

HEART OF THE MACHINE  
MINOPHASE

# Introduction to Human Anatomy

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# Definitions

- **Anatomy**: the science of the structure and shape of living organisms and their parts.
- **Physiology**: the science that deals with the normal functions of living organisms and their parts.
- **Gross Anatomy**: deals with structures visible with the unaided eye, also called "**Macroscopic anatomy**".
- **Histology**: the study of the microscopic structure of tissues, also called "**Microscopic anatomy**".
- **Clinical Anatomy**: anatomy as applied to clinical practice.
- **Basic Anatomy**: to study minimal structures and their relations to other structures to understand the overall structure and function of the body.

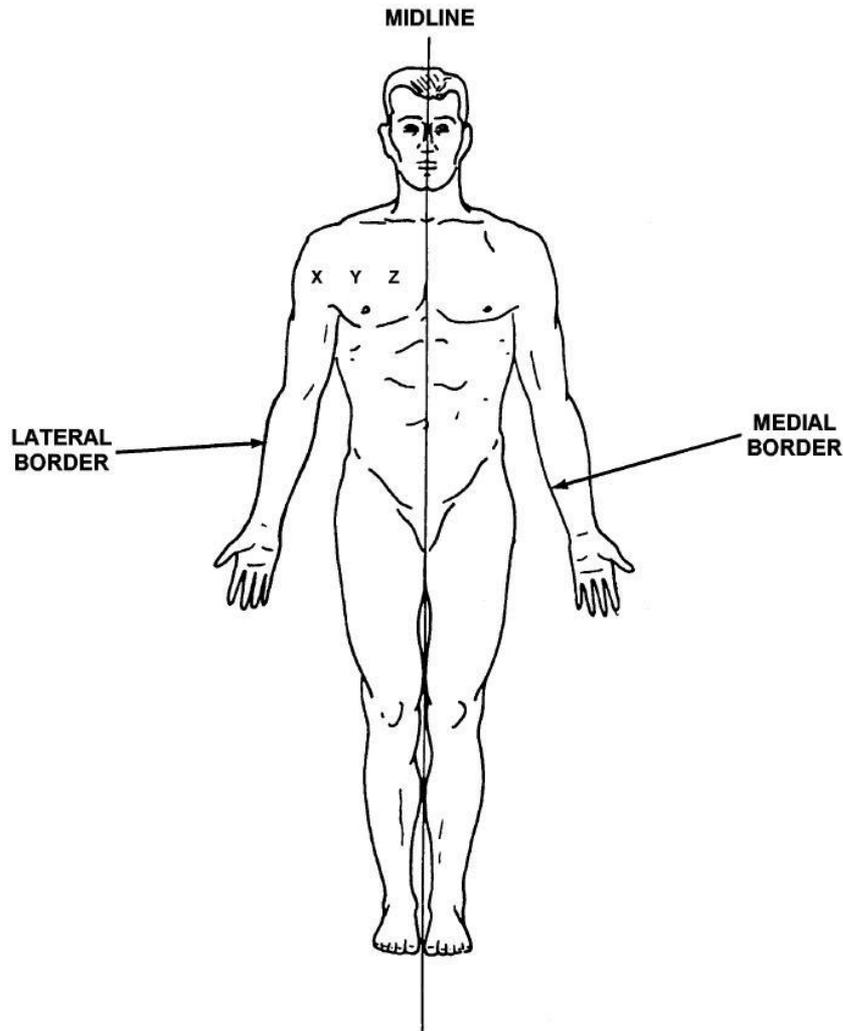
# Anatomical terms

## Positions:-

- **Anatomical position:** a standard position used in anatomy and clinical medicine to allow accurate and consistent description of one body part in relation to another.

### Features:

- Standing erect
  - The face directed anteriorly (looking forward)
  - The upper limbs at the sides and the palms facing forward
  - Feet together (or slightly separated)
- **Supine position:** lying on the back.
  - **Prone position:** lying face down.



**Supine**



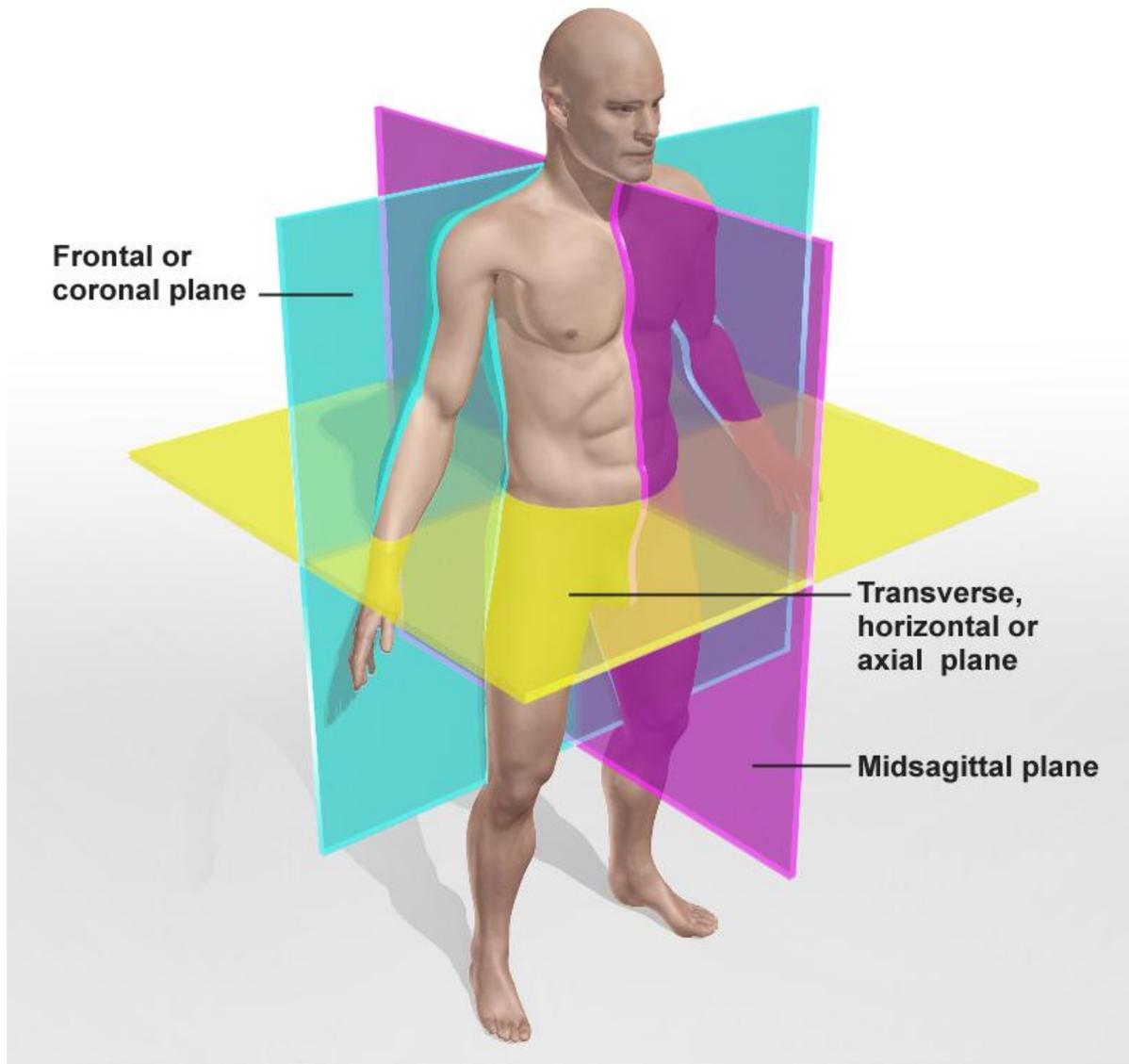
**Prone**

**X is lateral to Y and Z; Y is medial to X and lateral to Z  
In the example shown, the body is in the normal anatomical position.**

# Anatomical Planes

- **Midsagittal plane (Median plane):** the vertical plane passing through the midline of the body and dividing it into right and left halves.  
Any plane parallel to this plane is termed paramedian or sagittal plane.
- **Horizontal (Transverse):** divides the body into upper and lower parts.
- **Coronal (Frontal):** divides the body into anterior and posterior parts.

# Anatomical Planes



# Anatomical terms of position 1/2

- Anterior (Ventral) أمامي: In front of (nearer to the front of the body).
- Posterior (Dorsal) خلفي : In back of nearer to the back of the body.
  - The liver is anterior to the kidneys.
  - The palmar surface of the hand is facing anteriorly in the anatomical position, while the dorsal surface is facing posteriorly.
- Superior (Cephalic) علوي : above.
- Inferior (Caudal) سفلي : below.
  - The eyes are superior to the mouth.
  - The nose is inferior to the eyes.
- Medial متوسط : nearer to the mid sagittal line (median line).
- Lateral جانبي : away from the mid sagittal line (median line).
- Superficial سطحي : nearer to the surface.
- Deep عميق: away from the surface.
  - Stomach is superficial in the abdominal cavity.
  - Kidneys are deep in the abdominal cavity.

# Anatomical terms of position 2/2

- **Proximal** قريب : nearer to the origin of the limb (nearer to a specific point).
- **Distal** بعيد : away from the origin of the limb (farther from a specific point).
  - Elbow joint is proximal whereas wrist joint is distal.
  - Shoulder joint is proximal whereas elbow joint is distal.
- **Ipsilateral** بنفس الجهة : two parts of the body on the same side.
- **Contralateral** بالجهة المقابلة : two parts of the body one on the right and the other on the left.
  - The right hand is ipsilateral to the right foot.
  - The left hand is contralateral to the right foot.
- **Internal** : toward the inside.
- **External** : toward the outside.

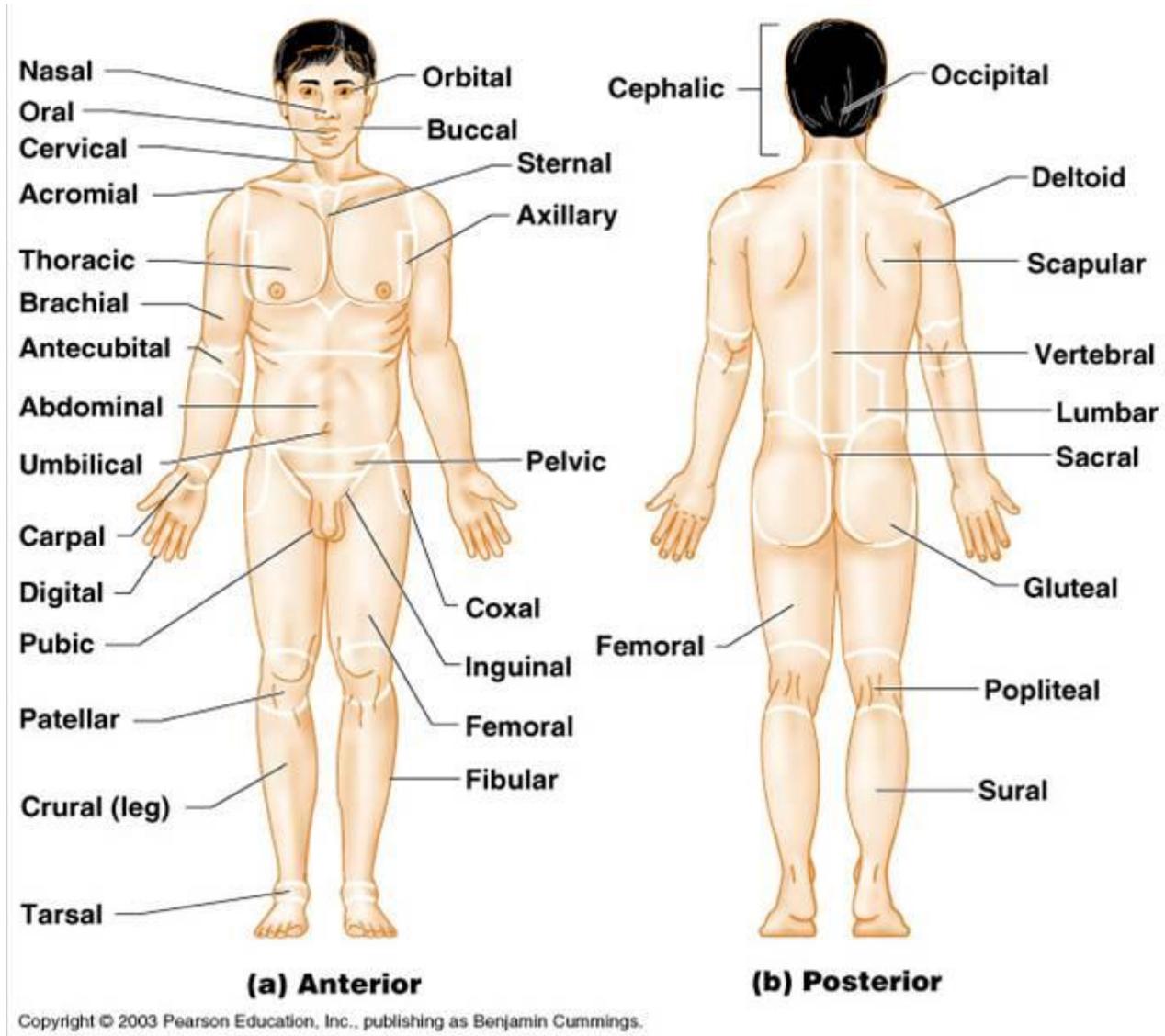
# Anatomical terms of movement

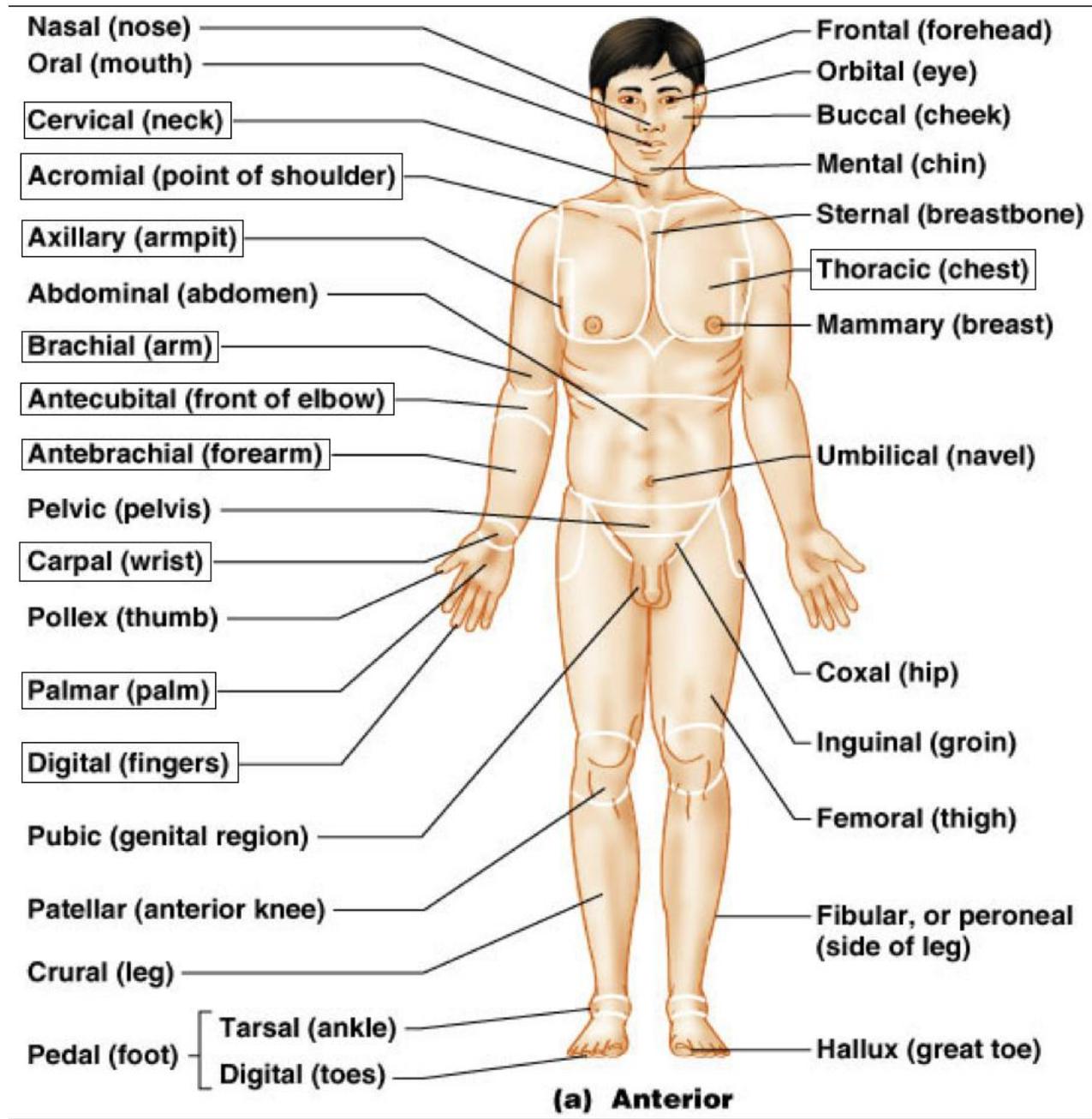
- **Flexion:** to bend at a joint, or to reduce the angle.
- **Extension:** to straighten at a joint, or to increase the angle.
- **Adduction:** movement toward the midline.
- **Abduction:** movement away from the midline.
- **Supination:** to rotate the forearm so that the palm faces forward.
- **Pronation:** to rotate the forearm so that the palm faces backward.
- **Rotation:** movement of part of the body around its long axis.
- **Medial Rotation:** to turn inward.
- **Lateral Rotation:** to turn outward.
- **Circumduction:** Movement of a part in a circular direction (a combination of flexion, adduction, extension, and abduction).
- **Inversion:** the movement of the sole towards the median plane.
- **Eversion:** the movement of the sole of the foot so that the sole faces in a lateral direction.

# Useful prefixes and suffixes

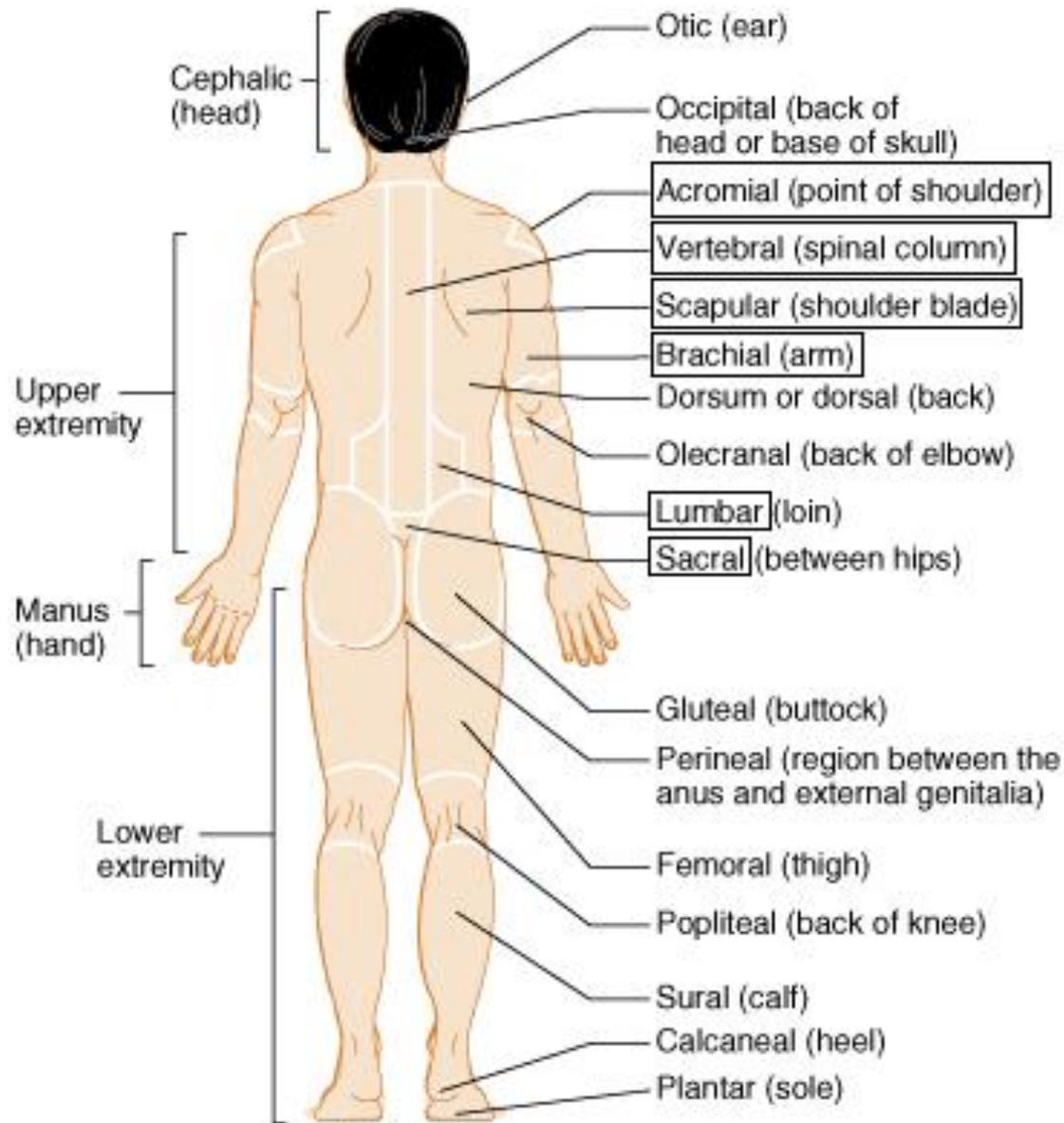
- -itis = inflammation → tonsillitis
- -pathy = disease → neuropathy
- -ectomy = to cut out (remove) → appendectomy, tonsillectomy
- a/an = without, none → avascular, anemia (literally no blood but means few red cells)
- -emia = blood condition → anemia, leukemia, uremia
- hemo-, hema- = blood → hemorrhage, hemoglobin
- gastr(o) = stomach → gastrointestinal, gastritis
- hepat(o) = liver → hepatitis
- Cardio = heart → cardiac arrest
- pulmon- = lung → pulmonary artery
- Nephro/rene = kidney → nephrectomy, anephric, renal artery

# Anatomical regional terms

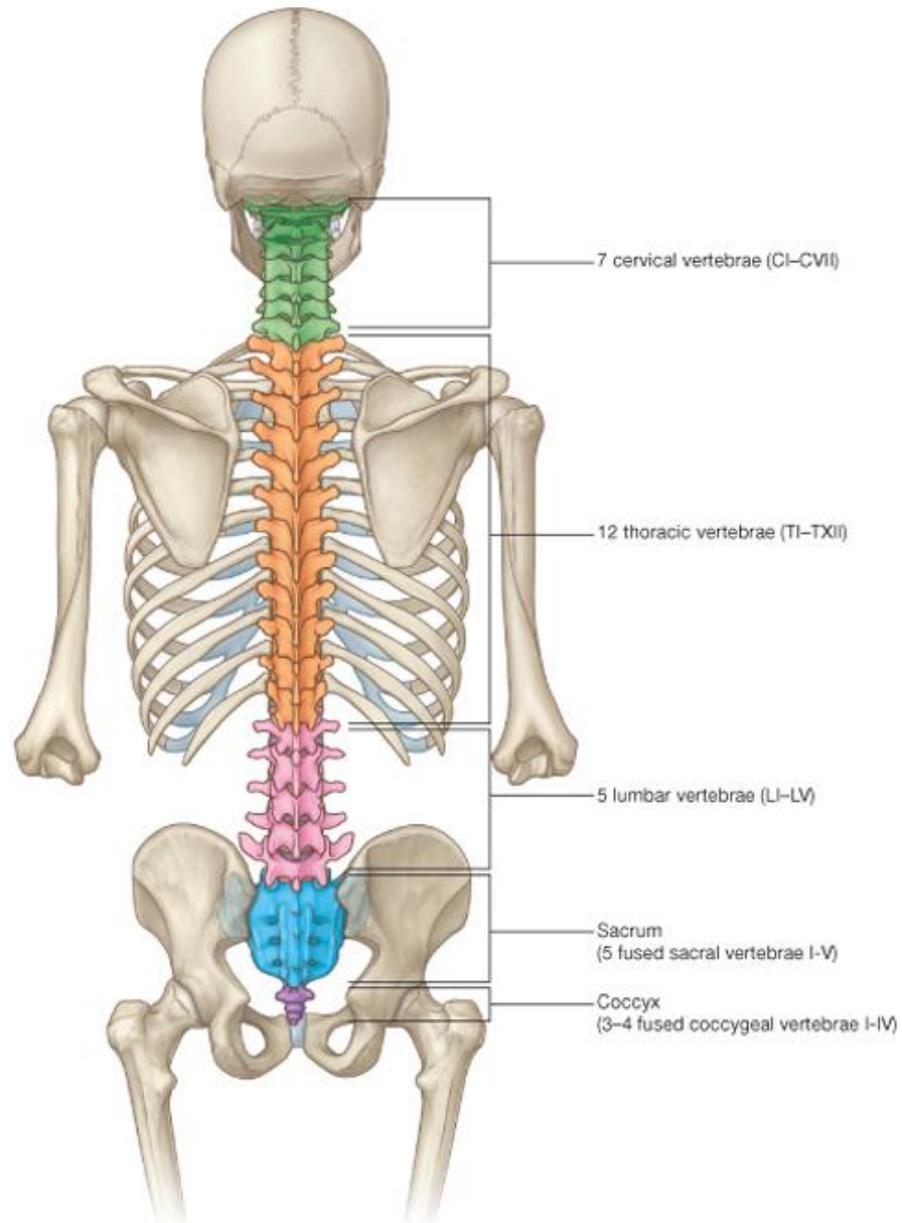


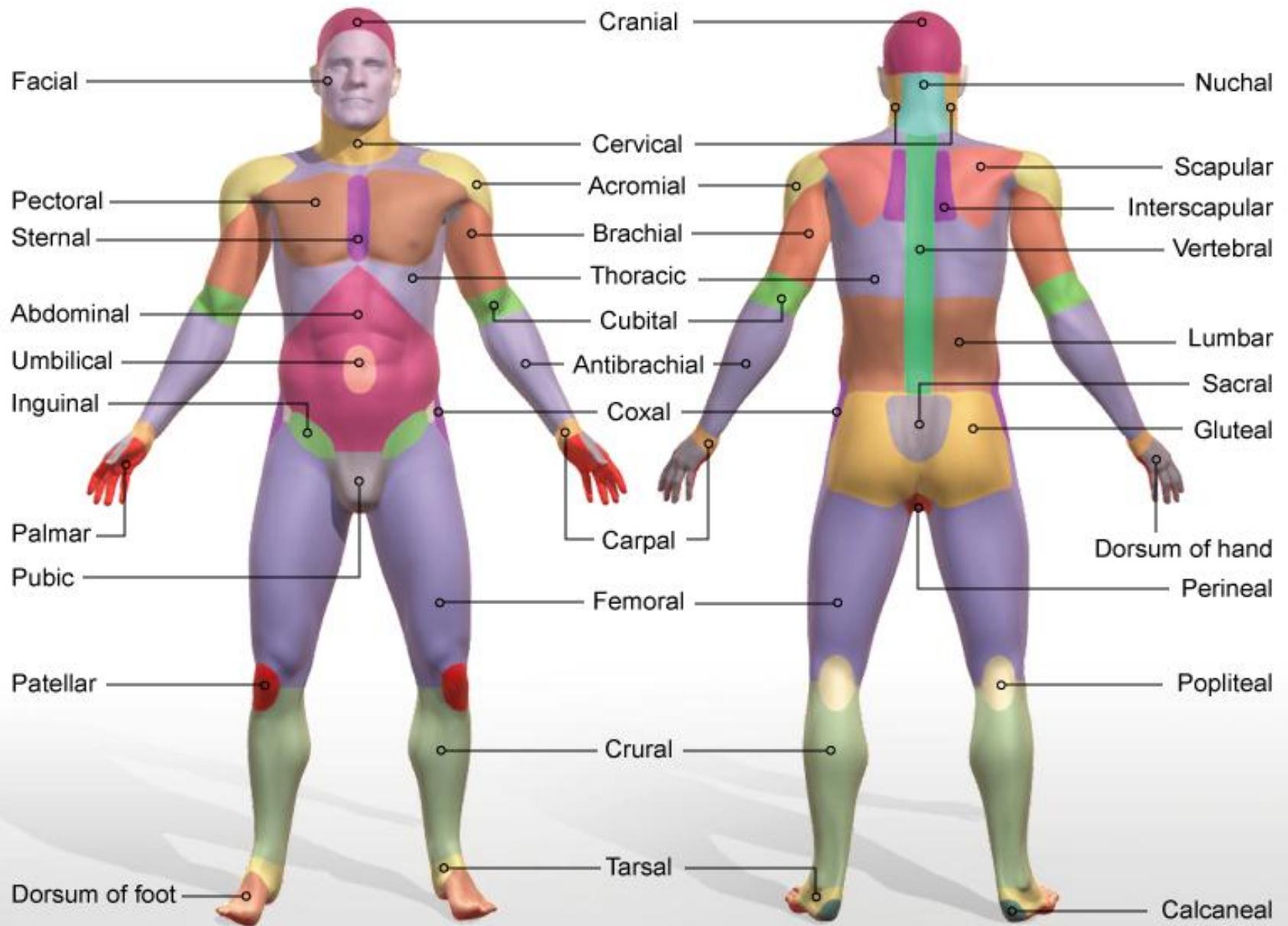


**(a) Anterior**



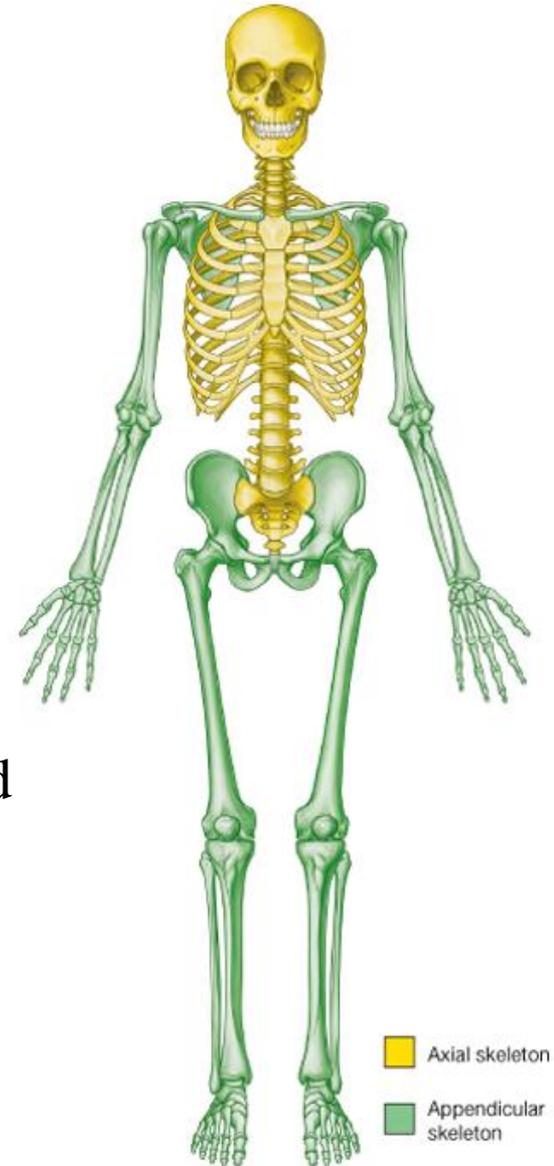
**(b) Posterior**





# The Skeleton Consists of

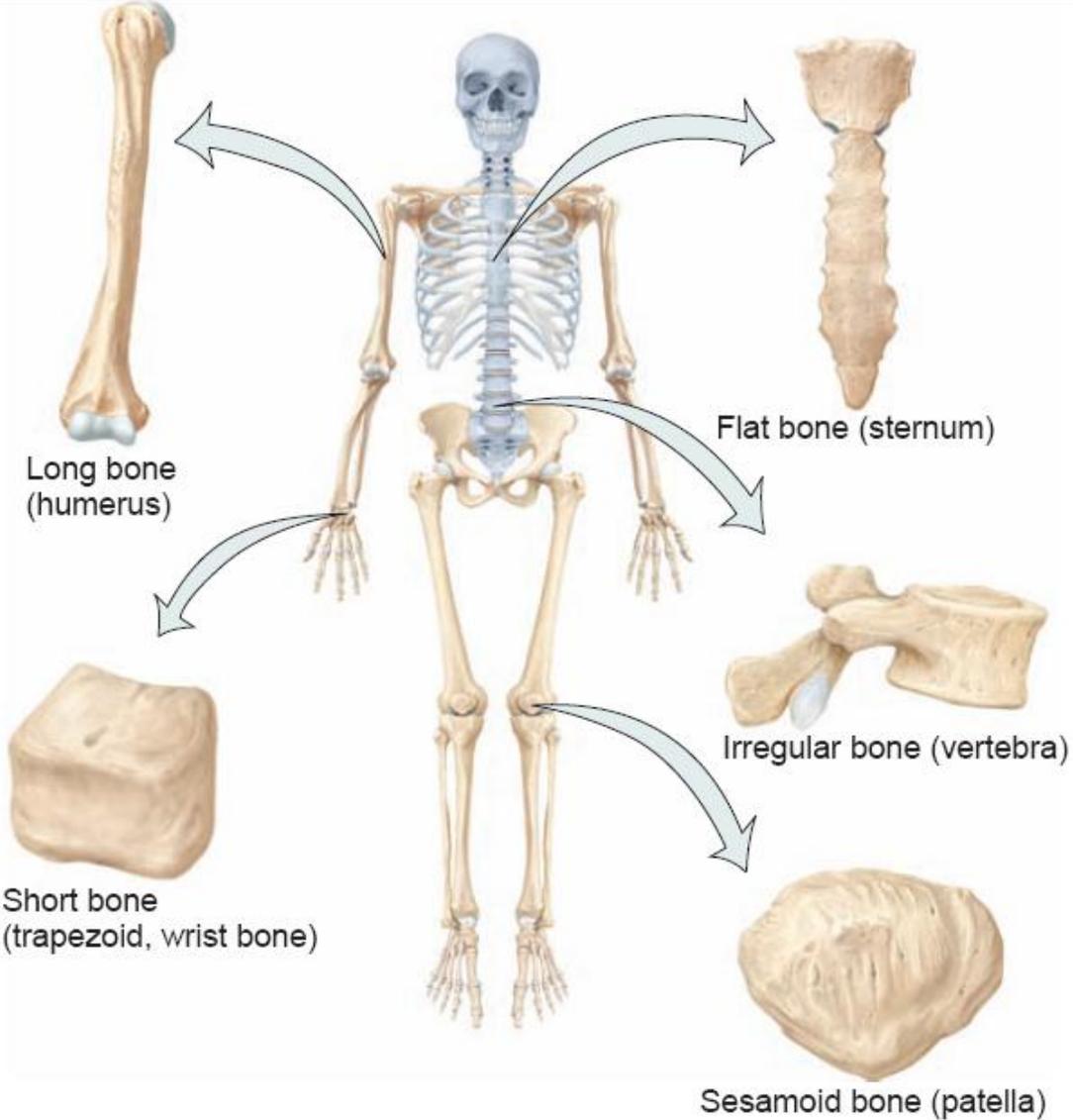
- Bones, cartilage, joints, and ligaments
- Composed of 206 bones grouped into two divisions
  - Axial skeleton (80 bones)
  - Appendicular skeleton (126 bones)
- The Axial Skeleton
  - Formed from 80 named bones
  - Consists of the skull, the vertebral column, and the thoracic cage (ribs and sternum).
- Axial skeleton supports and protects organs of head, neck and trunk



# Functions of bone (skeleton)

- ✓ Support and protection
- ✓ Blood cell formation
- ✓ Mineral storage (calcium especially)
- ✓ Site for muscle attachment → body movement

# Types of bones based on shape

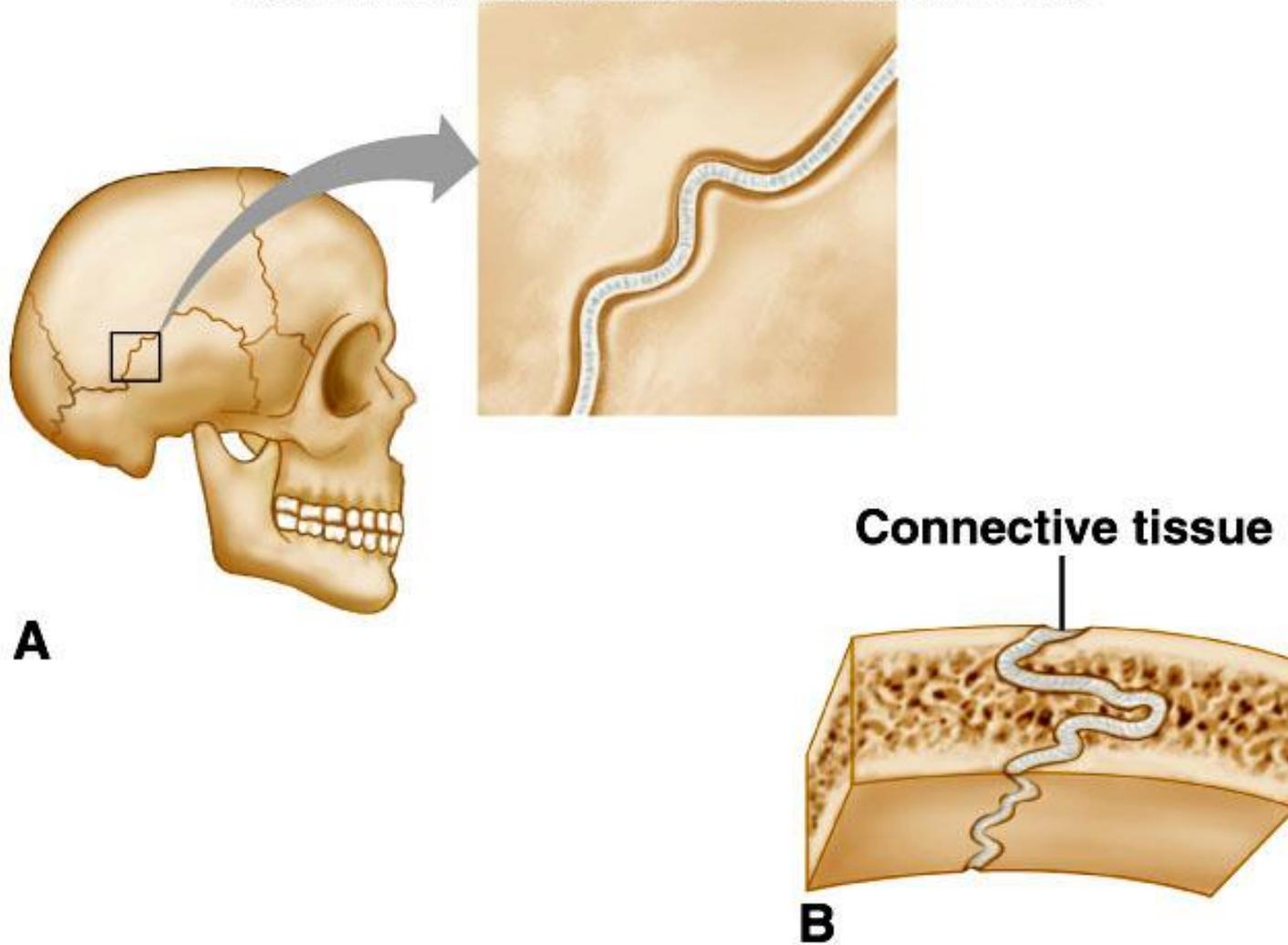


# Types of joints

- **Fibrous joints (المفصل الليفي):** There is no synovial cavity, and the bones are held together by dense irregular connective tissue that is rich in collagen fibers. Fibrous joints permit little or no movement. E.g. sutures between bones of the skull.
- **Cartilaginous joints (المفصل الغضروفي):** There is no synovial cavity and the bones are held together by cartilage. Cartilaginous joint allows little or no movement. E.g. the intervertebral joints between the bodies of vertebrae, the pubic symphysis between the anterior surfaces of the hip bones.
- **Synovial joints (المفصل الزليلي):** The bones forming the joint have a synovial cavity, allowing a wide range of movement at the expense of stability. E.g. shoulder joint, hip joint.

# Fibrous joint

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**SOLID JOINTS**

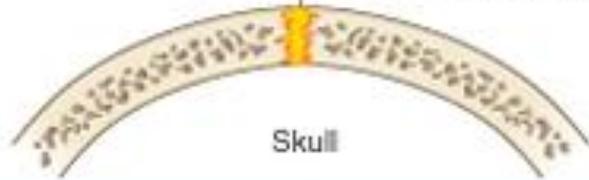
**Fibrous**

**Cartilaginous**

**Sutures**

Sutural ligament

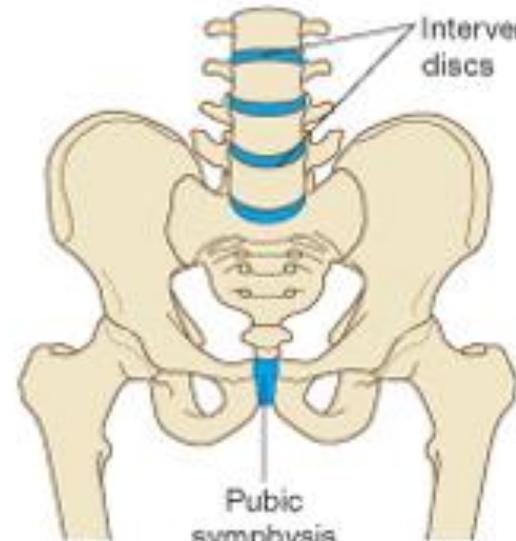
Skull



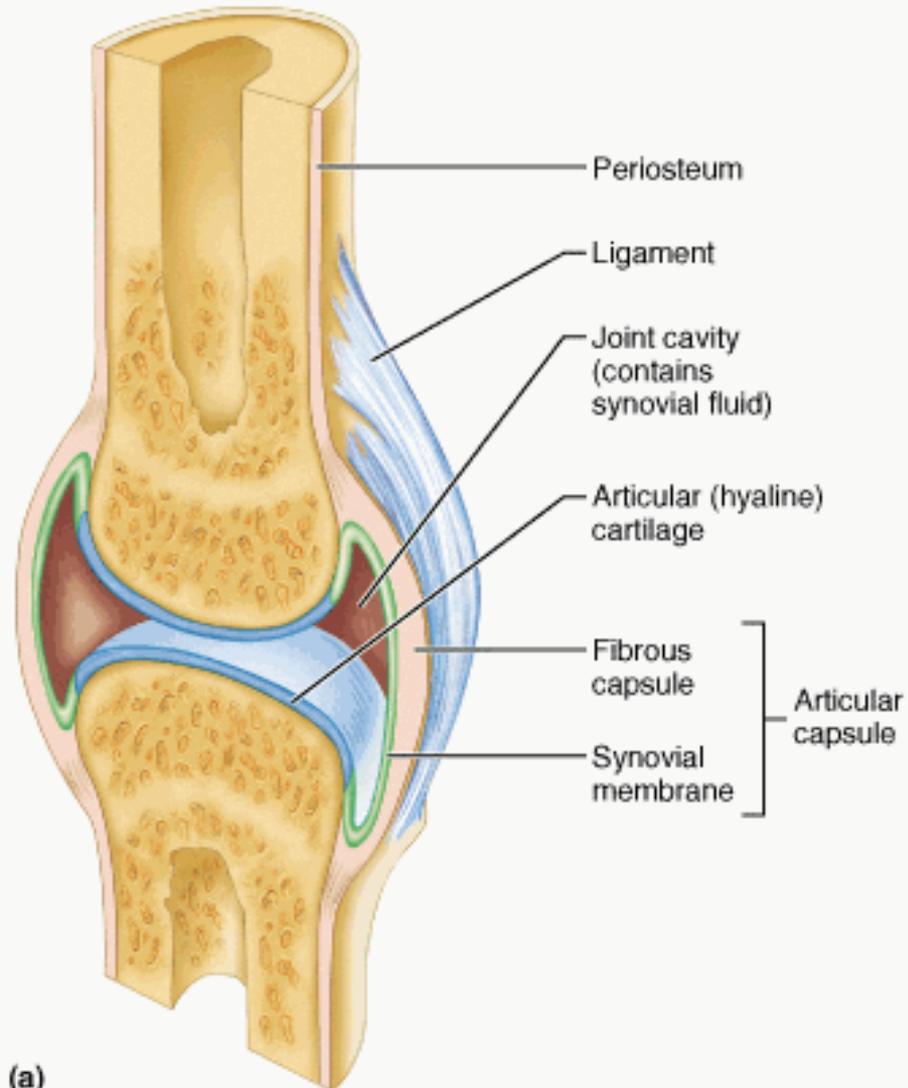
**Symphysis**

Intervertebral discs

Pubic symphysis



# Synovial joint



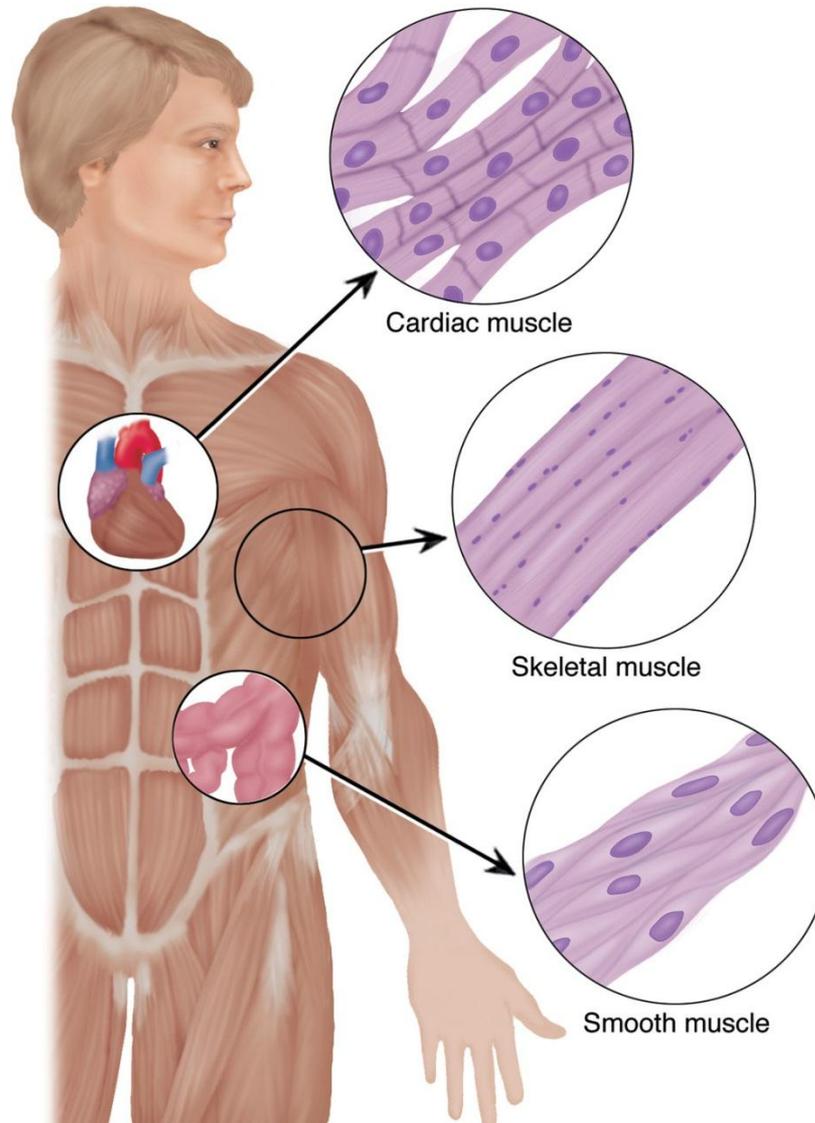
(a)

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# Human body has three types of muscles

- **Skeletal muscles:** attached to bones via tendons and have the main function of contracting to facilitate our movement. These muscles are under direct conscious control (voluntary muscles).
- **Smooth muscles:** found in the walls of hollow organs such as the Stomach, Esophagus, Bronchi, and in the walls of blood vessels. Contraction of these muscles is regulated by the autonomic nervous system (involuntary muscles) and we are unable to control their movements.
- **Cardiac muscles:** found solely in the walls of the heart and are under the control of the autonomic nervous system (involuntary muscles).

# Types of Muscles



**Thank You**

