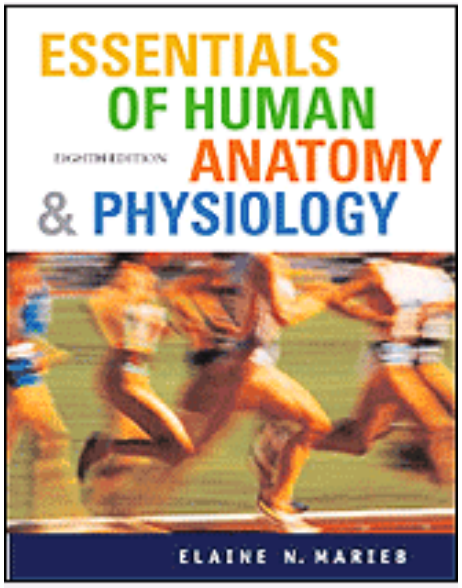
Human Anatomy and Physiology

CLS 224



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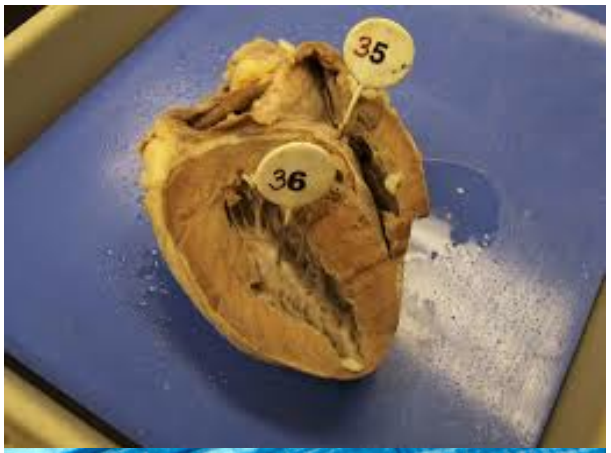
Lecture 1:

The Human Body
(an orientation)

1. An overview of anatomy and physiology
2. Levels of structural organization
3. The language of anatomy

1. An overview of anatomy and physiology

•**Anatomy:** Is the study of the body structure and its parts.

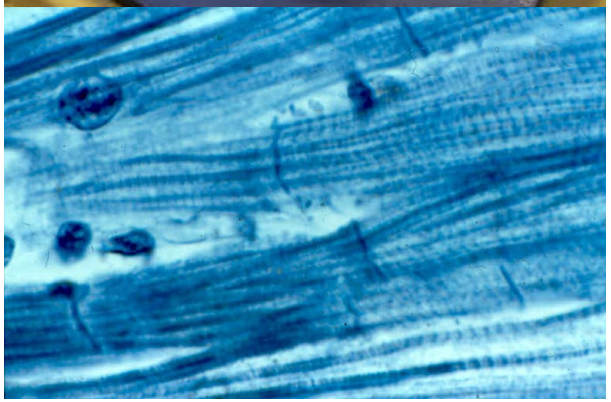


- **Gross Anatomy**:

  studying large, easily observed structures.

- **Microscopic Anatomy**:

  Studying very small structures that can only be viewed with a microscope.

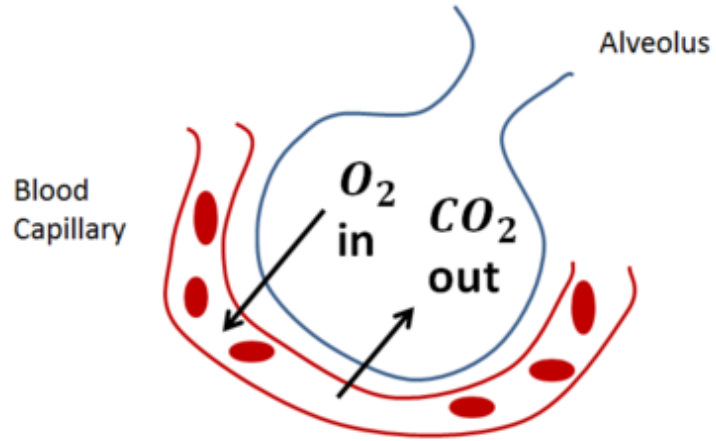


•**Physiology:** Is the Study of how the body and its parts work.

- **The Relationship between anatomy and physiology:**

Topics of anatomy and physiology are <u>always</u> related.

The physiology, or function, of a particular body part is dependent upon its structure.



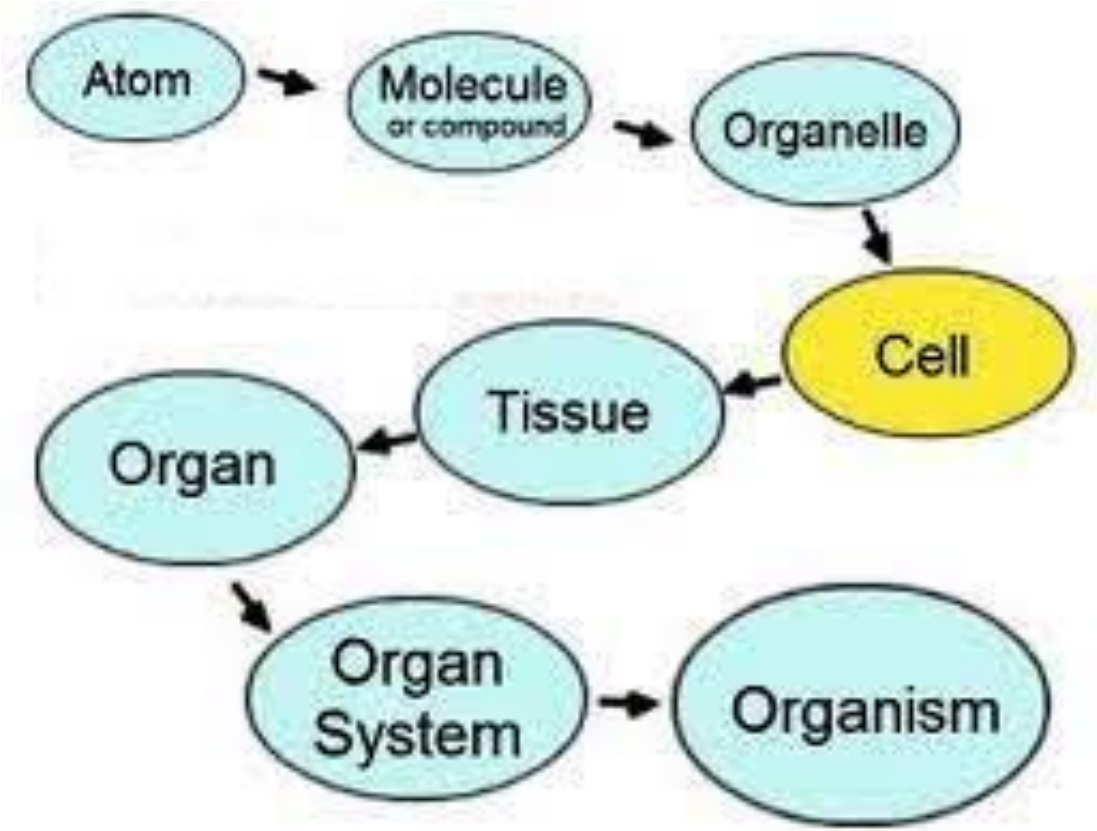
1. An overview of anatomy and physiology

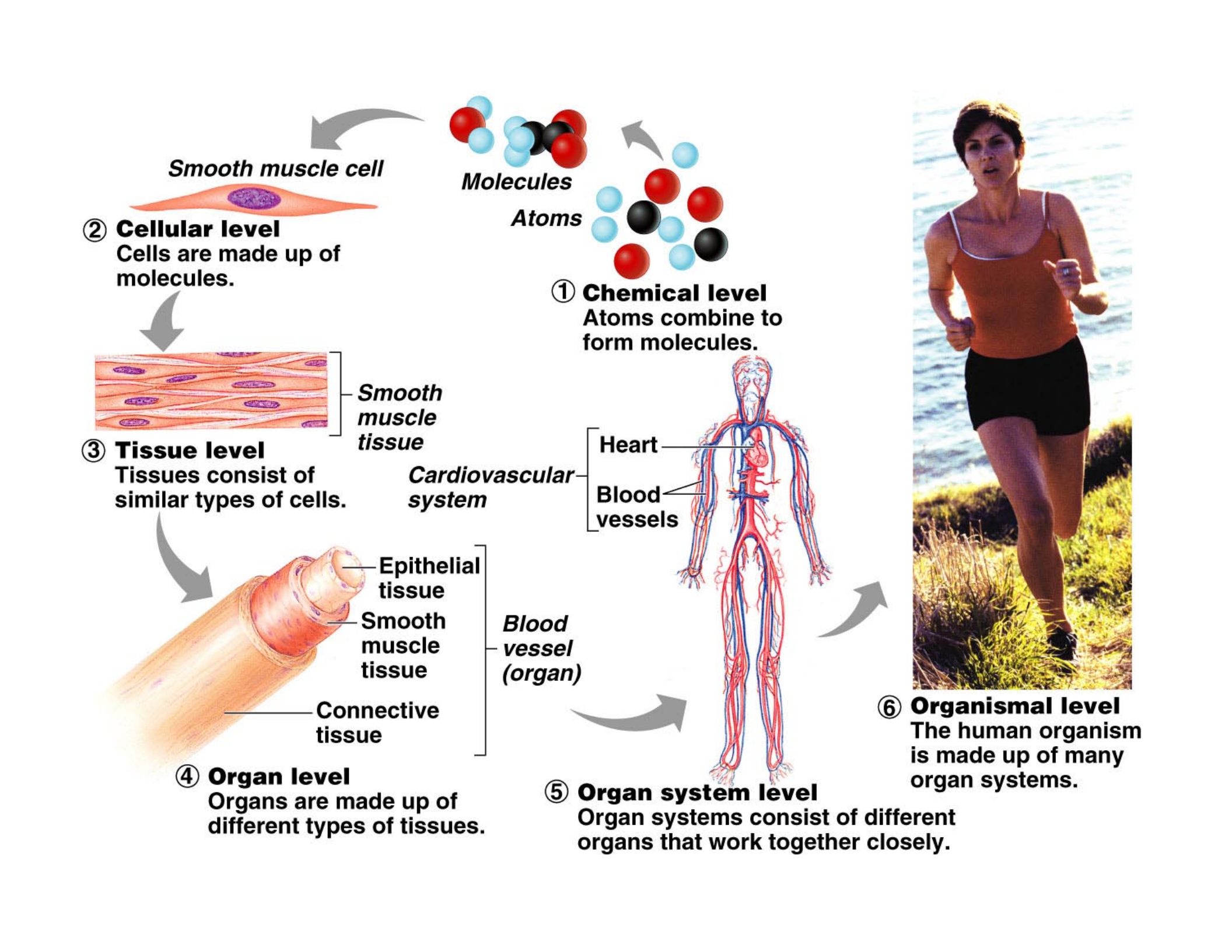
Objectives:

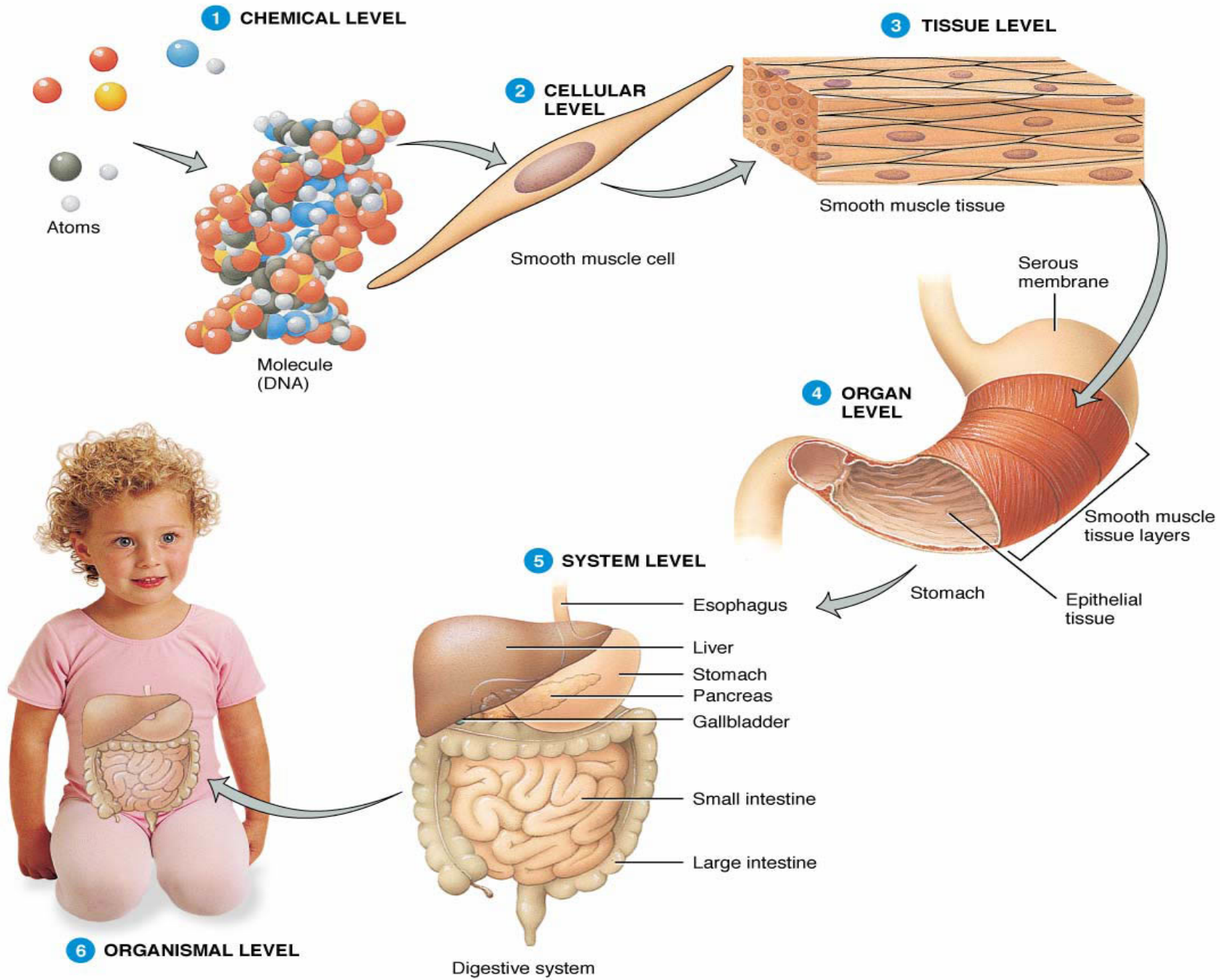
- Define anatomy and physiology.
- Explain how anatomy and physiology are related.

2. Levels of structural organization

- **From atoms to organism**




Smooth muscle cell
② Cellular level
Cells are made up of molecules.
Molecules
Atoms
① Chemical level
Atoms combine to form molecules.
Smooth muscle tissue
③ Tissue level
Tissues consist of similar types of cells.
Cardiovascular system
Heart
Blood vessels
Epithelial tissue
Smooth muscle tissue
Connective tissue
Blood vessel (organ)
④ Organ level
Organs are made up of different types of tissues.
⑤ Organ system level
Organ systems consist of different organs that work together closely.
⑥ Organismal level
The human organism is made up of many organ systems.


1 CHEMICAL LEVEL
Atoms
Molecule (DNA)
2 CELLULAR LEVEL
Smooth muscle cell
3 TISSUE LEVEL
Smooth muscle tissue
Serous membrane
4 ORGAN LEVEL
Smooth muscle tissue layers
Epithelial tissue
Stomach
5 SYSTEM LEVEL
Esophagus
Liver
Stomach
Pancreas
Gallbladder
Small intestine
Large intestine
Digestive system
6 ORGANISMAL LEVEL

•**Body Systems overview**

1. Integumentary system:

Organ

-Skin.

Function

-Protects internal body structures from injury.

-Regulate body temperature.

-Synthesize vitamin D.

2. Skeletal system:

Organ

- Bones, Cartilages, joints.

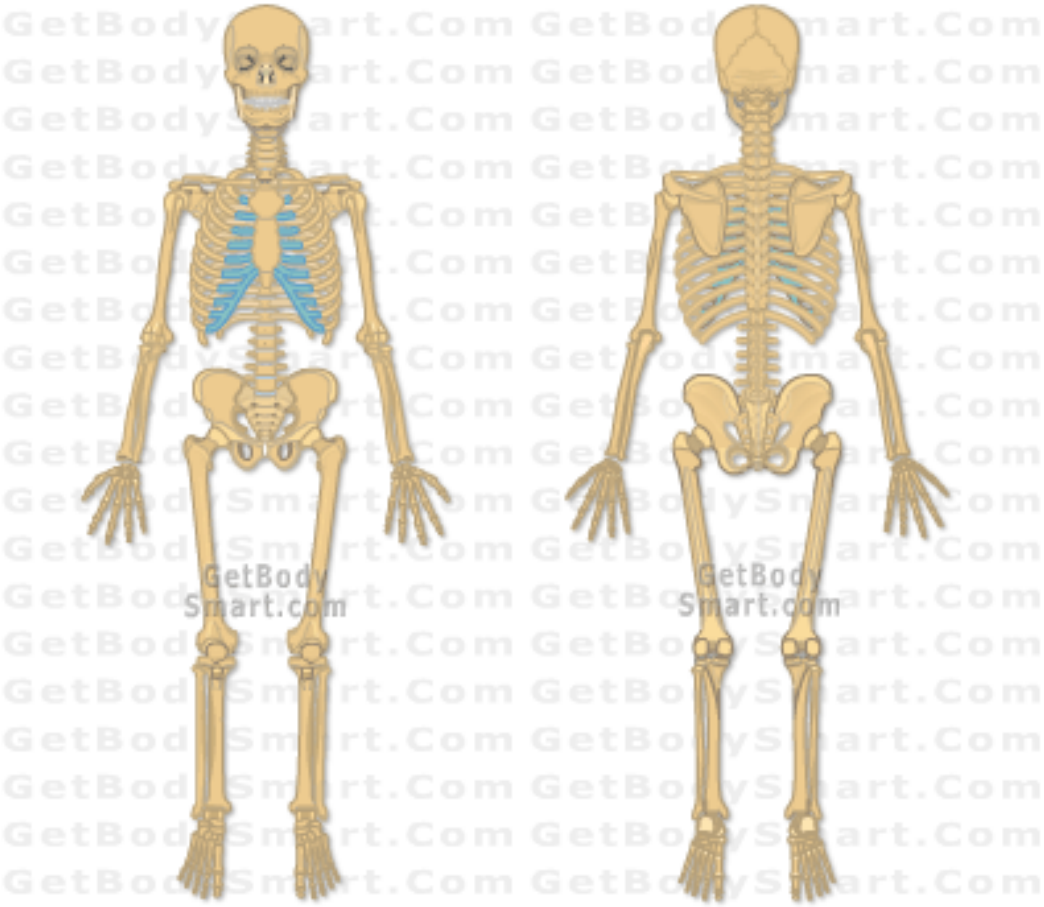
Function

-Supports and protects body organs.

-Provides a framework the muscles use to cause movement.

-Blood formation.

-Store minerals.



3. Muscular system:

Organ

-Skeletal muscles.

Function

- Only one function (to contract)

Causing movement to occur.

-Maintenance of posture.

-Production of body heat.

4. Nervous system:

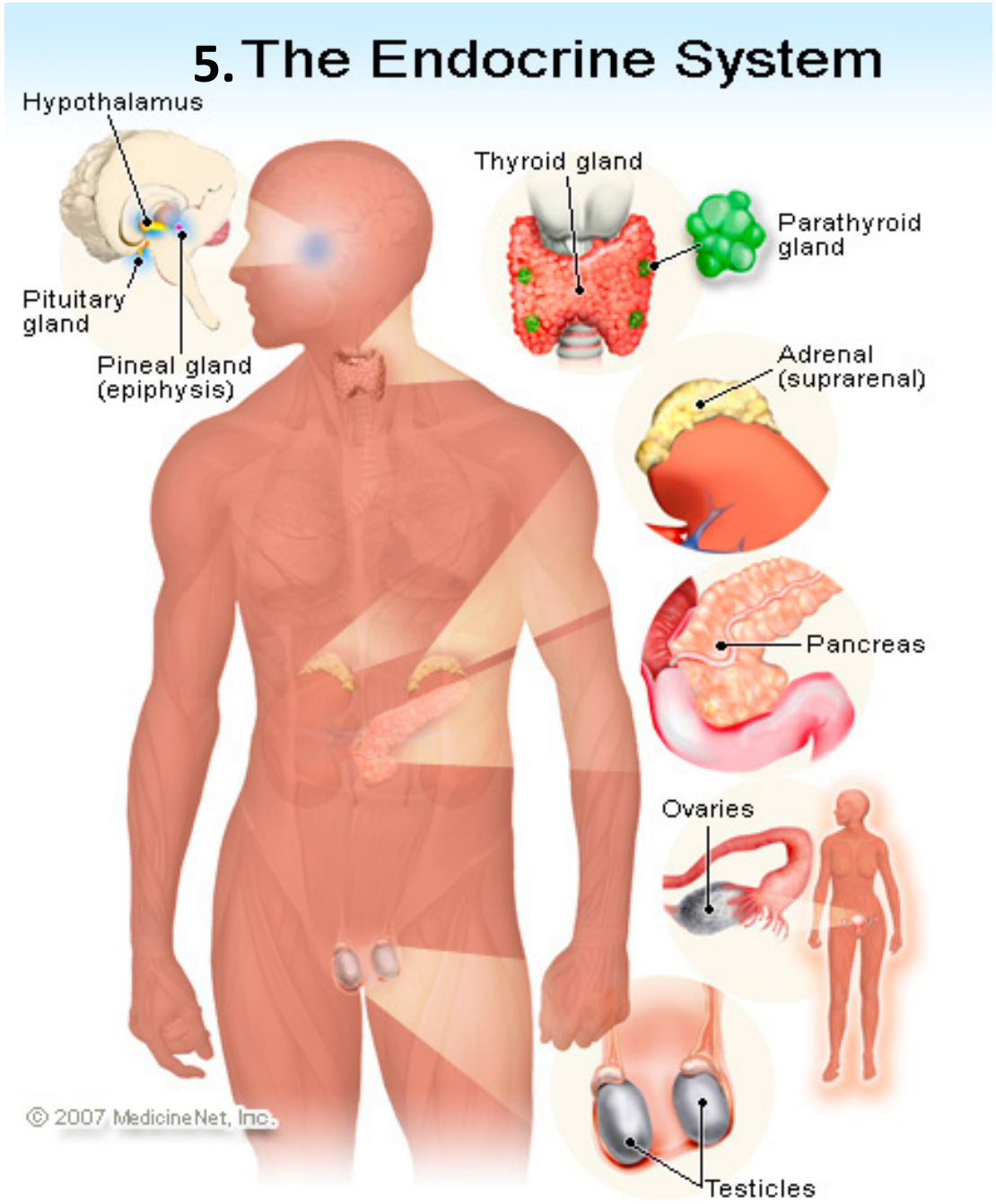
Organ

-Brain, spinal cord, nerves and sensory receptors.

Function

-Fast acting control system of the body.

-Responsible for "higher functions" such as thought and reasoning.



Organ

- Pituitary, thyroid, parathyroid, adrenal, thymus, pancreas, pineal, ovaries, testes.

Function

-Gland produces hormones that regulates :

Growth

Reproduction

Metabolism

6. Cardiovascular system:

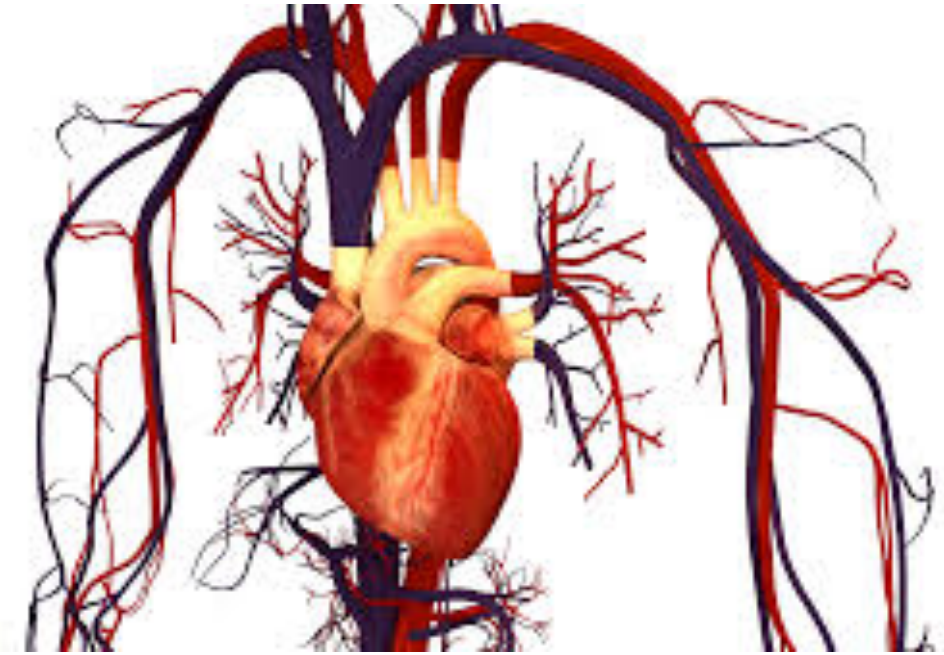
Organs

- Heart blood vessels, blood.

Function

-BV: Transportation of materials (O2, nutrients, hormones etc) to and from the cells.

-Heart: pumps blood.



7. Respiratory system:

Organ

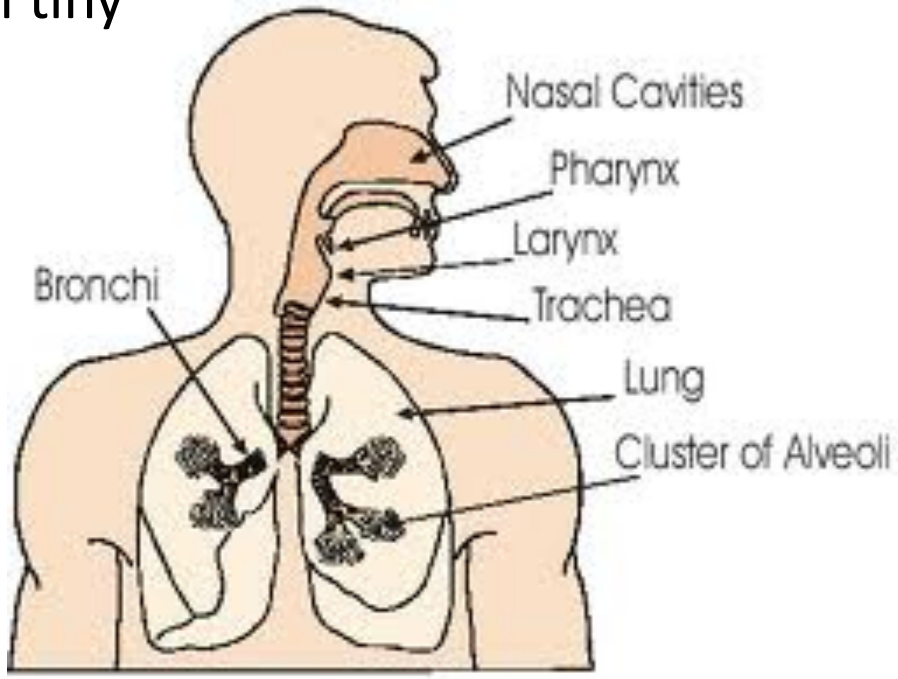
- nasal cavity, Pharynx, larynx, trachea, bronchi and lungs.

Function

-Carries out gas exchange through tiny air sacs in lungs.

-Keeps blood supplied with O2

-CO2 removal.



8. Digestive system:

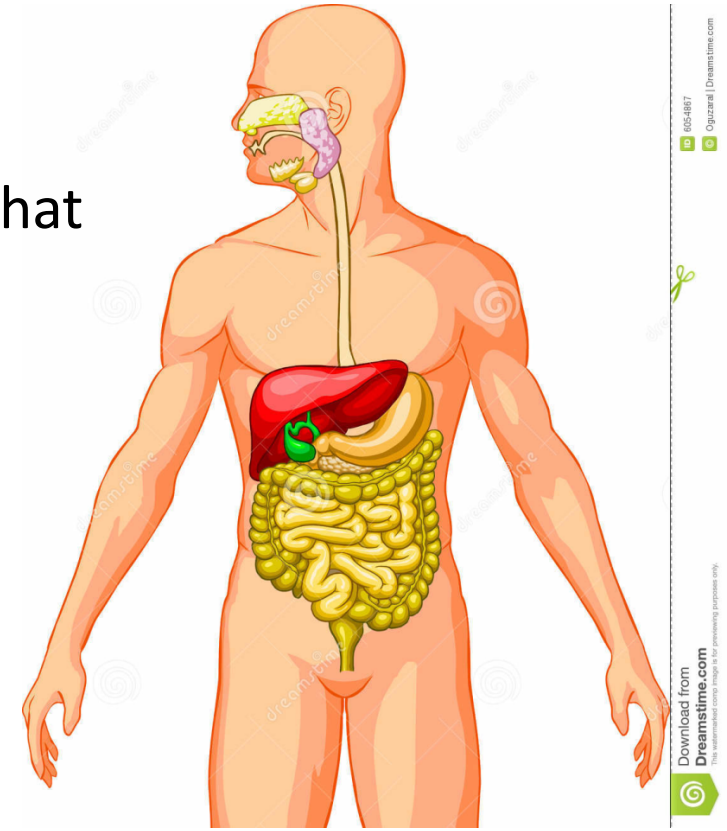
Organ

-Oral cavity, esophagus, stomach, small intestine, large intestine, and rectum, liver &pancreas.

Function

-Break down food into absorbable units that enter the blood.

-Eliminates undigested food as feces.



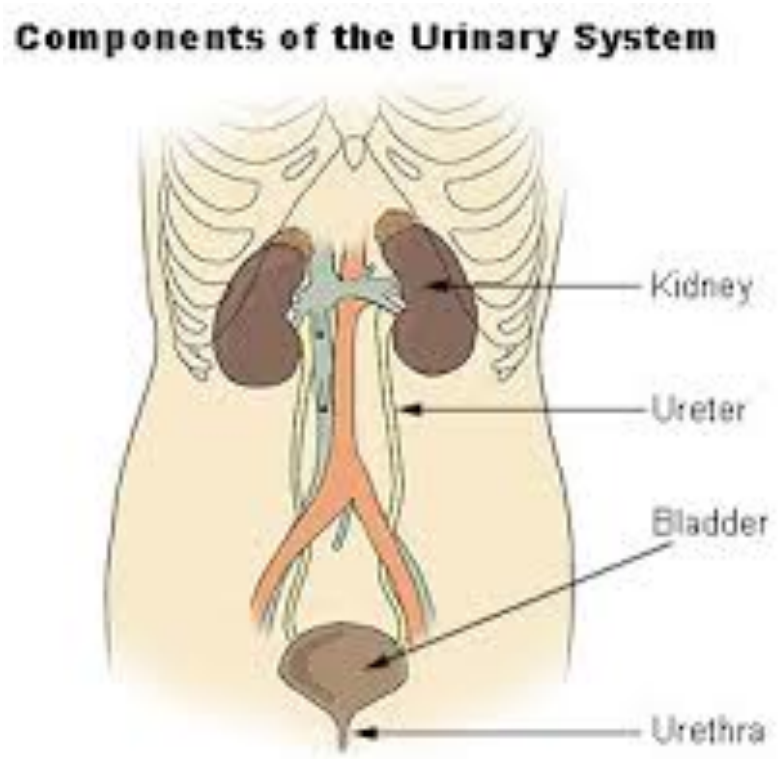
9. Urinary system

Organ

- kidney, ureter, urinary bladder, urethra.

Function

- Eliminates nitrogenous waste from the body (urea& uric acid).
- maintain water and electrolyte balance.
- Regulate the acid-base balance of the blood.



10. Lymphatic system:

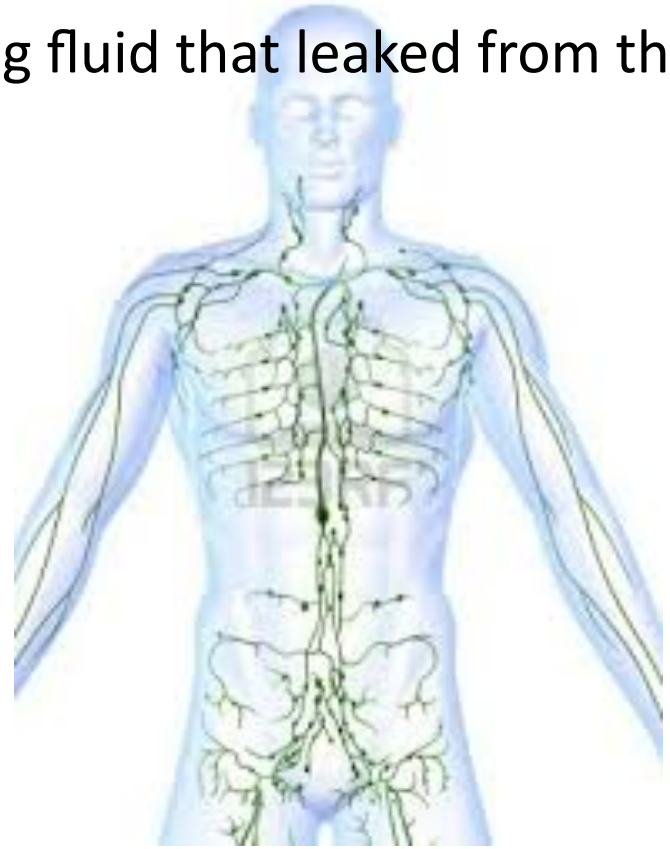
Organ

- Lymphatic vessels, lymph nodes, spleen, tonsils.

Function

-Complements circulatory system by returning fluid that leaked from the blood back to blood vessels.

-House cells Involved in immunity.

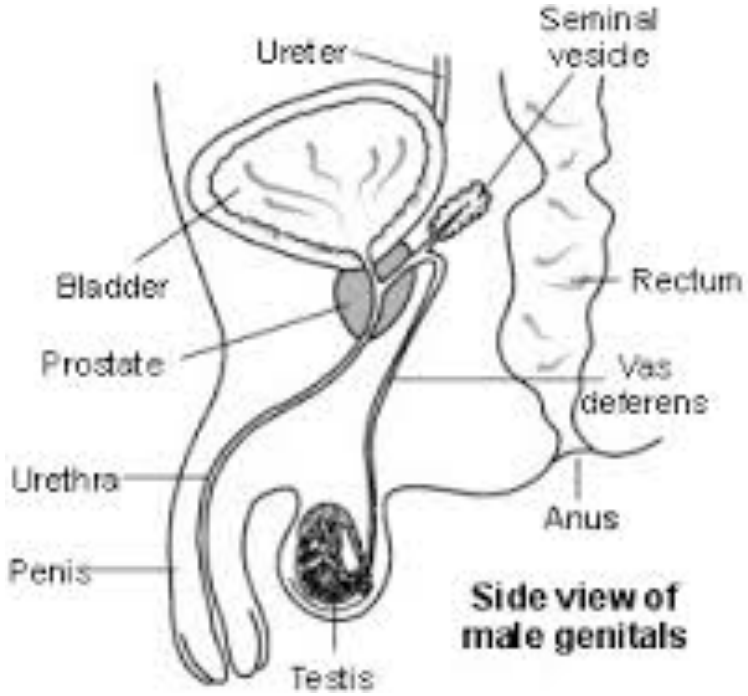


11. Reproductive system:

Organs

- Male: Seminal vesicles, prostate, penis, vas deferens, testis, scrotum.

-Female: ovary , uterus, vagina, fallopian tubes.

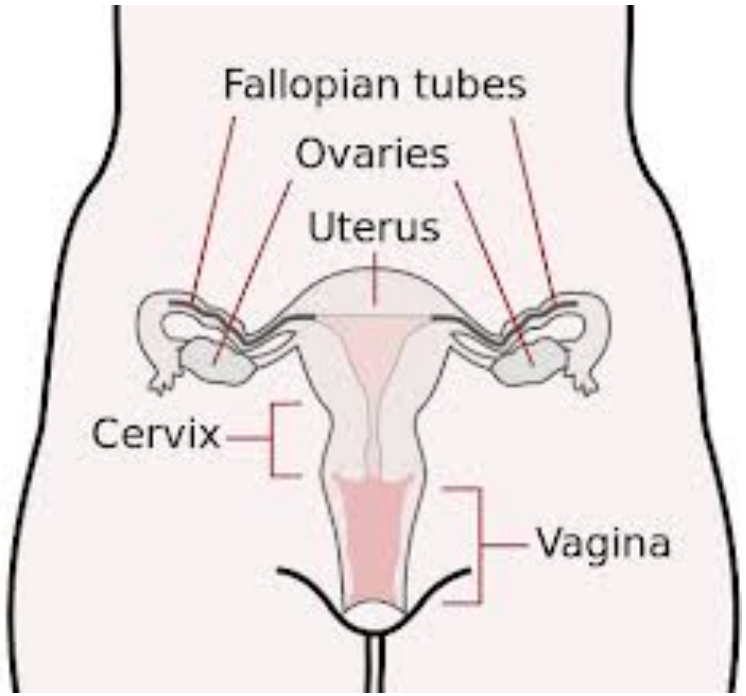


Functions

-To produce offspring,

-Male testes produces sperm and male sex hormones.

-Female ovary produce eggs (ova) & female sex hormones.



2. Levels of structural organization

Objectives:

- Name the levels of structural organization that make up the human body and explain how they are related.
- Name the body system, and briefly state the major functions of each system.
- Name the organs that the body system is composed of and identify them on a diagram.

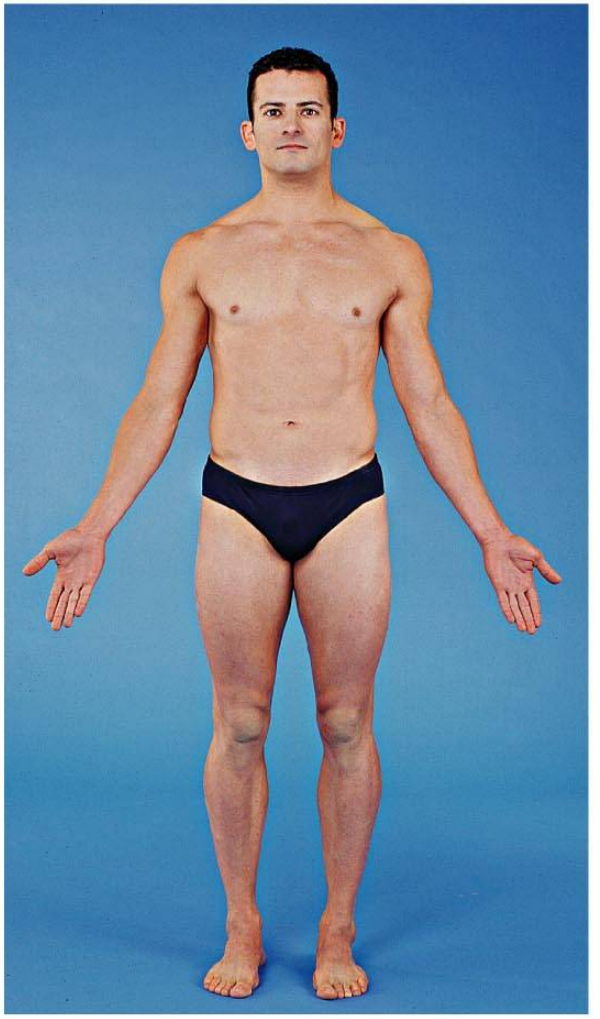
3. The language of anatomy

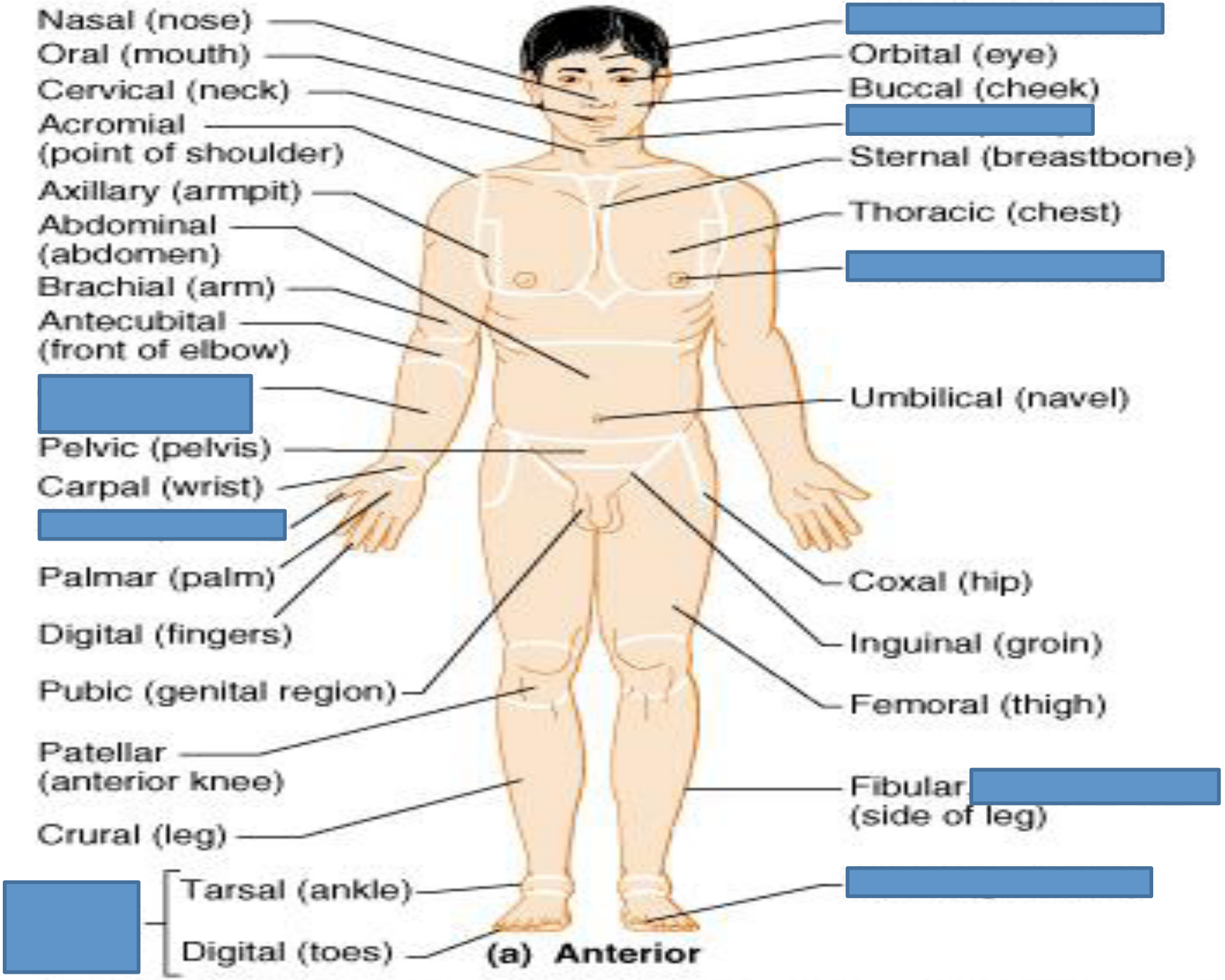
- **Anatomical position:**

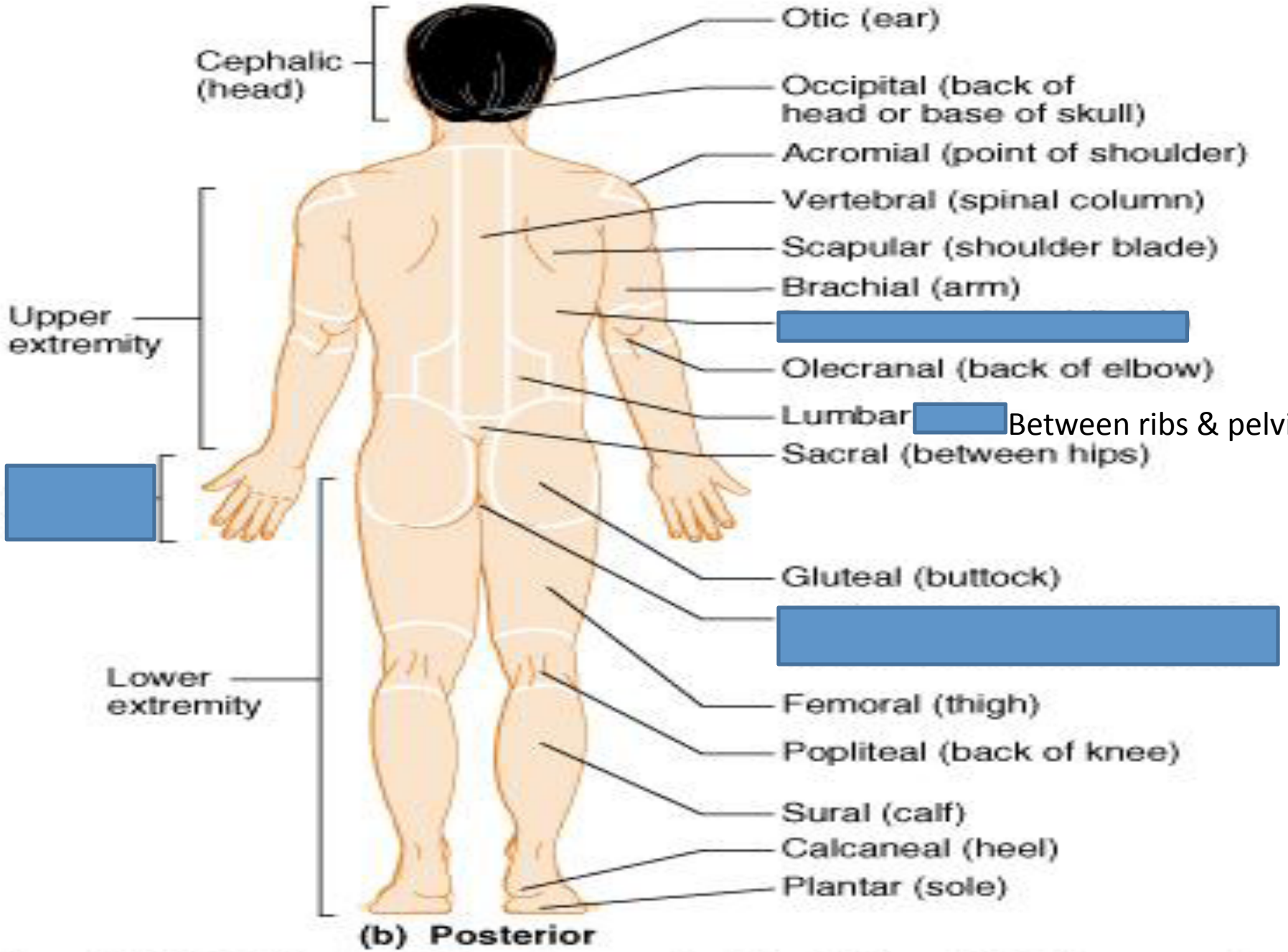
The body is erect,

Feet are parallel,

Arms hanging at the sides with palms facing forward.

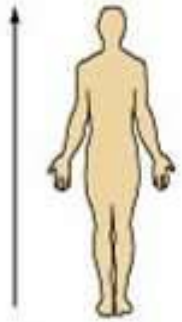
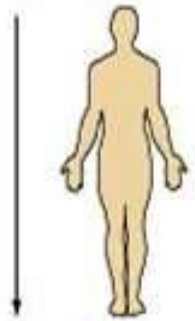
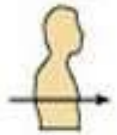
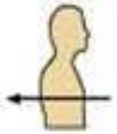
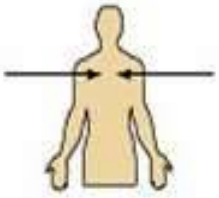


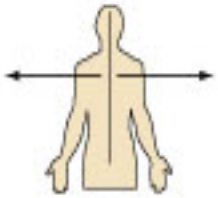
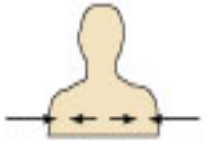
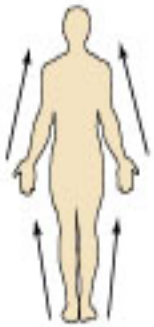
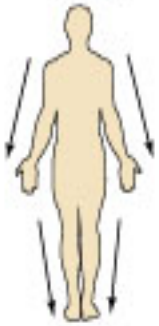
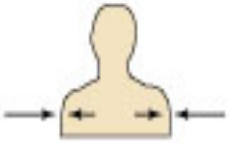
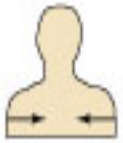


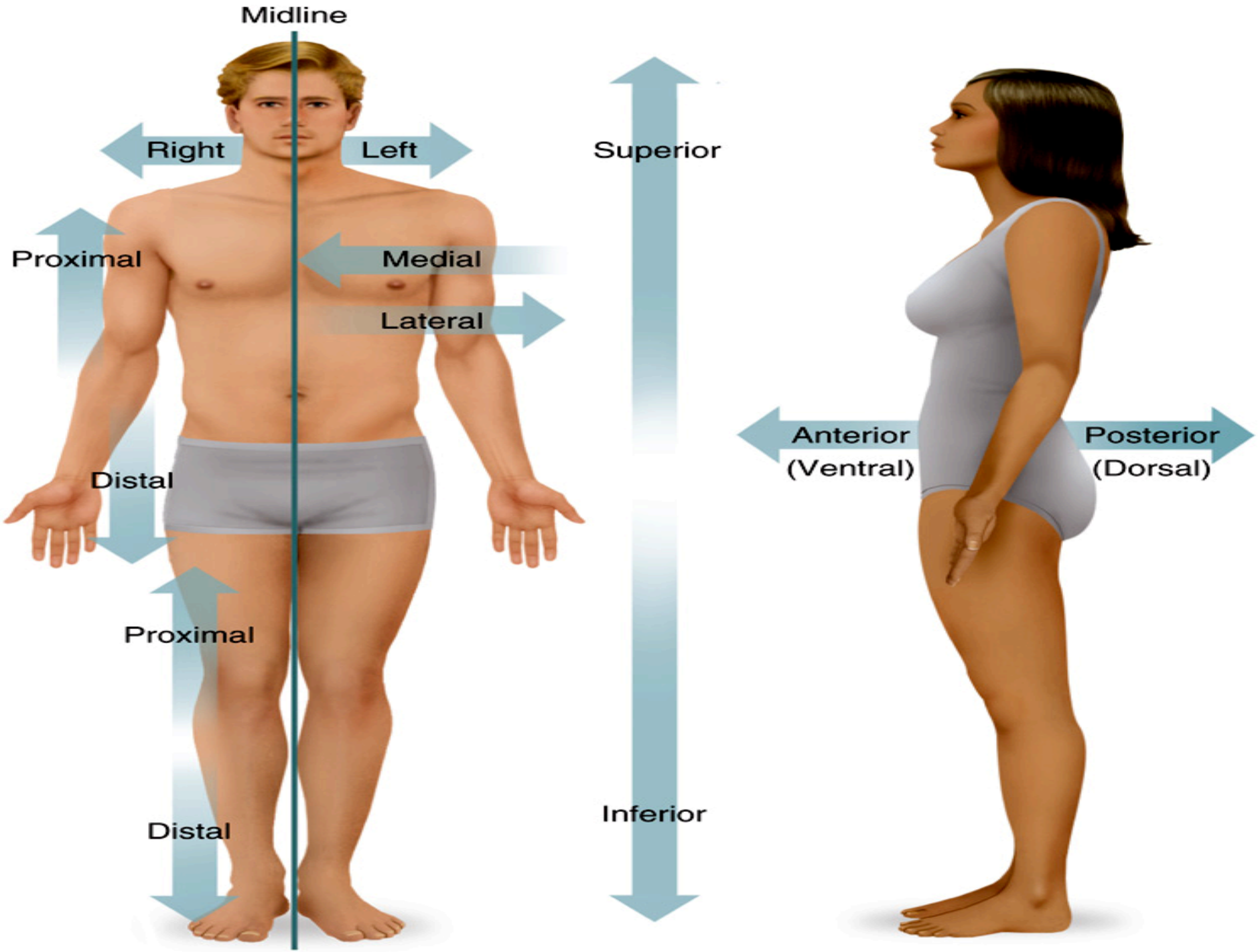


(b) Posterior

- **Directional terms:**

Term	Definition	Illustration	Example
Superior (cranial or cephalad)	Toward the head end or upper part of a structure or the body; above		The forehead is superior to the nose.
Inferior (caudal)	Away from the head end or toward the lower part of a structure or the body; below		The navel is inferior to the breastbone.
Anterior (ventral)*	Toward or at the front of the body; in front of		The breastbone is anterior to the spine.
Posterior (dorsal)*	Toward or at the backside of the body; behind		The heart is posterior to the breastbone.
Medial	Toward or at the midline of the body; on the inner side of		The heart is medial to the arm.

Term	Definition	Illustration	Example
Lateral	Away from the midline of the body; on the outer side of		The arms are lateral to the chest.
Intermediate	Between a more medial and a more lateral structure		The armpit is intermediate between the breastbone and shoulder.
Proximal	Close to the origin of the body part or the point of attachment of a limb to the body trunk		The elbow is proximal to the wrist (meaning that the elbow is closer to the shoulder or attachment point of the arm than the wrist is).
Distal	Farther from the origin of a body part or the point of attachment of a limb to the body trunk		The knee is distal to the thigh.
Superficial	Toward or at the body surface		The skin is superficial to the skeleton.
Deep	Away from the body surface; more internal		The lungs are deep to the rib cage.


Midline
Right
Left
Proximal
Medial
Lateral
Distal
Proximal
Distal
Superior
Inferior
Anterior
(Ventral)
Posterior
(Dorsal)

•Body planes and sections:

Body planes are imaginary lines used to divide the body into sections.

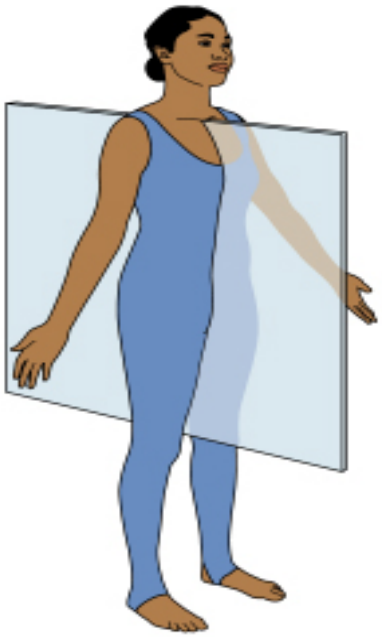
There are three types of planes:

1) Sagittal– divides the body into right and left parts

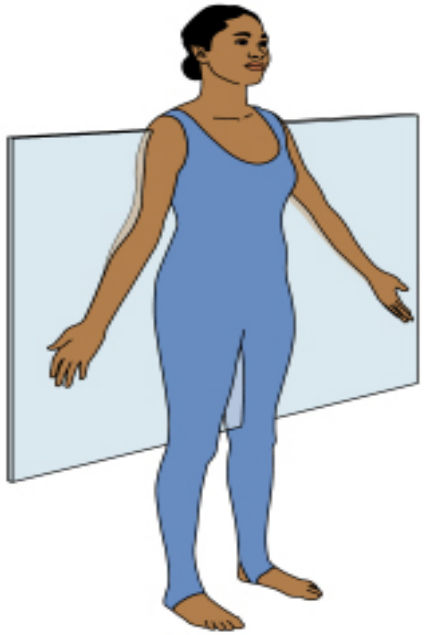
-Midsagittal or, medial– sagittal plane that lies on the midline.

2) Frontal or coronal– divides the body into anterior and posterior parts.

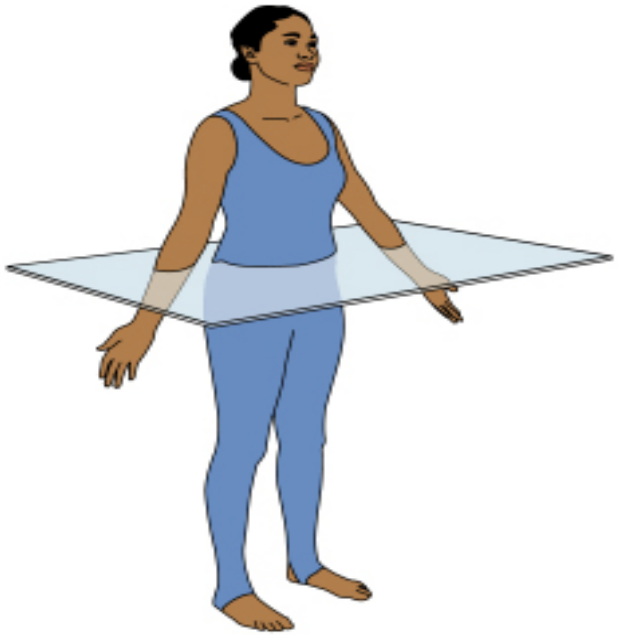
3) Transverse or cross section– divides the body into superior and inferior parts.



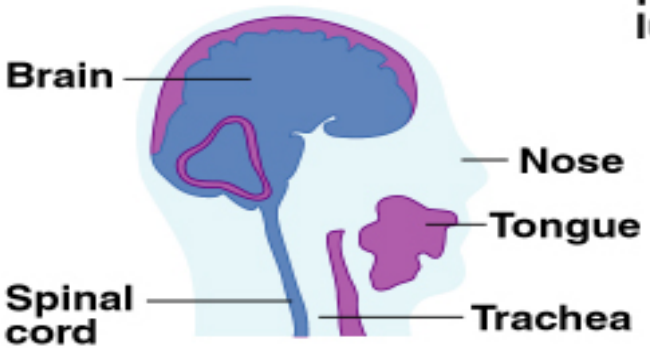
(a) Median (midsagittal)

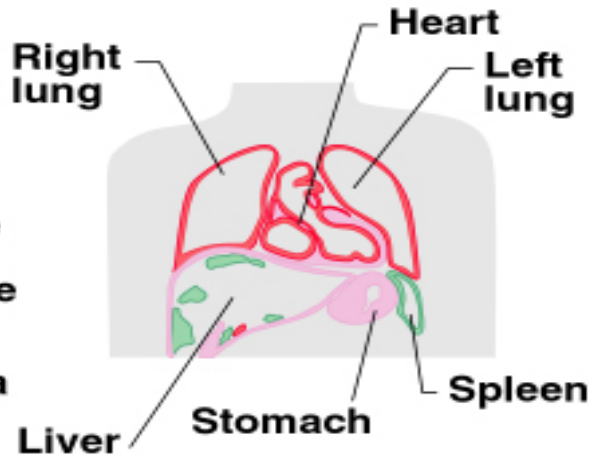


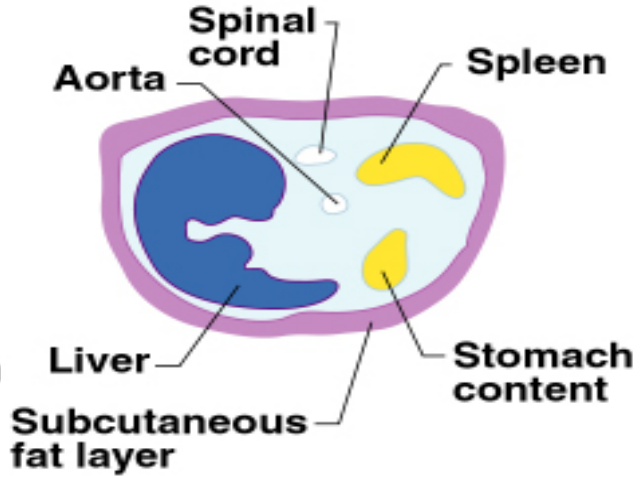
(b) Frontal (coronal) plane



(c) Transverse plane

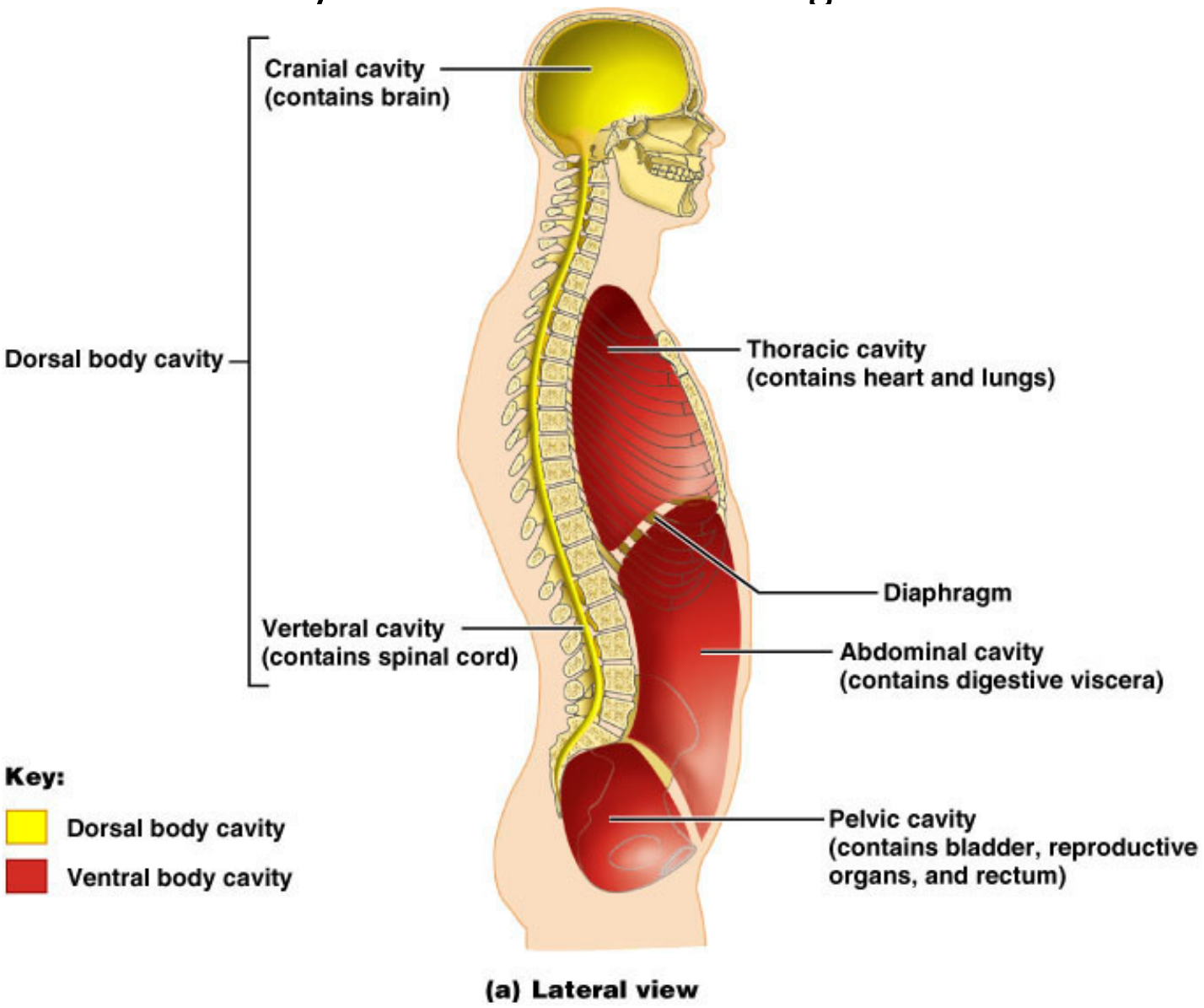






- **Body Cavities:**

Spaces within the body which contain vital organs.



❖ **Dorsal cavity** protects the nervous system, and has two subdivisions which are continuous with each other:

1-Cranial cavity: The space within the skull.

2-Spinal cavity: The space that runs within the vertebral column and encases the spinal cord.

❖ **Ventral cavity** houses the visceral organs, and is divided into two subdivisions: -

1-Thoracic cavity: encloses the heart and lungs.

2-Abdominopelvic cavity: It is composed of two subdivisions:

a) **Abdominal cavity** – contains the stomach, intestines, liver, and other organs.

b) **Pelvic cavity** – lies within the pelvis and contains the bladder, reproductive organs, and rectum.

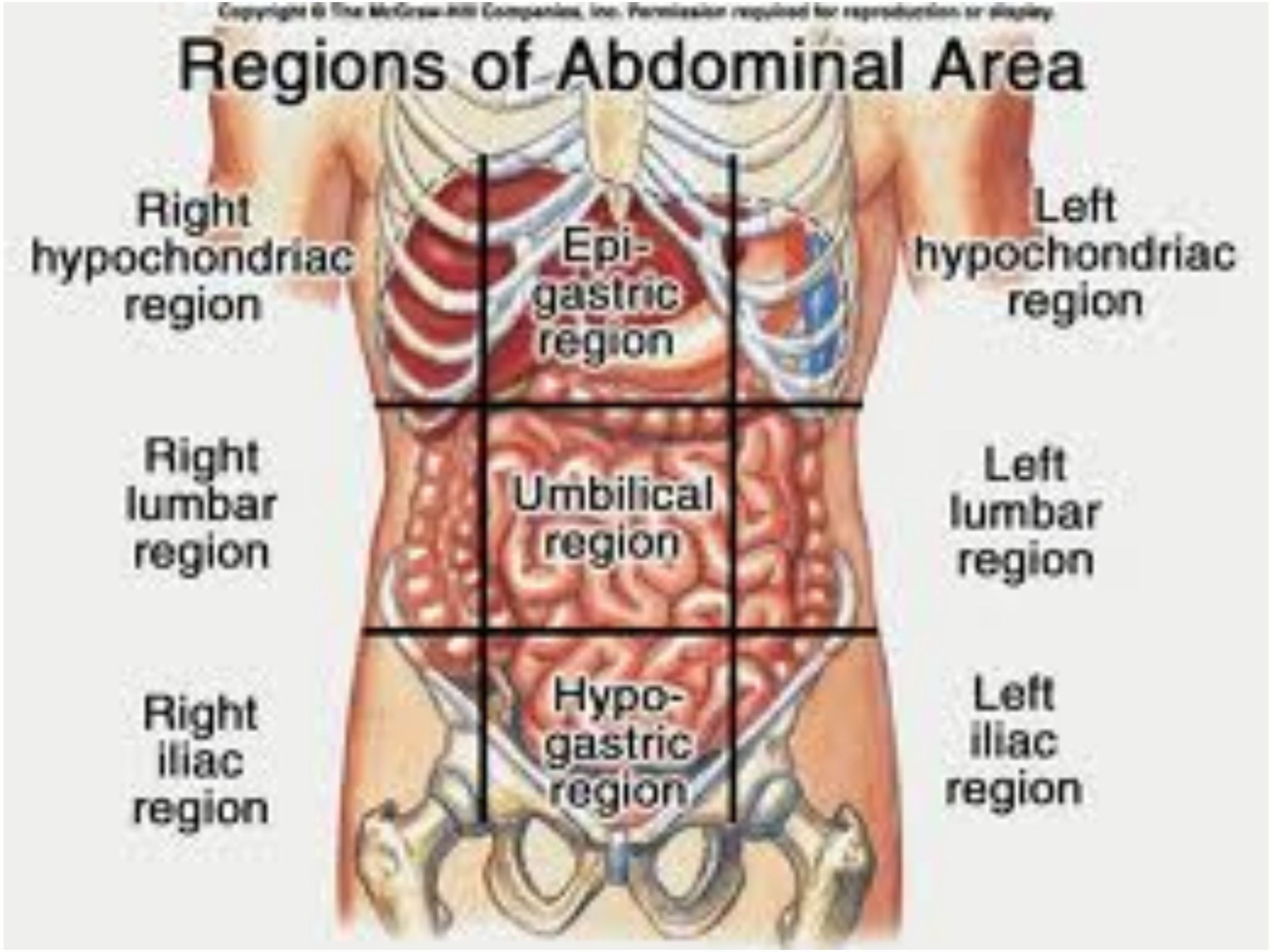
abdominopelvic cavity is separated from the superior thoracic cavity by the dome-shaped diaphragm.

Abdominal Regions and Quadrants

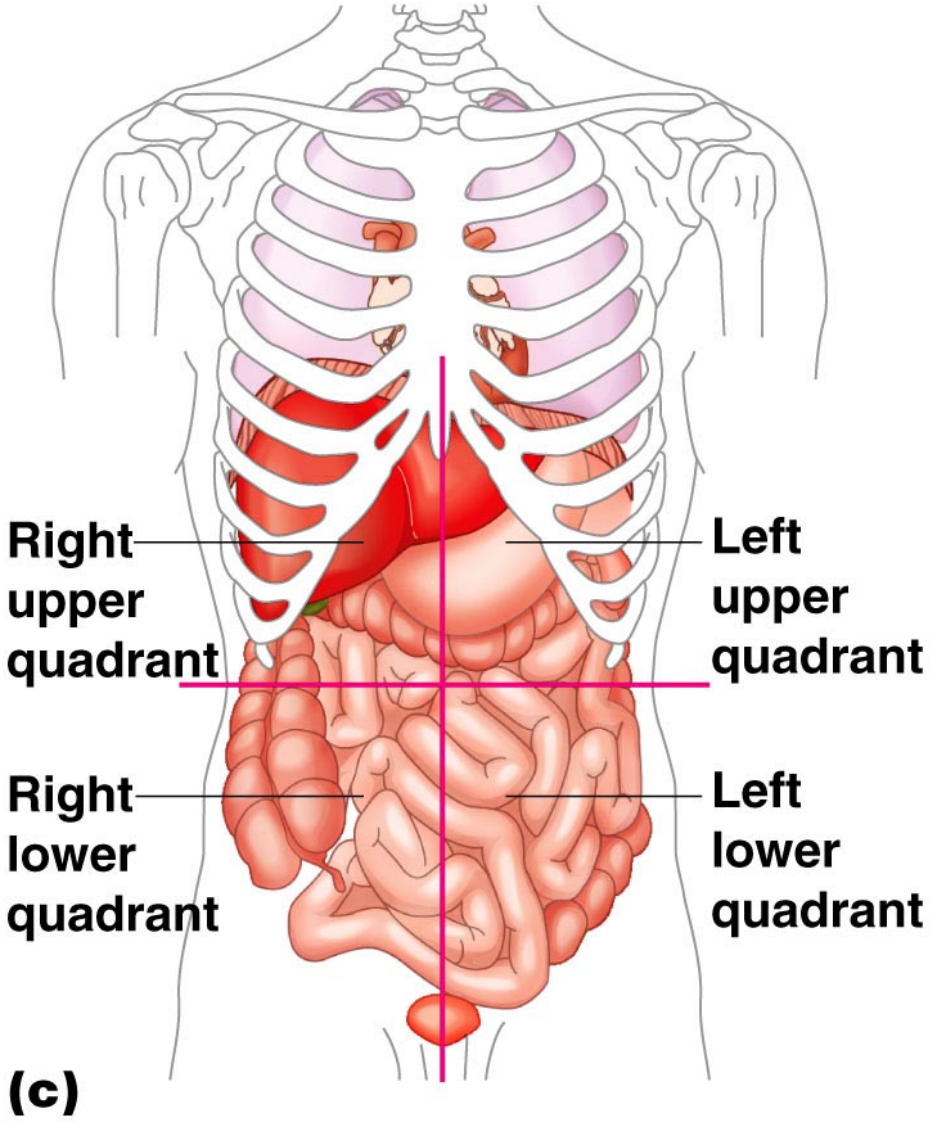
Anatomists often divide the body cavity into smaller regions for study

- Abdominal regions – divides abdomen into nine regions.
- Abdominal quadrants – divides abdomen into four quadrants.

Regions of Abdominal Area



Abdominal Quadrants



3.The language of anatomy

Objectives:

- Verbally describe the anatomical position.
- Use proper anatomical terminology to describe body directions, surfaces and planes.
- Name the major body cavities and list the chief organs in each cavity.