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المحاضرة الأولى

Anatomy

Anatomical

Terminology



BODY CAVITIES

- ➔ Spaces within the body
- ➔ containing vital organs
- ➔ Two MAIN Cavities

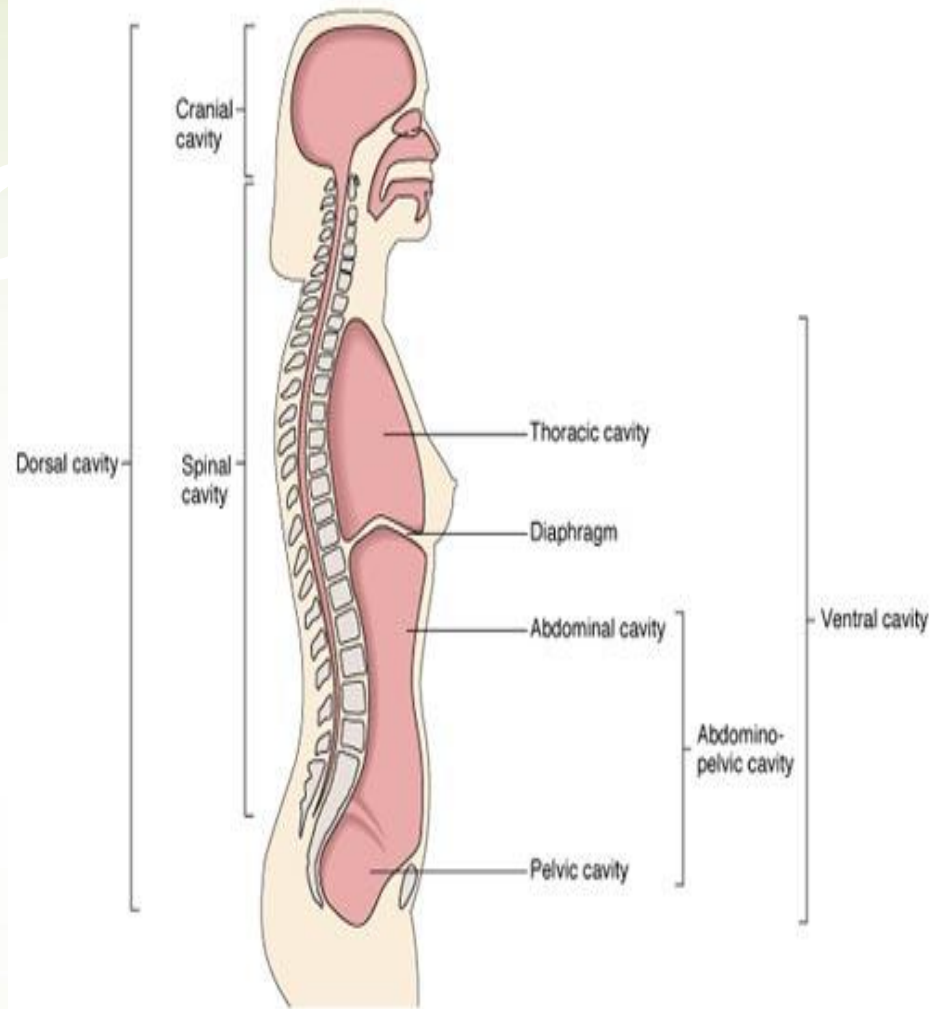
Dorsal - (posterior)
on the back side of the body

- **Cranial** - holds the brain
- **Spinal Cavity** - holds the spinal cord

Ventral - (anterior)

on the belly side of the body

- **Thoracic** - holds the heart, lungs, and major blood vessels
- **Abdominal** - holds organs of the digestive & urinary systems, Stomach, small intestines, liver, gallbladder, pancreas, spleen, & part of the large intestine
- **Pelvic** - contains the urinary bladder, reproductive organs, rectum, remaining part of the large intestine & the appendix





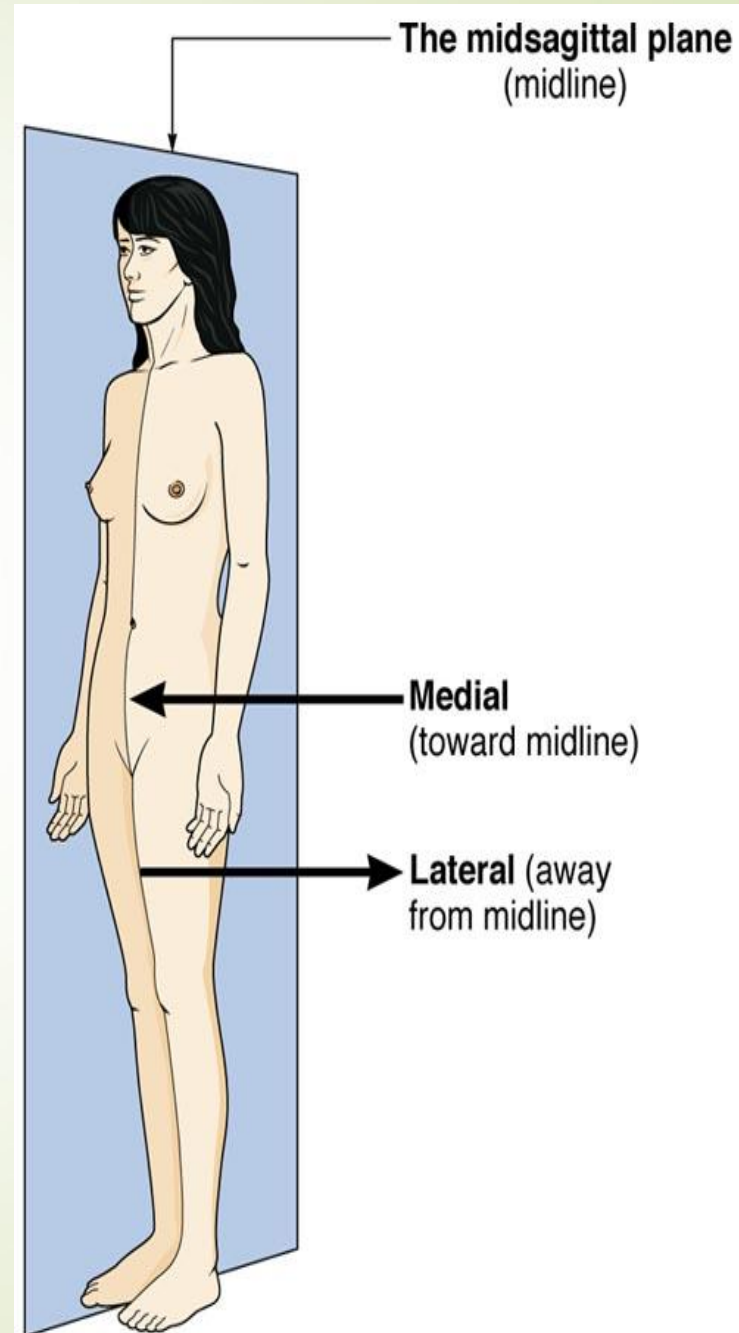
BODY PLANES

- Fixed lines of reference along which the body is often divided or sectioned
- Allows for a three-dimensional perspective

MIDSAGITTAL PLANE

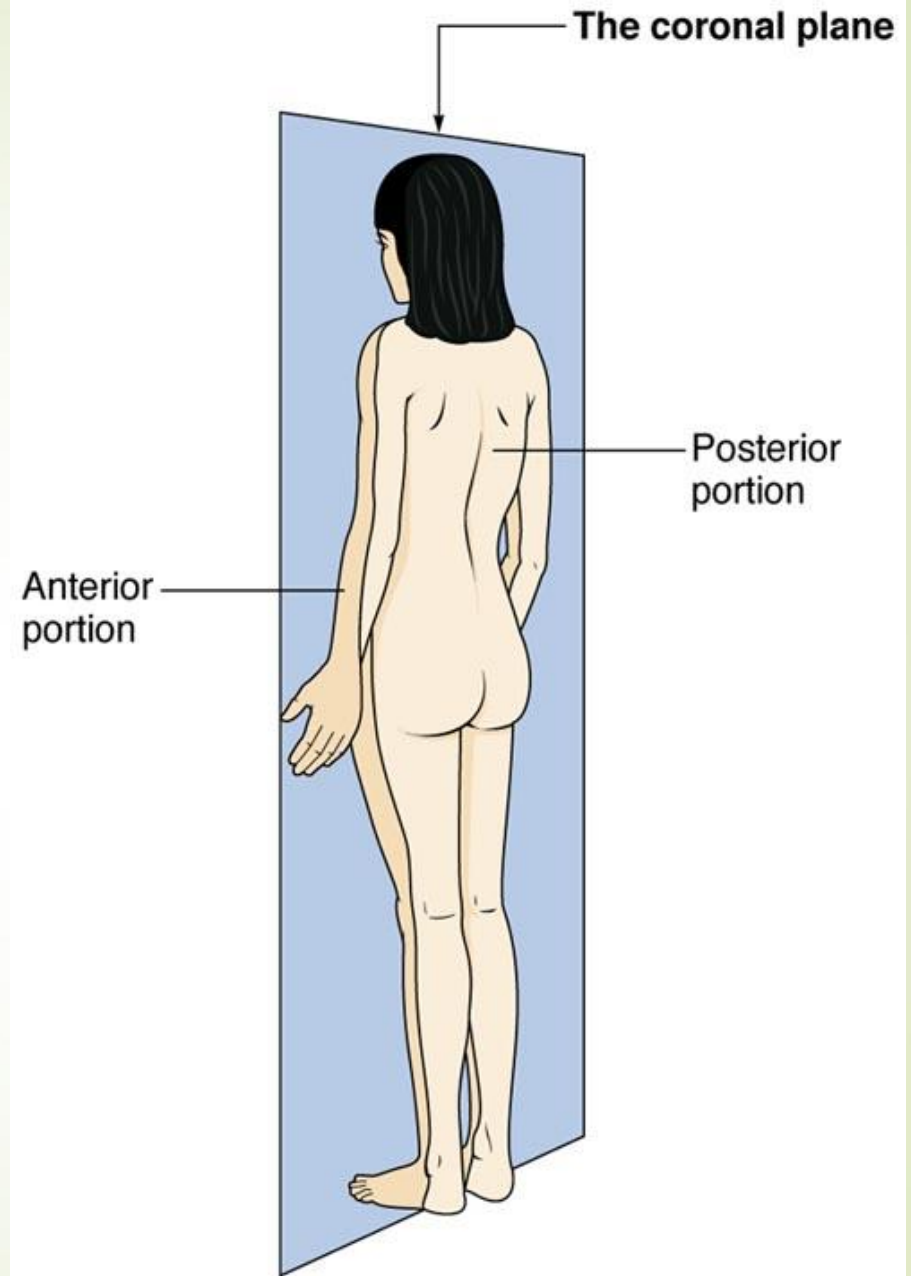
Divides the body into EQUAL left and right halves

- ➔ **SAGITTAL/MEDIAL PLANE** divides the body into two parts (Left & Right)



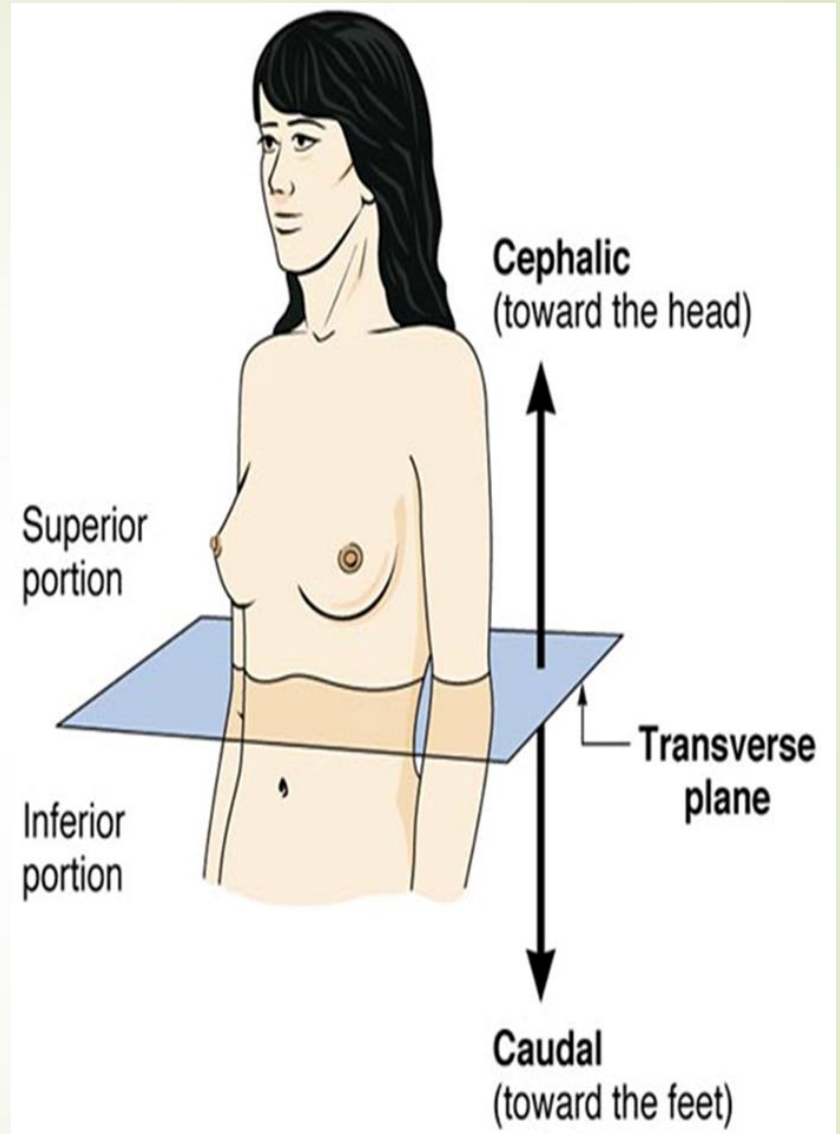
FRONTAL or CORONAL PLANE

- ▶ divides the body into anterior and posterior sections



TRANSVERSE PLANE

divides body into top (superior) and bottom (inferior) parts



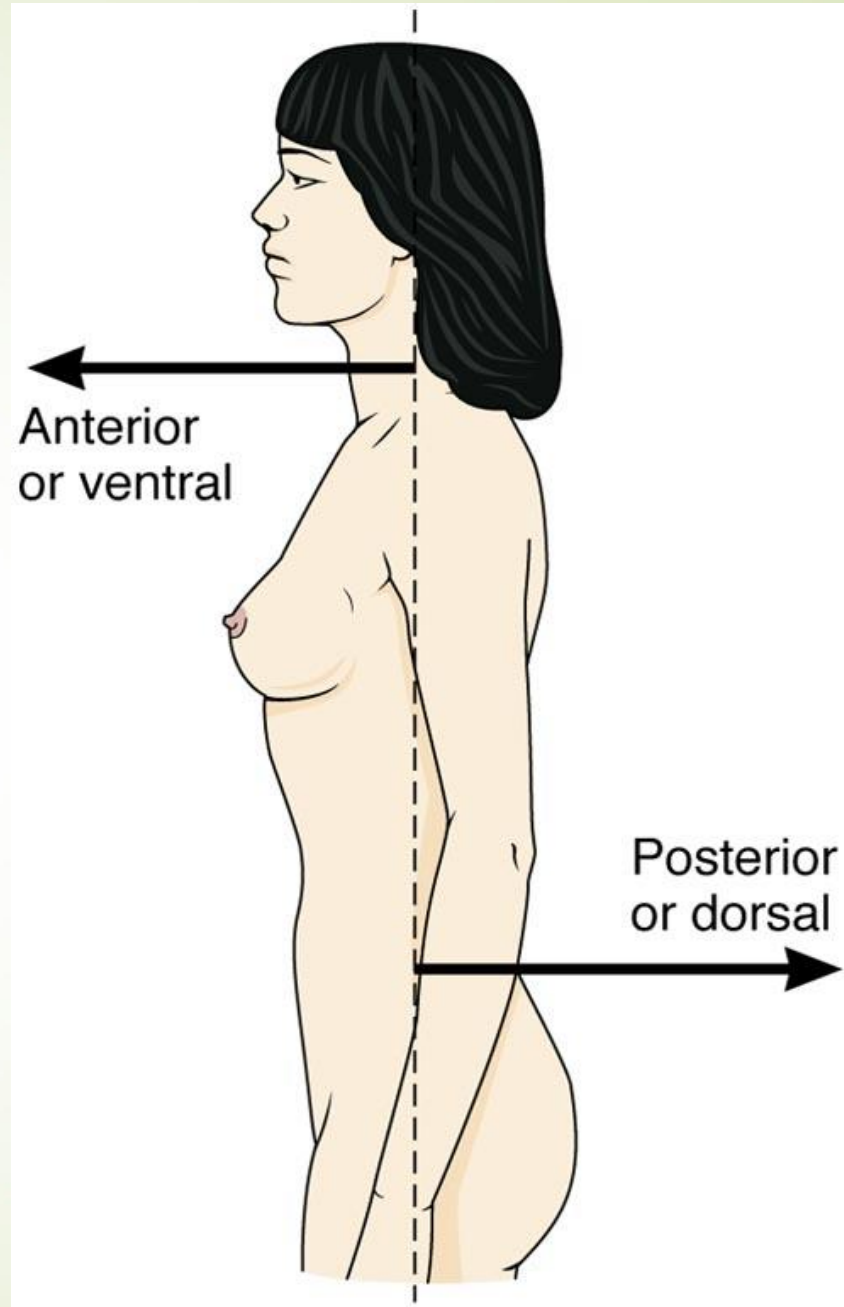
DIRECTIONAL TERMS ANATOMICAL POSITION

ANTERIOR/VENTRAL

Means to the front
(belly) side of the body

POSTERIOR/DORSAL

Means the back side of
the body





LATERAL

Means to the side

MEDIAL

Means middle or near the medial plane

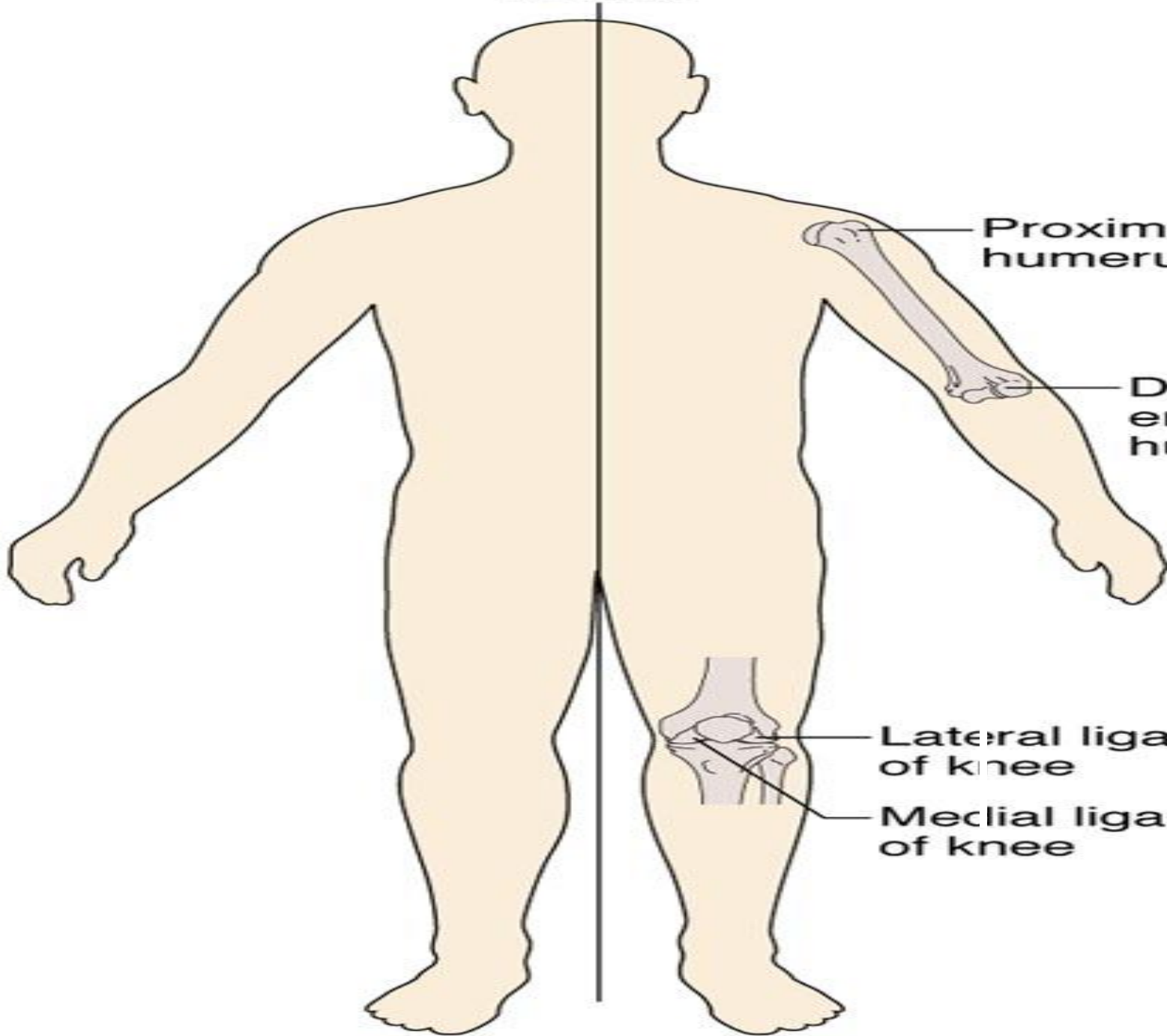
PROXIMAL

Means near the point of attachment to the trunk

DISTAL

Means away from the point of attachment

Midline



Proximal end of humerus

Distal end of humerus

Lateral ligaments of knee

Medial ligaments of knee

- **SUPINE**

- Means lying on the back facing upward

- **PRONE**

- Means lying on the stomach facing downward

- **DEEP**

- Means through the surface

- **SUPERFICIAL**

- Means on or near the surface



CRANIAL / CEPHALIC

Meaning toward the head

CAUDAL

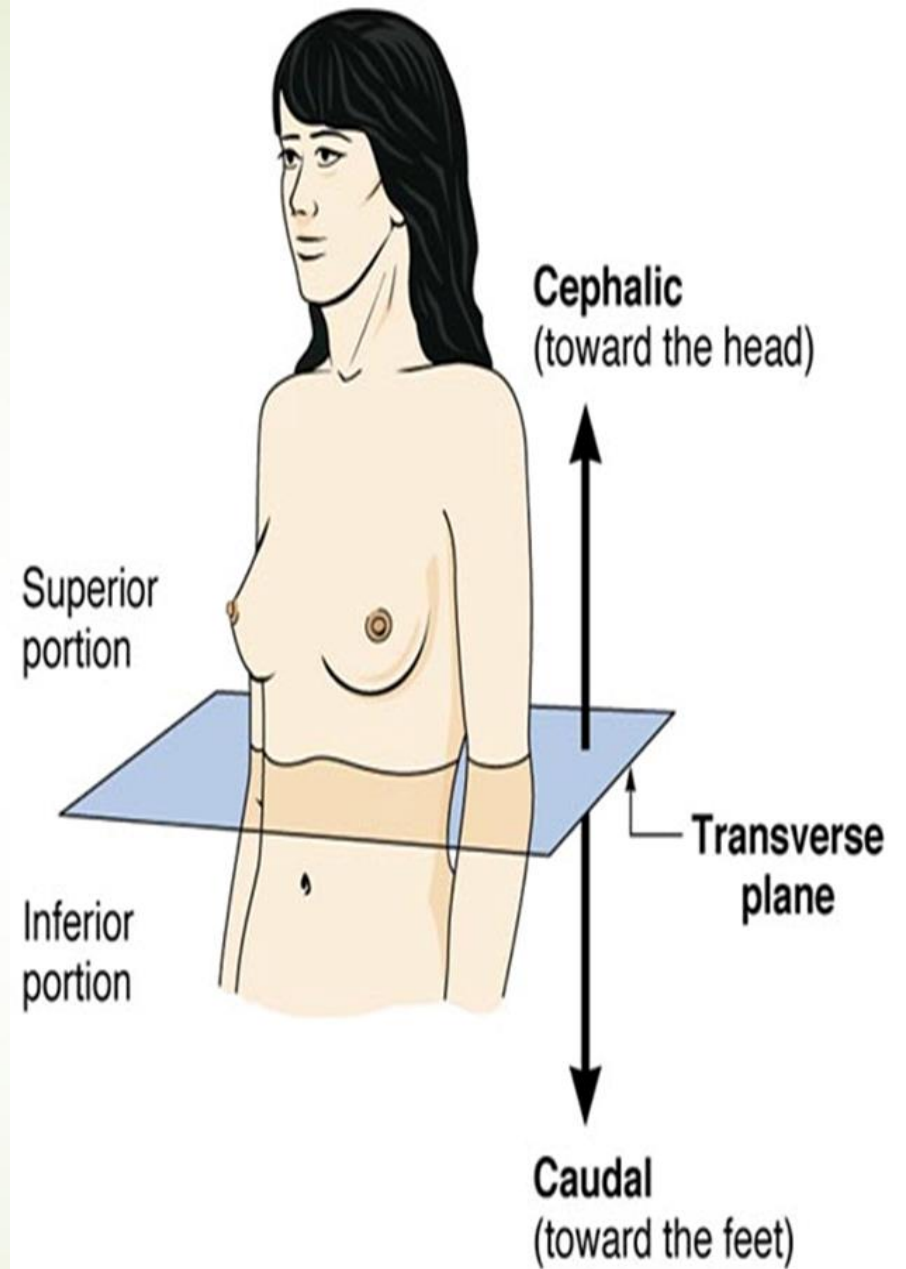
Meaning toward the feet

SUPERIOR

Above another structure

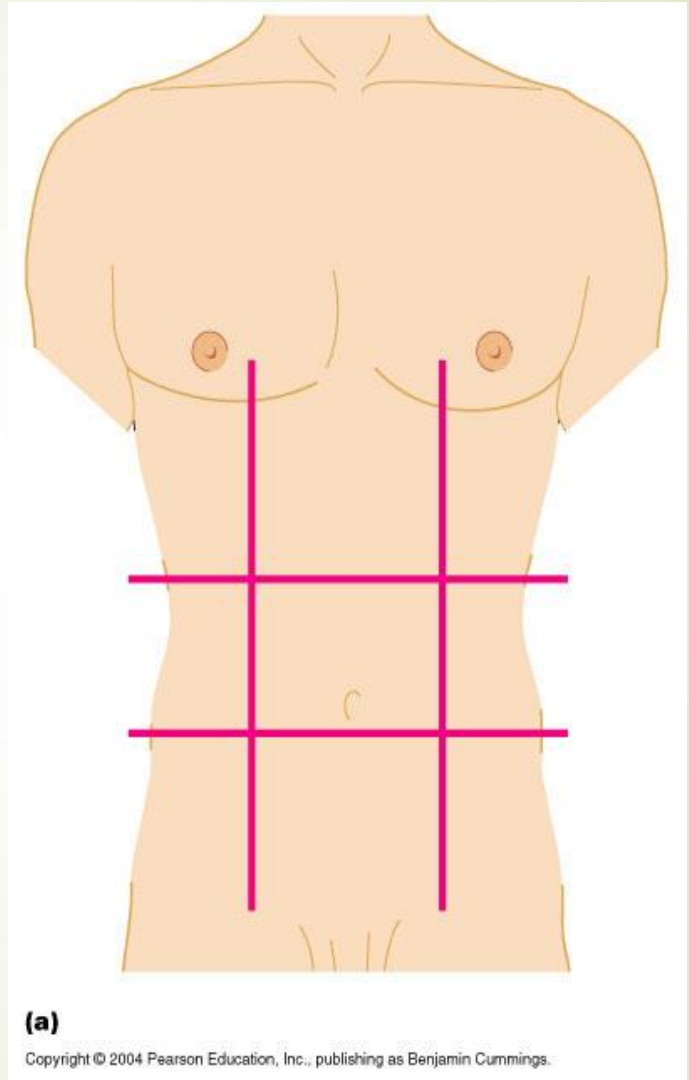
INFERIOR

Below another structure



REGIONS

- ➔ Abdominal cavity is divided into nine regions
- ➔ Regions are used to describe the location of the organ, injury or pain

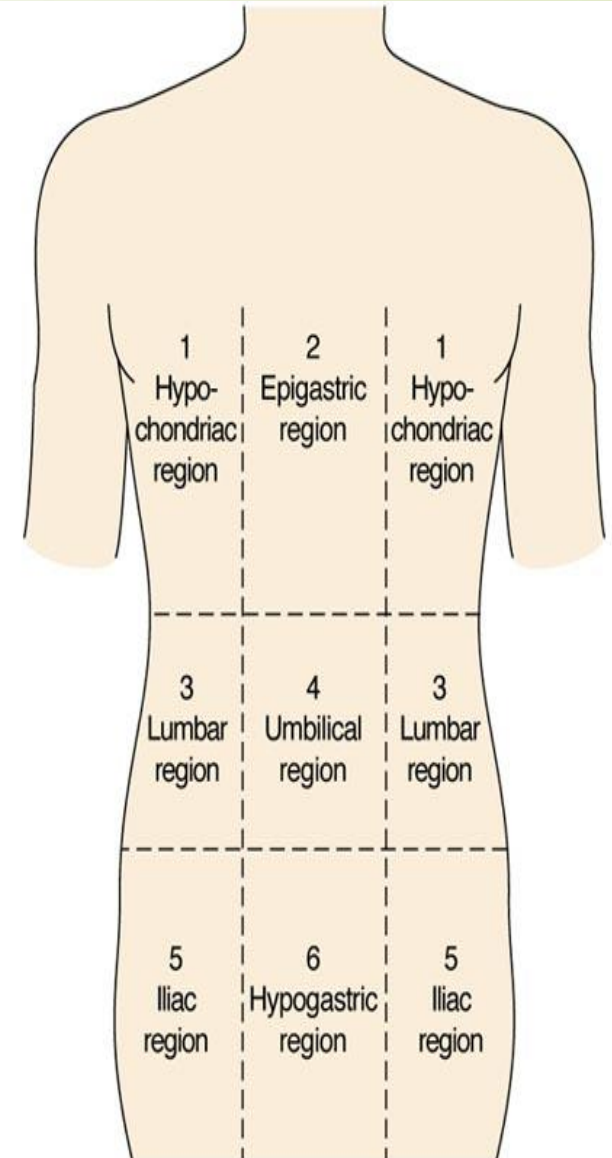


EPIGASTRIC

Upper, center area
above the stomach

HYPOGASTRIC

Area just below the
umbilical region



ILIAC or INGUINAL

Located near the upper portion of the hipbone

On either side of the hypogastric region

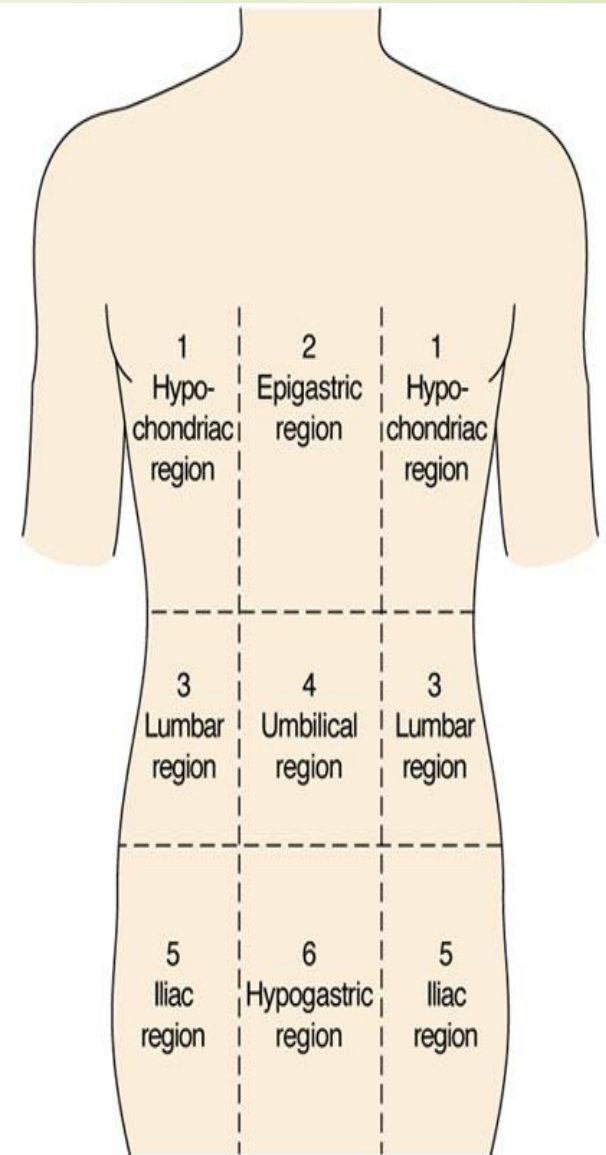
A left and a right side

➔ HYPOCHONDRIAC

Just below the ribs, immediately over the abdomen

On either side of the epigastric region

A left and a right side



LUMBAR

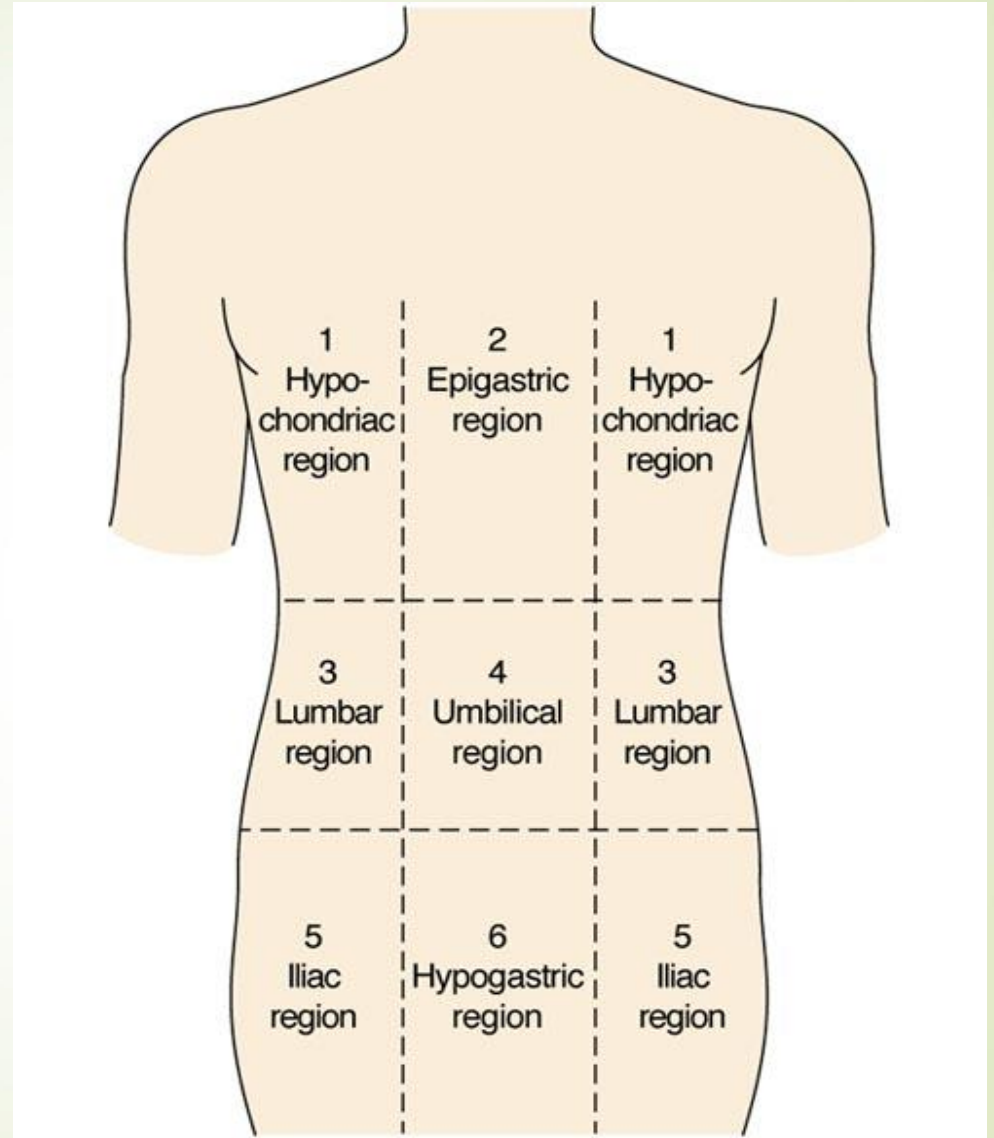
Near the waist

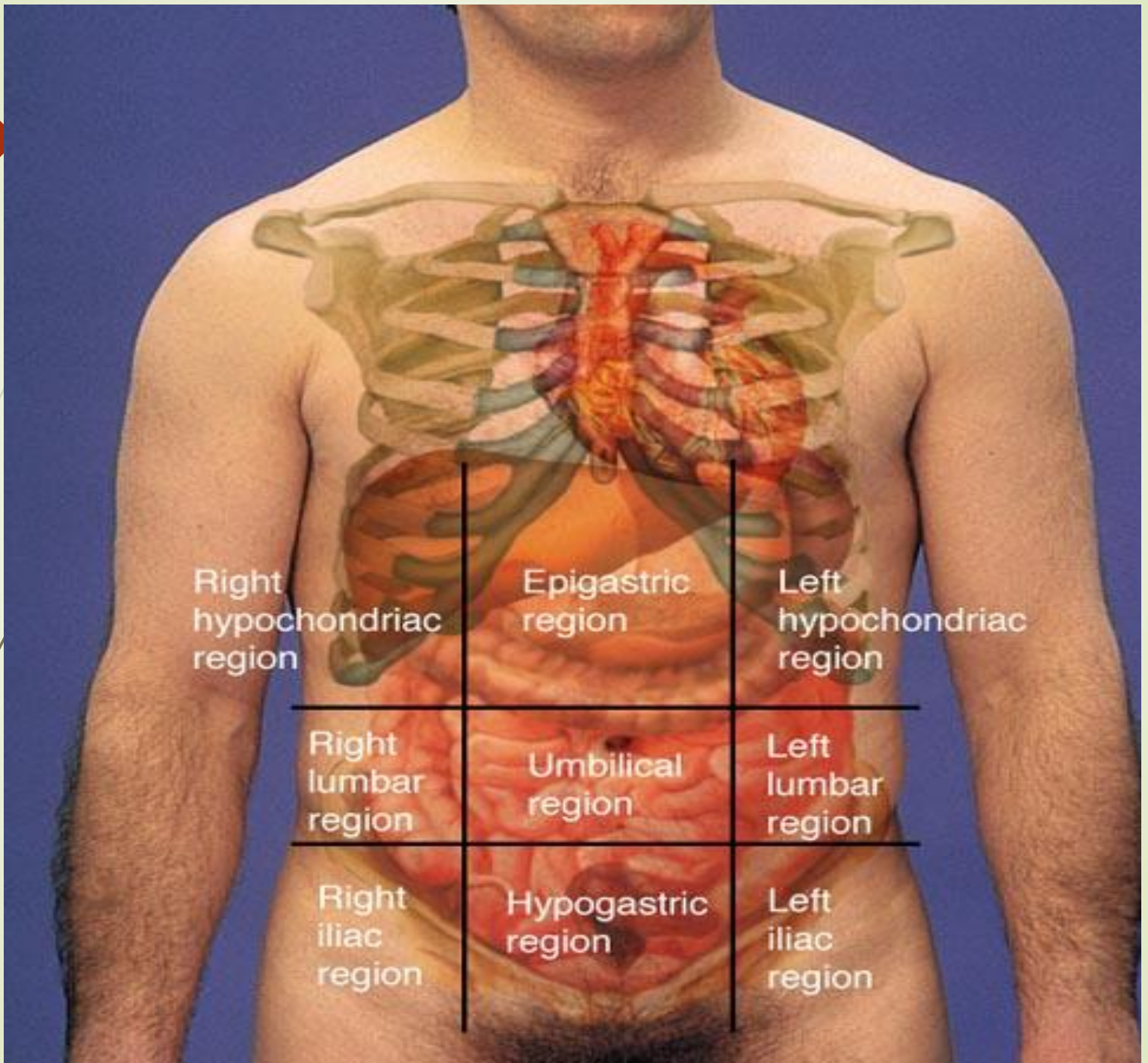
On either side of the umbilical region

A left and a right side

UMBILICAL

The region surrounding the umbilicus





Right
hypochondriac
region

Epigastric
region

Left
hypochondriac
region

Right
lumbar
region

Umbilical
region

Left
lumbar
region

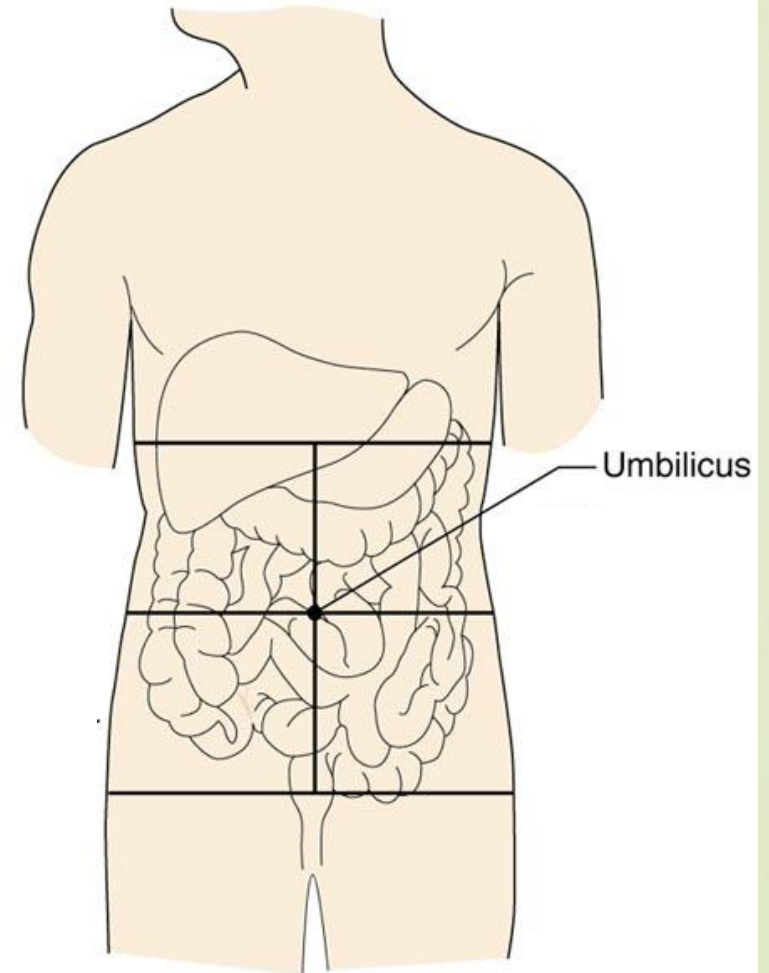
Right
iliac
region

Hypogastric
region

Left
iliac
region

QUADRANTS

- A simpler way to divide the abdominal cavity is into QUADRANTS



Right Upper Quadrant (RUQ)

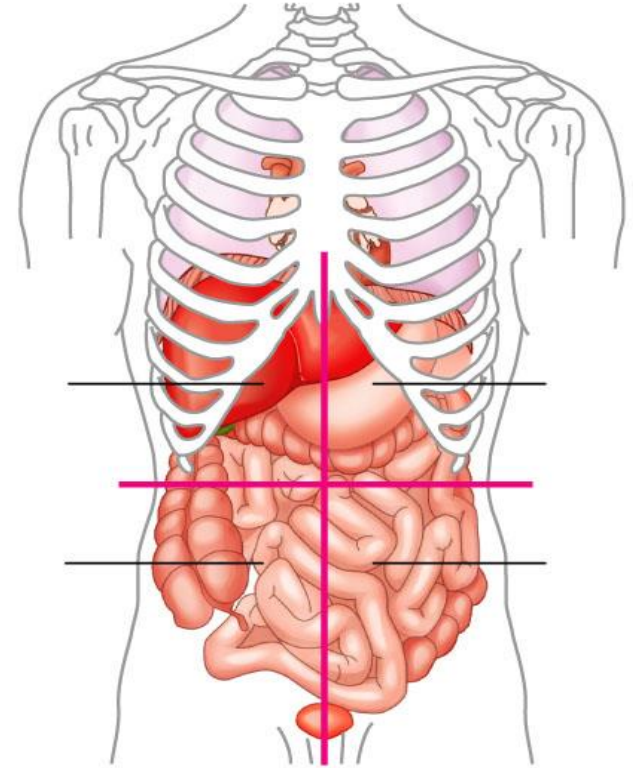
On the right anterior side

Contains part of the liver, the gallbladder, parts of the pancreas and intestinal tract

Right Lower Quadrant (RLQ)

On the right anterior side

Contains the appendix, parts of the intestines, female reproductive organs and the urinary tract



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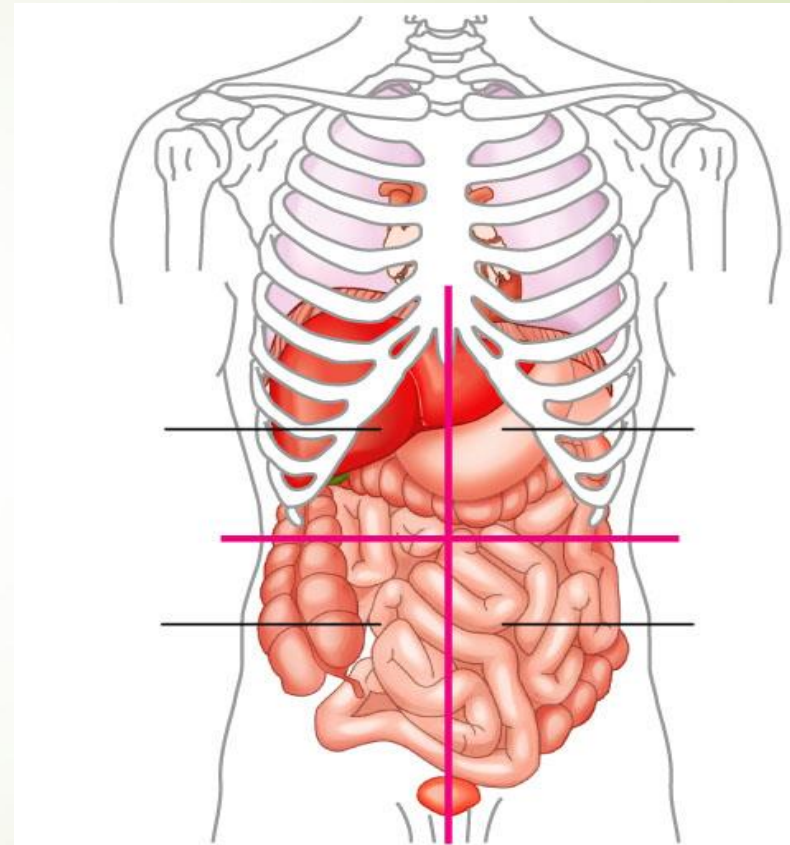
Left Upper Quadrant (LUQ)

On the left anterior side
Contains the stomach, spleen, and parts of the liver, pancreas and intestines

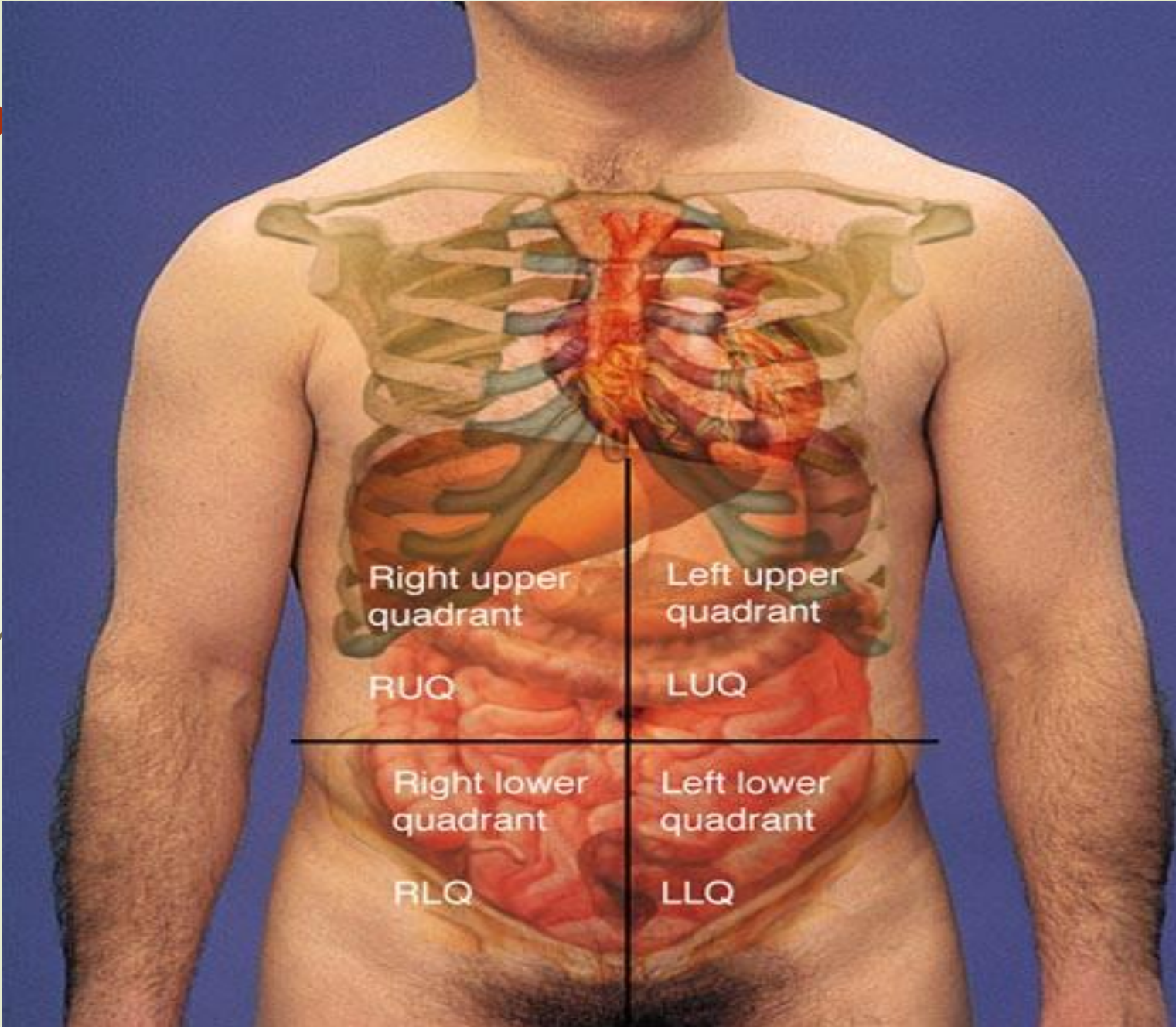
Left Lower Quadrant (LLQ)

On the left anterior side

Contains parts of the intestines,
reproductive organs of the female and
the urinary tract



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Right upper quadrant

RUQ

Left upper quadrant

LUQ

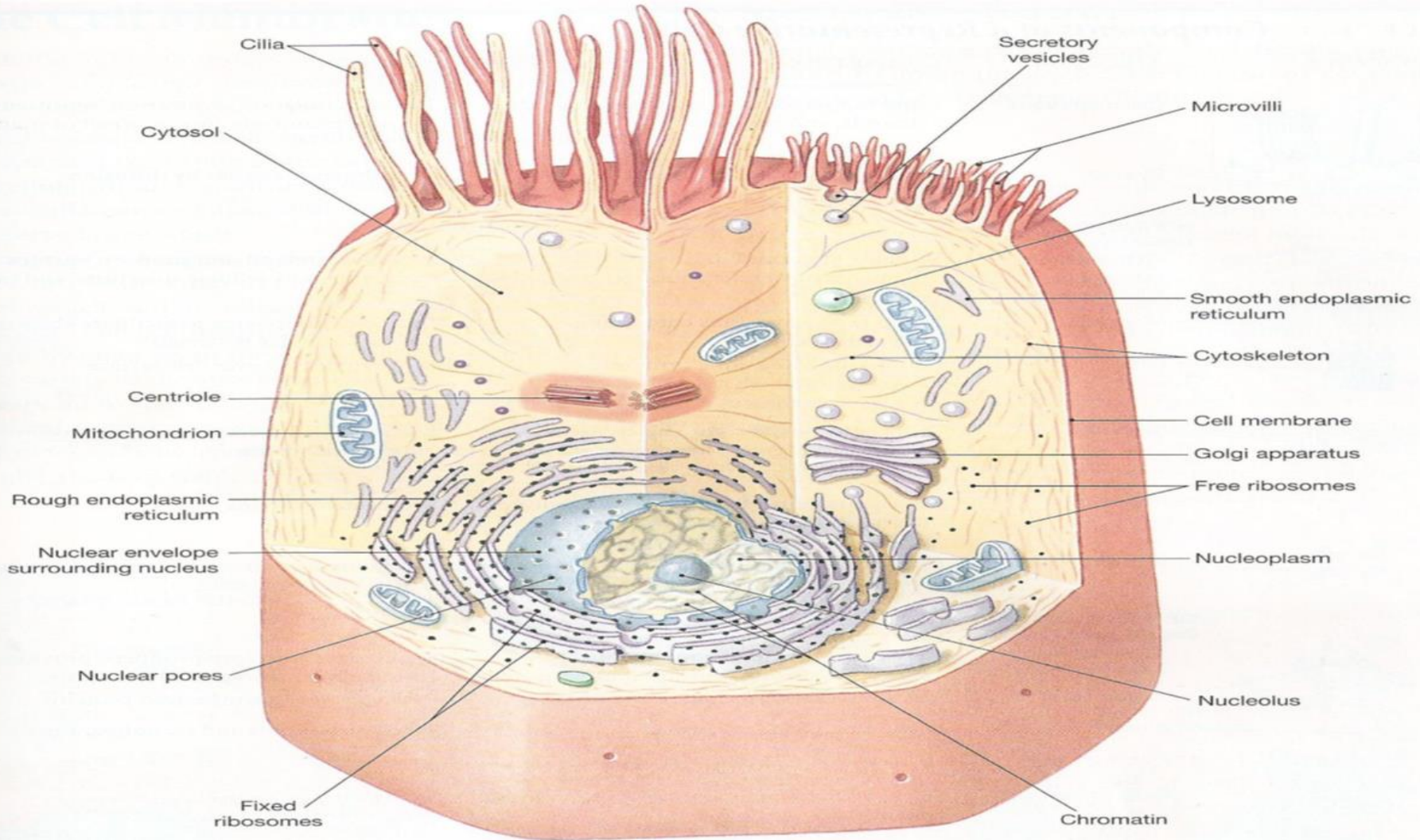
Right lower quadrant

RLQ

Left lower quadrant

LLQ

cell structure

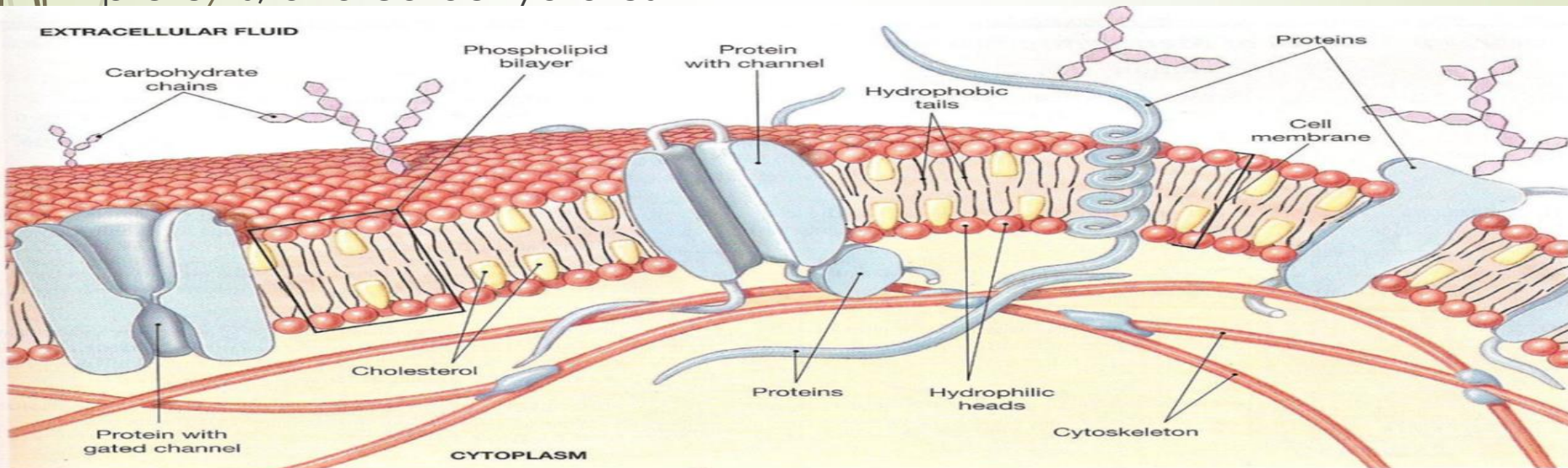


● **FIGURE 3-2** Anatomy of a Representative Cell. See Table 3-1 for an overview of the functions associated with the various structures shown.

Cells

–are the building blocks of the human body. About trillions human body cells form and maintain anatomical structures, and they perform physiological functions

- **The cell membrane:** - it's the outer boundary of the cell, and also called plasma membrane, Its general functions include-
- 1 –physical isolation
- 2-Regulation of exchange with the environment
- 3-Sensitivity
- 4- Structural support
- membrane structure: -cell membrane is extremely thin and delicate, the ranging from 6 nm to 10 nm in thickness. This membrane contains lipids, proteins, and carbohydrates



● FIGURE 3-3 The Cell Membrane.

The cytoplasm:

is the material inside the cell membrane to the nucleus, the cytoplasm contains cytosol and organelles.

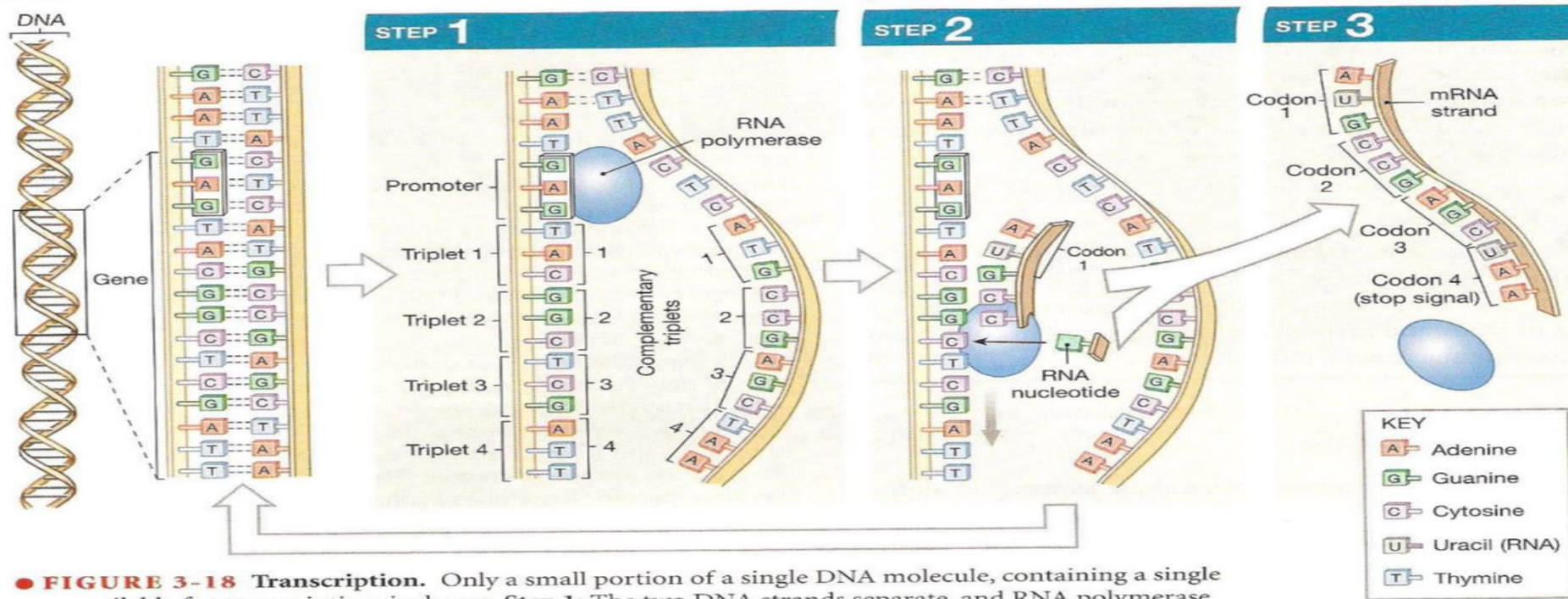
- **1-cytosol:** - is the intracellular fluids, which contain dissolved nutrients, ions soluble and insoluble proteins, and waste products. It differs in composition from the extracellular fluid.
- **2-organelles:**- are internal structures that perform specific functions essential to normal cell structure, maintenance, and metabolism. They are include-
- **The cytoskeleton:** - is an internal protein framework of various threadlike filaments and hollow tubules that gives the cytoplasm strength and flexibility.
- **Microvilli:** - are small, finger-shaped projections of the cell membrane on the exposed surfaces of many cells. Its functions, they increase the surface area of the membrane.
- **Centrioles:** - are important for cell division, it directs movement of chromosomes.
- **Cilia:** - can move fluids and secretions across the cell surface by rhythmically beating.
- **Flagella:** - move a cell through the surrounding fluid by rhythmically beating.

- **Ribosomes:** - they are intracellular factory that manufactures proteins. Free Ribosomes are found in the cytoplasm, and fixed Ribosomes are attached to the endoplasmic reticulum.
- **proteasomes:** - remove and breakdown damaged or abnormal proteins.
- **The endoplasmic reticulum:** - Is a network of intracellular membranes.
- Rough endoplasmic reticulum (**RER**) contain Ribosomes on their surface thus is involved in protein synthesis.
- Smooth endoplasmic reticulum (**SER**) does not contain Ribosomes thus is involved in lipid and carbohydrate synthesis.
- **The Golgi apparatus:** - It consists of a set of five to six flattened membranes disc. Their functions:1- To form secretory vesicles.2- Produce new membrane components.
- **Lysosomes:** - are vesicles filled with digestive enzymes. Their functions include ridding the cell of bacteria and debris.
- **Mitochondria:** - are small organelles that responsible for 95% of ATP production within typical cell.

The nucleus

It is the control center for cellular operations. It is surrounded by a nuclear envelope, through which it communicates with the cytosol by way of nuclear pores.

- Chromosome structure:- The nucleus controls the cell by directing the synthesis of specific proteins using information stored in the DNA of chromosomes.
- The genetic code- It is the cell's information storage system.
- Protein synthesis-It includes both transcription, which occurs in the nucleus, and translation, which occurs in the cytoplasm.



● **FIGURE 3-18 Transcription.** Only a small portion of a single DNA molecule, containing a single gene available for transcription, is shown. **Step 1:** The two DNA strands separate, and RNA polymerase binds to the promoter of the gene. **Step 2:** The RNA polymerase moves from one nucleotide to another along the length of the gene. At each site, complementary RNA nucleotides form hydrogen bonds with the DNA nucleotides of the gene. The RNA polymerase then bonds the arriving nucleotides together into a strand of mRNA. **Step 3:** On reaching the stop signal at the end of the gene, the RNA polymerase and the mRNA strand detach, and the two DNA strands reattach.

The tissue level of organization

Tissue: - A group of similar cells specialized to perform a set of function.

There are 4 types of tissues:-

1- Epithelial, 2- Connective, 3-Muscle, 4- Neural tissue

1-Epithelial tissue ;-contain-

1-Epithelia: - Are layers of cells that cover internal or external surface.

2- Gland: - Composed of secreting cells derived from epithelia.

Classifying epithelia

- According to number of cells layers: - Simple and stratified.
- According to the shape of exposed cell: - Squamous, cuboidal, columnar.

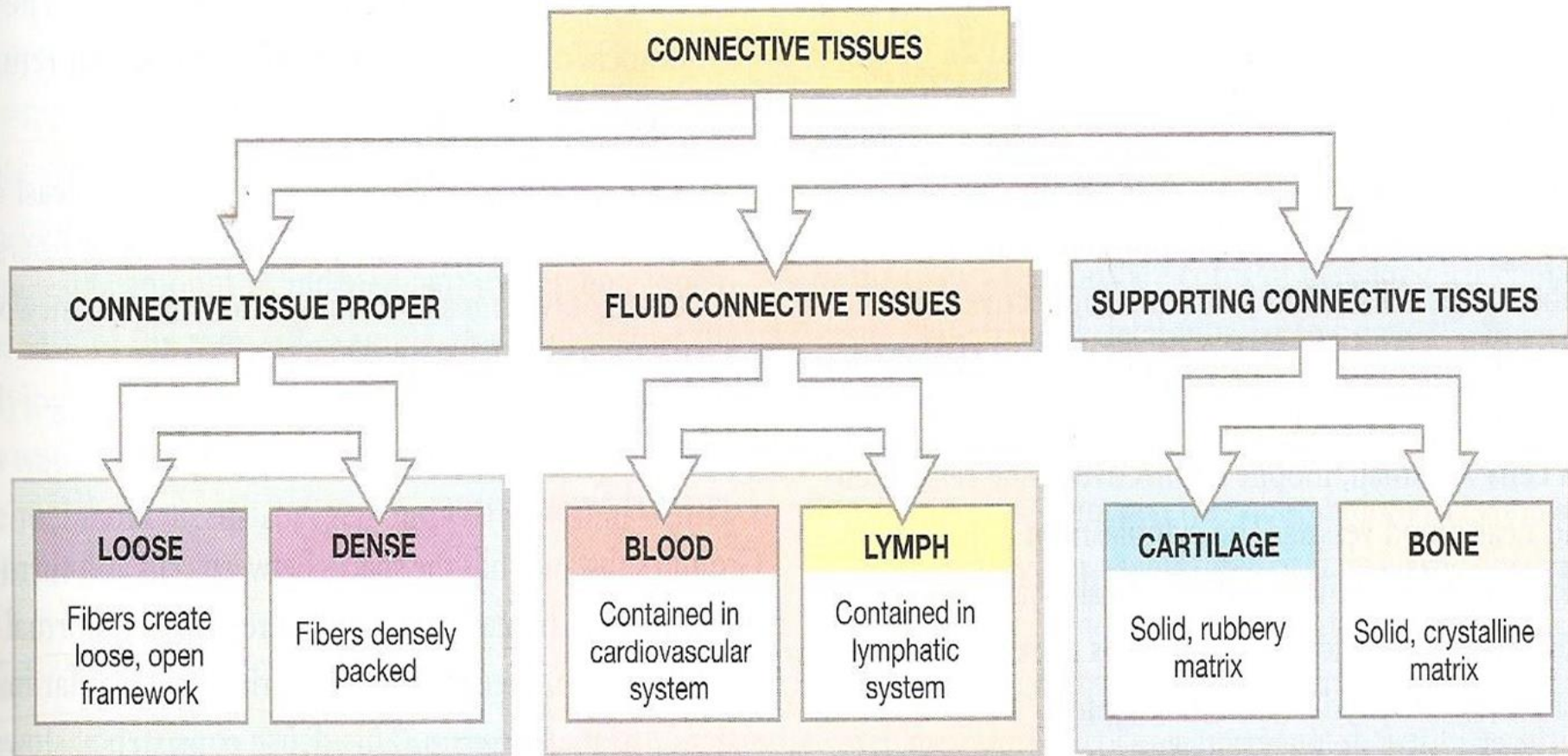
Classifying Glandular epithelium according to mode of secretion :-

- **Merocrine** secretion produce Mucous
- **Apocrine** secretion produce Milk
- **Holocrine** secretion produce Sebum

2-Connective tissues (CT):-are internal tissues

Classifying of (CT) classified in 3 types:-

- 1- CT proper:- as “subcutaneous T., fatty T., tendon and ligament”.
- 2- Fluid CT:- as blood and lymph.
- 3- Supportive CT:- as bone, cartilage.

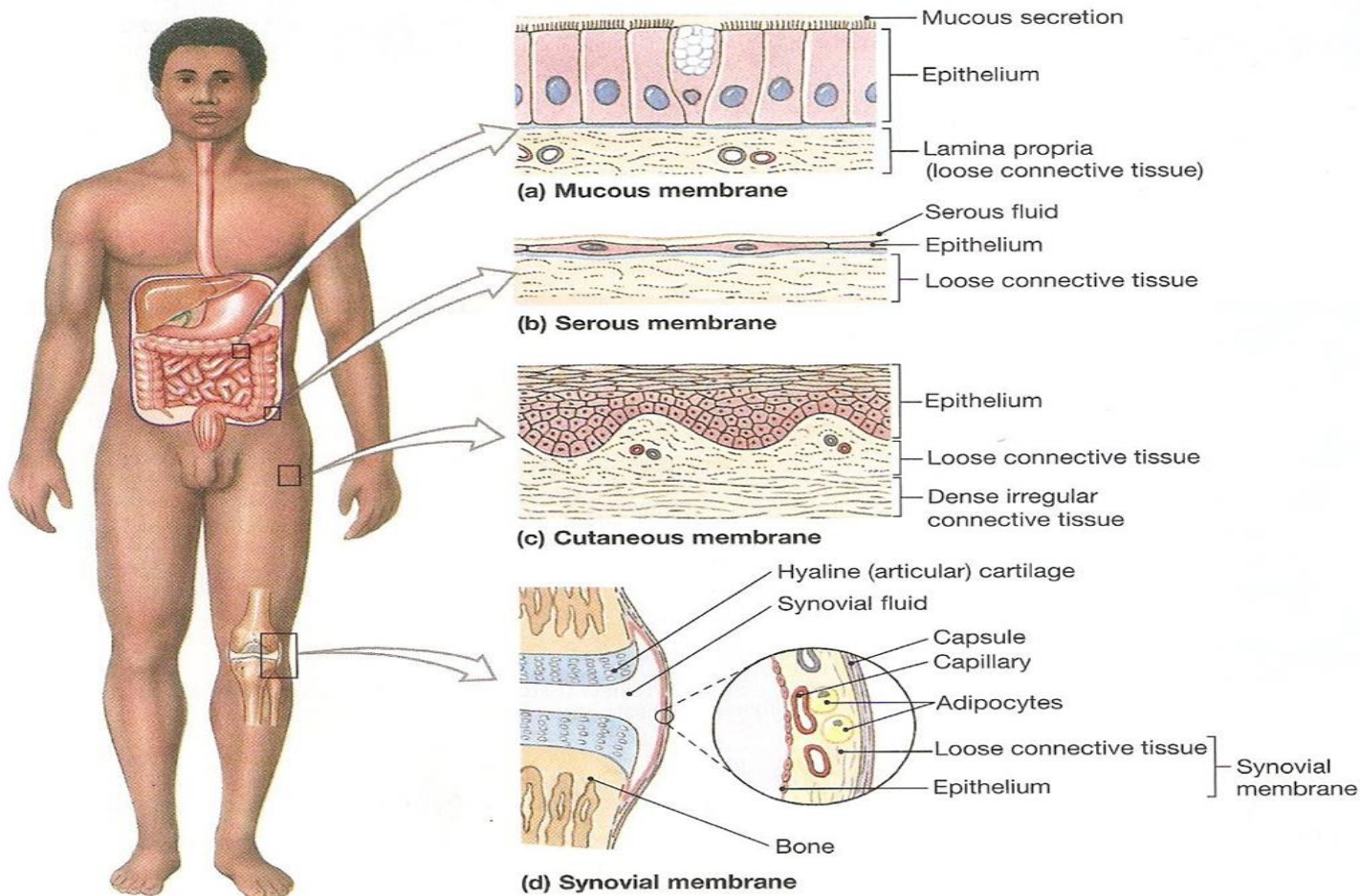


Membranes

□ Its combination of epithelial and connective tissues that covered & protect other structures & tissues.

□ The body have 4 types of membranes:-

- 1-mucous membranes.
- 2-serous membranes.
- 3-cutaneous membranes.
- 4-synovial membranes.



● **FIGURE 4-12 Membranes**

(a) Mucous membranes are coated with the secretions of mucous glands. These membranes line the digestive, respiratory, urinary, and reproductive tracts. (b) Serous membranes line the ventral body cavities (the peritoneal, pleural, and pericardial cavities). (c) The cutaneous membrane, or skin, covers the outer surface of the body. (d) Synovial membranes line joint cavities and produce the fluid within the joint.

3-Muscle tissue ;-

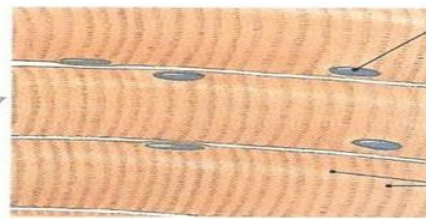
It is specialized for contraction. There are three types of muscle tissue:-
 1-skeletal , 2- cardiac, 3- smooth

SKELETAL MUSCLE TISSUE

Cells are long, cylindrical, striated, and multinucleate.

LOCATIONS: Combined with connective tissues and neural tissue in skeletal muscles

FUNCTIONS: Moves or stabilizes the position of the skeleton; guards entrances and exits to the digestive, respiratory, and urinary tracts; generates heat; protects internal organs

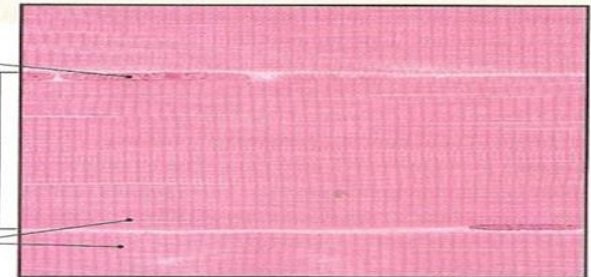


(a) Skeletal muscle

Nuclei

Muscle fiber

Striations



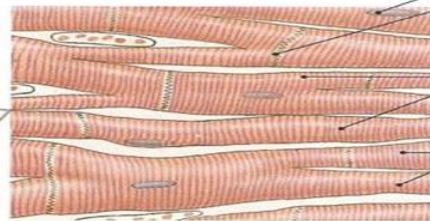
LM × 180

CARDIAC MUSCLE TISSUE

Cells are short, branched, and striated, usually with a single nucleus; cells are interconnected by intercalated discs.

LOCATION: Heart

FUNCTIONS: Circulates blood; maintains blood (hydrostatic) pressure



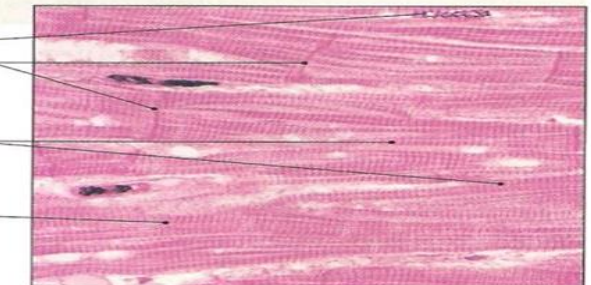
(b) Cardiac muscle

Nucleus

Intercalated discs

Cardiac muscle cells

Striations



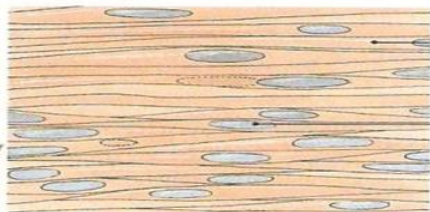
LM × 450

SMOOTH MUSCLE TISSUE

Cells are short, spindle-shaped, and nonstriated, with a single, central nucleus

LOCATIONS: Found in the walls of blood vessels and in digestive, respiratory, urinary, and reproductive organs

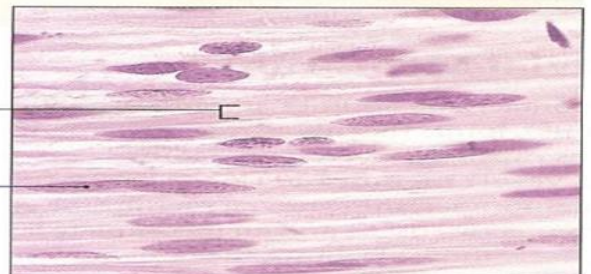
FUNCTIONS: Moves food, urine, and reproductive tract secretions; controls diameter of respiratory passageways; regulates diameter of blood vessels



(c) Smooth muscle

Smooth muscle cell

Nucleus



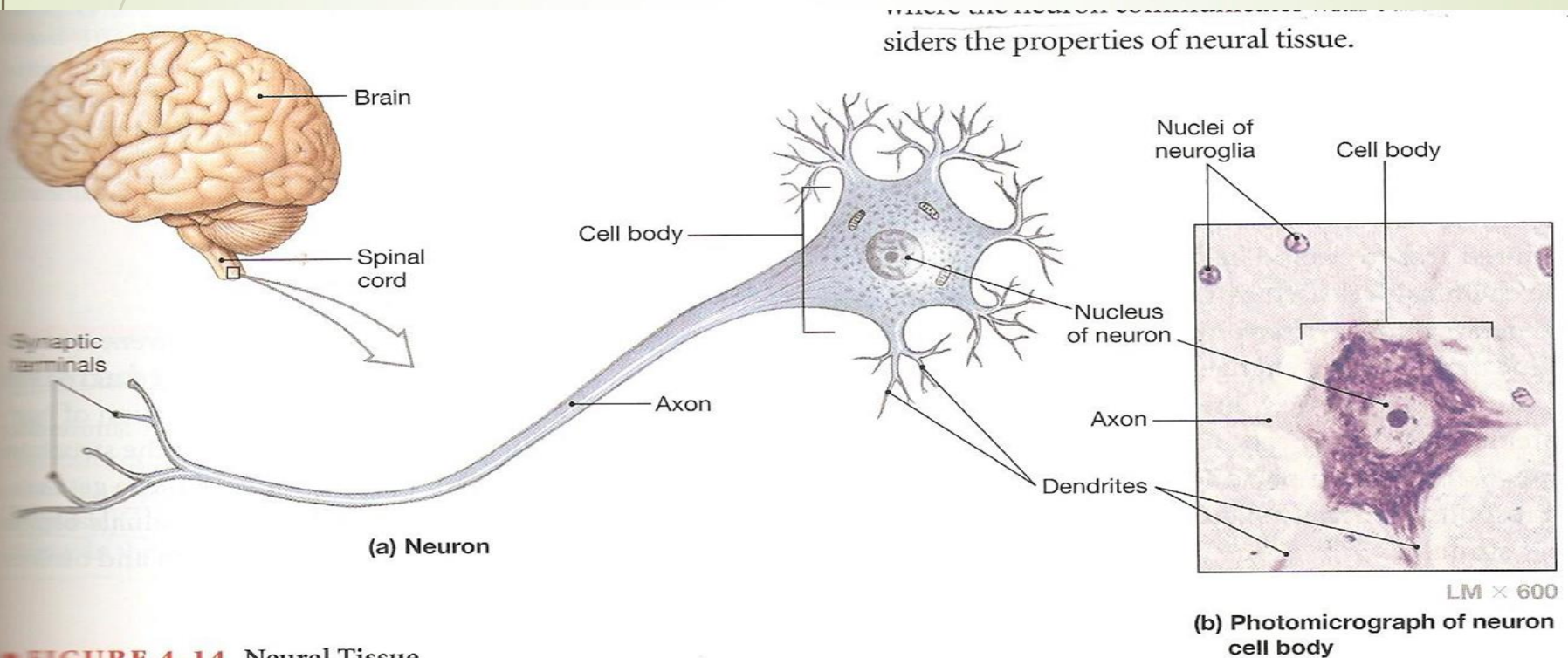
LM × 235

● **FIGURE 4-13 Muscle Tissue.** (a) Skeletal muscle fibers are large and have prominent striations (banding), multiple nuclei, and an unbranched arrangement. (b) Cardiac muscle cells differ from skeletal muscle fibers in three major ways: They are smaller, they branch, and they typically have a single centrally placed nucleus. Like skeletal muscle fibers, cardiac muscle cells have striations. (c) Smooth

4-nural tissue(NT) 98% of NT presents in brain and spinal cord, and the control centers for the nervous system. It is specialized for conduction of electrical impulses from one region of the body to another . Consist from neurons "conduct electrical impulse", and neuroglia.

Typical neuron has:-

cell body, containing large nucleus.- **dendrites**, numerous projection from the body received information from other cells. **axon**, long and slender "nerve fiber" projection carry information to other cells, and end with synaptic terminals by it communicate with other cells.



● **FIGURE 4-14** Neural Tissue.



Thank you