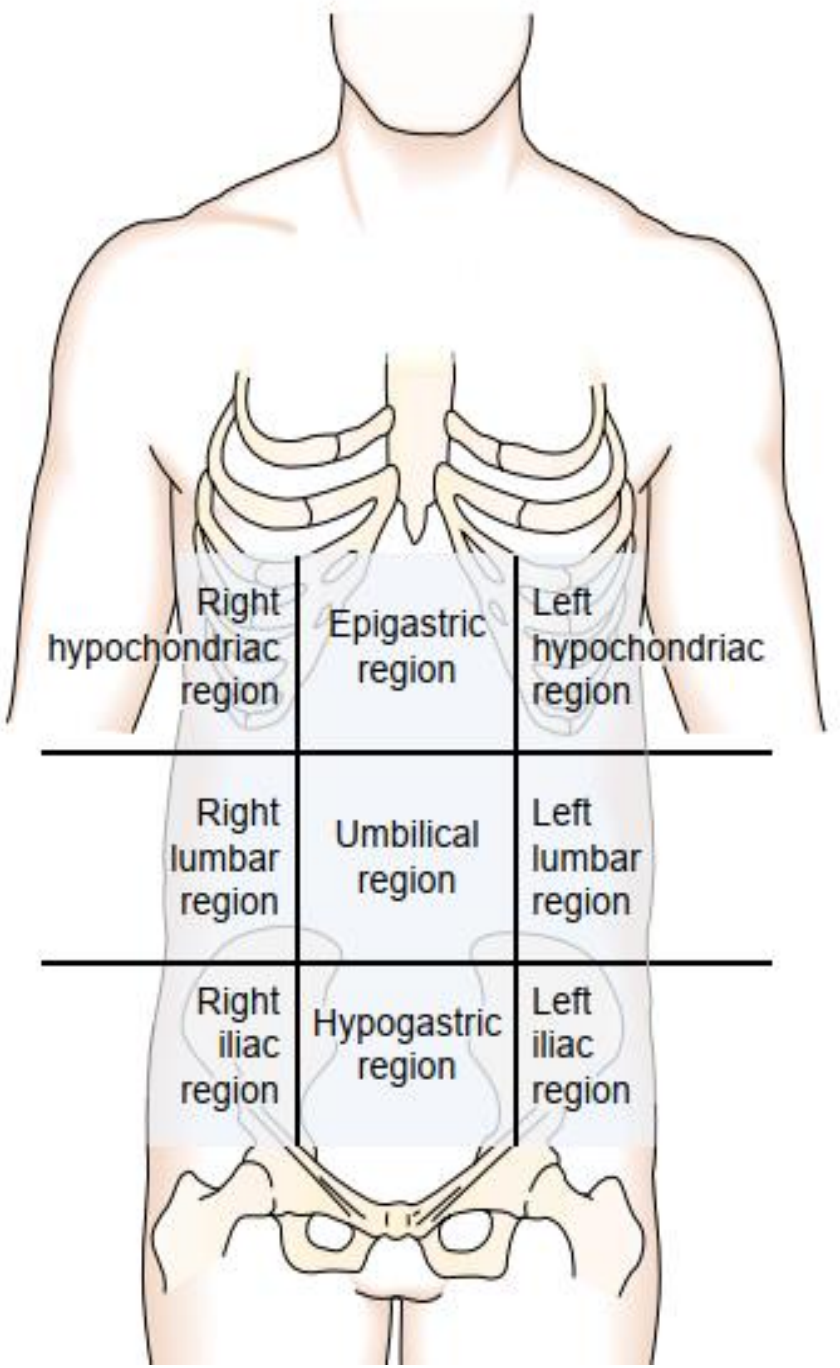
Body Regions

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

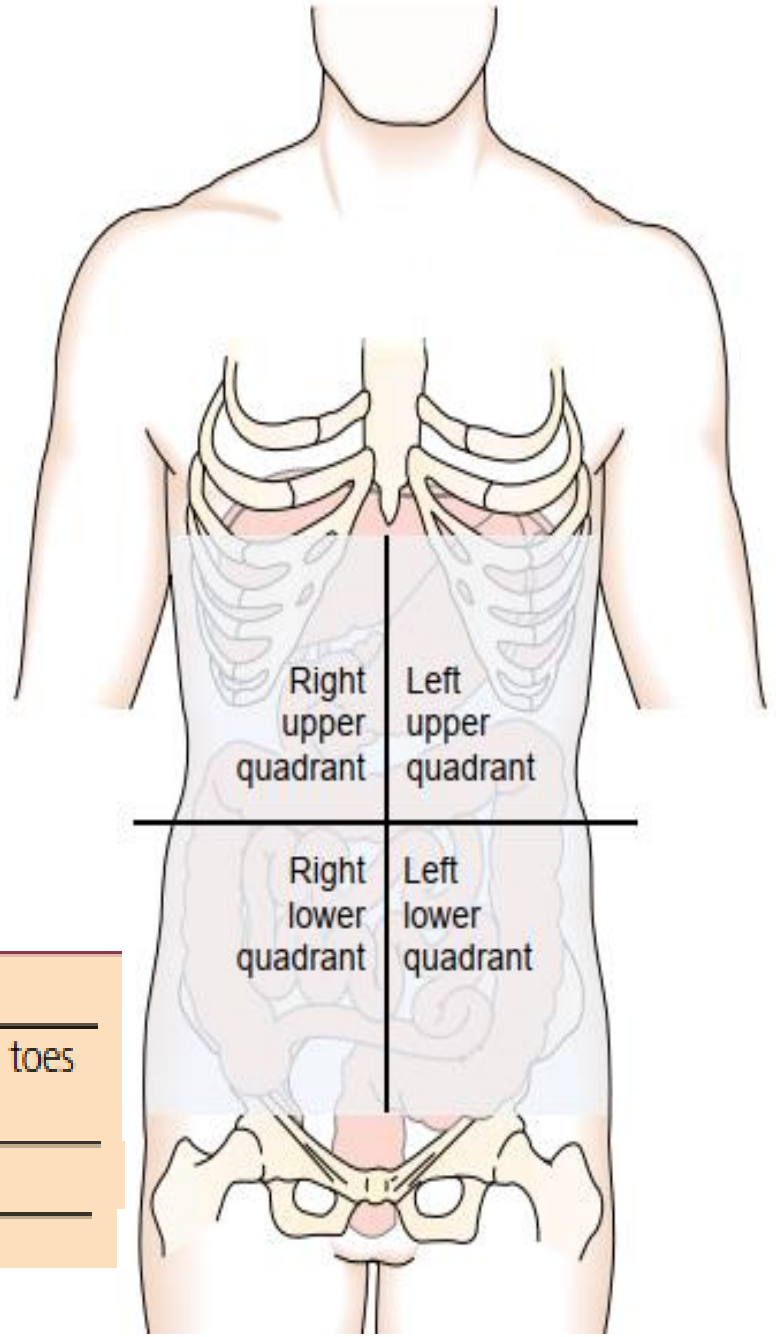
The lateral regions are the:

- 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

Word Parts Pertaining to Body Structure

ROOT	MEANING	EXAMPLE	DEFINITION OF EXAMPLE
cephal/o	head	microcephaly *mī-krō-SEF-a-lē*	abnormal smallness of the head
cervic/o	neck	cervicofacial *ser-vi-kō-FĀ-shal*	pertaining to the neck and face
thorac/o	chest, thorax	extrathoracic *eks-tra-thō-RAS-ik*	outside the thorax
abdomin/o	abdomen	intra-abdominal *in-tra-ab-DOM-i-nal*	within the abdomen

PREFIX	MEANING	EXAMPLE	DEFINITION OF EXAMPLE
circum-	around	circumoral *ser-kum-OR-al*	around the mouth
peri-	around	perivascular *per-ē-VAS-kū-lar*	around a vessel (*vascul/o*)
intra-	in, within	intrauterine *in-tra-Ū-ter-in*	within the uterus
epi-	on, over	epithelium *ep-i-THĒ-lē-um*	tissue that covers surfaces
extra-	outside	extracellular *eks-tra-SEL-ū-lar*	outside a cell or cells
infra-*	below	infrapatellar *in-fra-pa-TEL-ar*	below the kneecap (patella)
sub-*	below, under	sublingual *sub-LING-gwal*	under the tongue (*lingu/o*)
inter-	between	intercostal *in-ter-KOS-tal*	between the ribs (*cost/o*)
juxta-	near, beside	juxtaposition *juks-ta-pō-ZI-shun*	a location near or beside another structure
para-	near, beside behind	parasagittal *par-a-SAJ-i-tal*	near or beside a sagittal plane
retro-	backward	retroperitoneal *re-trō-per-i-tō-NĒ-al*	behind the peritoneum
supra-	above	suprascapular *su-pra-SKAP-ū-lar*	above the scapula (shoulder blade)

*Also indicates degree.