



The Musculoskeletal System

By

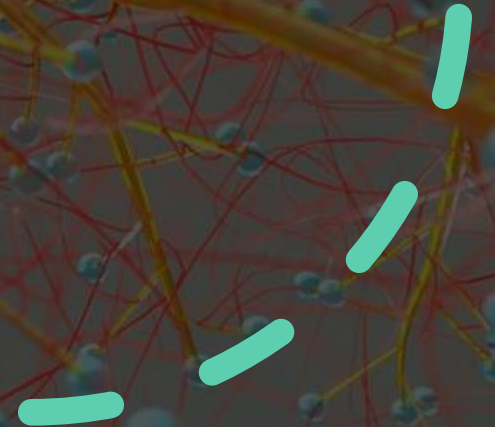
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The Musculoskeletal System

- The term musculoskeletal is assembled with four-word parts: muscul/o/ skelet/al. This system forms the framework that holds the body together, enables it to move, and protects and supports all the internal organs. This system includes bones, joints, and muscles.



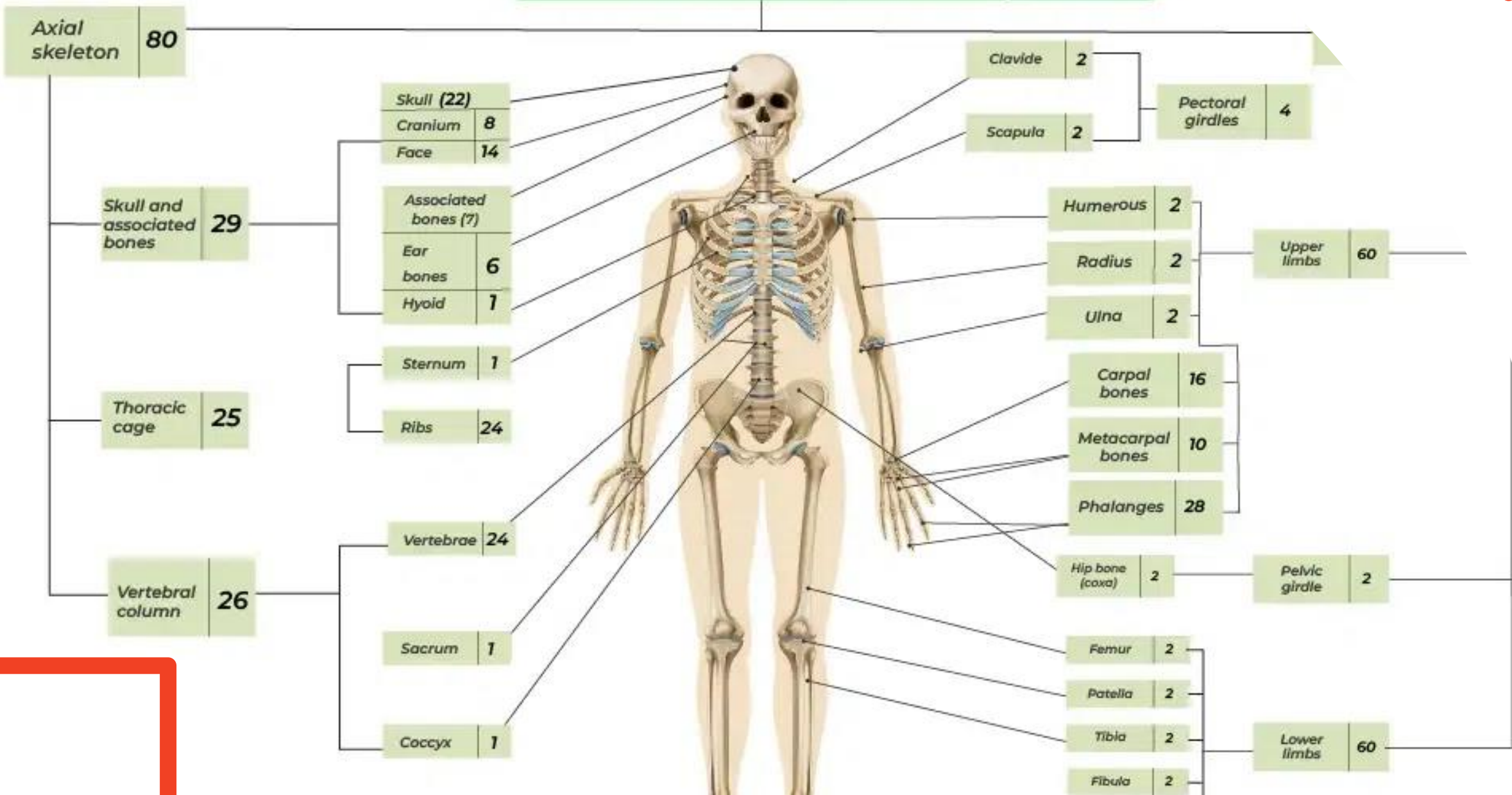
The Skeletal System

The bony skeleton, composed of 206 bones, provides the jointed framework for the body, giving it shape. This framework protects vital organs from external injury and provides attachment points for muscles, ligaments, and tendons to make body movement possible.

Bones, also called osseous tissue, are one of the hardest materials in the body. They are connected to other bones by ligaments. Muscles are connected to bones by tendons, which are located at each end of a muscle because a muscle needs to be attached to two bones to make movement possible. A joint, then, is any place in the body where two or more bones meet.

Skeleton System

206
Bones



Types of Bones

Bones are classified according to their shape into:

1. Long bones: form the extremities of the body, found in arms (humerus is the upper arm) and legs (femur is the thigh). They are strong, broad at the ends where they join with other bones, and have large surface areas for muscle attachment.

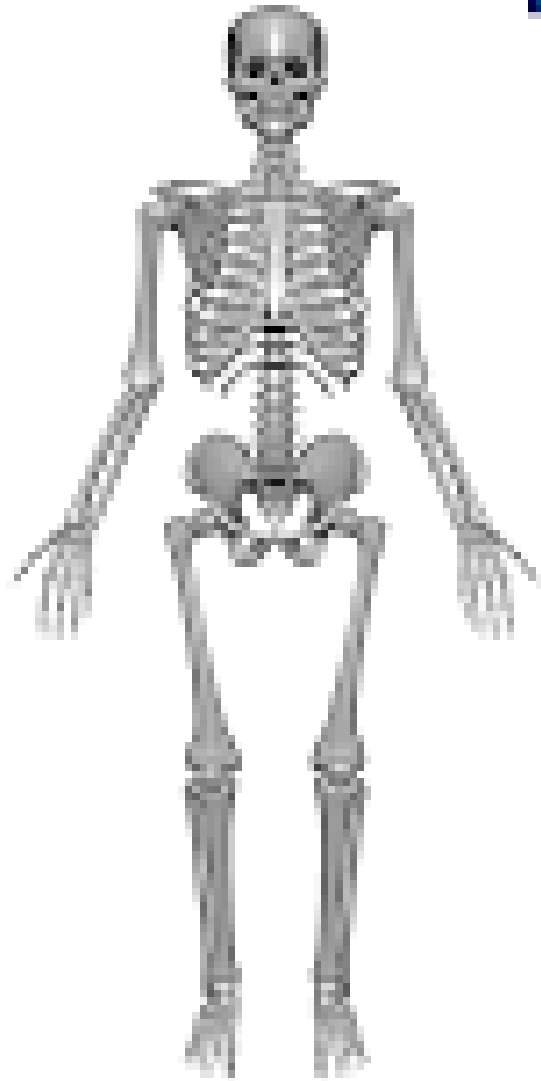
2. Short bones: are small, cube-shaped bones found in the wrists, ankles, and toes.

3. Flat bones: they have large, somewhat flat surfaces that cover organs or provide a surface for large areas of muscle. The shoulder blades, pelvis, and skull are examples of flat bones.

4. Irregular bones: are specialized bones with specific shapes. The bones of the ears, vertebrae, and face are irregular bones.

5. Sesamoid bones: are bones formed in a tendon near joints, example: patella (kneecap).

Types of Bones



Average Adult = 206 Bones

- Long Bones (90)
- Short Bones (28)
- Flat Bones (36)
- Sesamoid Bones (4)
- Irregular Bones (48)

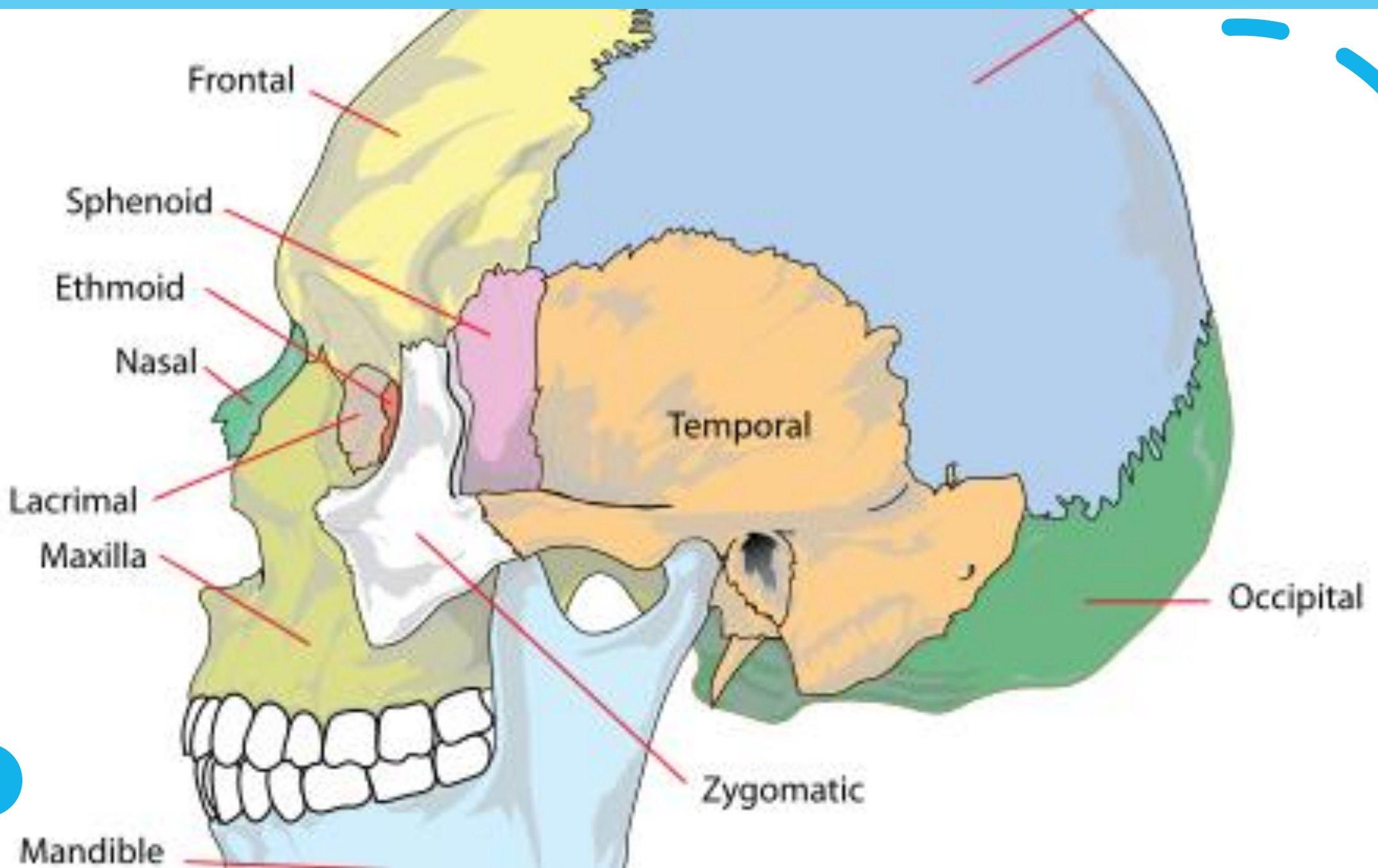


Bones of the Head

The head or skull is divided into two parts consisting of the cranium and facial bones. Cranial bones form the skull, which serves to protect the brain and the structures inside of the skull.

The bones of the cranium include:

1. Frontal bone [FRU˘N-täl bön]: which forms the forehead and bony sockets that contain the eyes.
2. Parietal bone [pä-RĪ-ě-täl bön]: forms the roof and upper sides of the skull.
3. Temporal bones [TĚM-po˘-räl bönz]: two bones form the lower sides and base of the cranium.
4. Occipital bone [o˘k-SĪP-ĭ-täl bön]: forms the back and base of the skull.



The facial bones surround the mouth, nose, and eyes, and include:

1. Mandible [MĂN-dī-bl] or mandibular bone [măn-DĪB-yū-lăr bōn]: is the lower jawbone and contains the sockets for the lower teeth.

2. Maxillary bones [MĂK-sī-lăr-ē bōnz]: form the upper jawbone and contain the sockets for the upper teeth.

3. Zygomatic bones: form the cheekbones.

4. Palatine bones: form the hard palate (roof of oral cavity and floor of nasal cavity).

5. Nasal bones [NĂ-zăl bōnz]: form part of nasal septum and the bridge of nose.

6. Lacrimal bones [LĂK-rī-măl bōnz]: hold the lacrimal gland and the canals for the tear ducts.

Vertebral column

The vertebral or spinal column extends from the skull to the pelvis. It serves to support and stabilize the body. It is composed of 26 bone segments called vertebrae, which are arranged in five divisions:

1. Cervical vertebrae [SĚR-vĩ-kl VĚR-tě-brē]: are the seven vertebrae located in the neck.

2. Thoracic vertebrae [thō-RĀS-ĩk VĚR-tě-brē]: are the 12 vertebrae that connect to the ribs.

3. Lumbar vertebrae [LUĚM-bĕr VĚR-tě-brē]: are the five bones of the middle back.

4. Sacrum [SĀ-krŭm]: is the curved bone of the lower back and consists of five separate bones at birth that fuse together in early childhood.

5. Coccyx [KOĚK-sĩks]: also called the tailbone, is formed from four bones fused together.

Bones of the Chest and Pelvis

There are two weight-transferring transverse sections of bones. The upper is the group formed by the clavicle (collar bone) and scapula (shoulder blade), which transfers the weight of the upper body and distribute it evenly to the spine.



The second weight-transferring transverse section is formed by the pelvic girdle. The bones of the pelvis serve to support and protect the body. The pelvic girdle transfers the weight of the body from one leg to the other during running, walking, or any movement.

Bones of the Extremities

The bones of the arms, hands, and legs allow the body to move. Muscles attach to these bones to aid in body movement.

1. Humerus [HYŪ-mēr-ŭs]: Upper arm bone

2. Radius [RĀ-dē-ŭs]: forearm bone on thumb side of lower arm.

3. Ulna [ŪL-nă]: forearm bone on little finger side of lower arm

4. Carpus (carpal bones) [KĀR-pāl bōnz]: the eight bones of wrist

5. Metacarpus (metacarpal bones) [MĒT-ă-KĀR-pāl bōnz] are the five bones of the palm that radiate out to the finger bones.

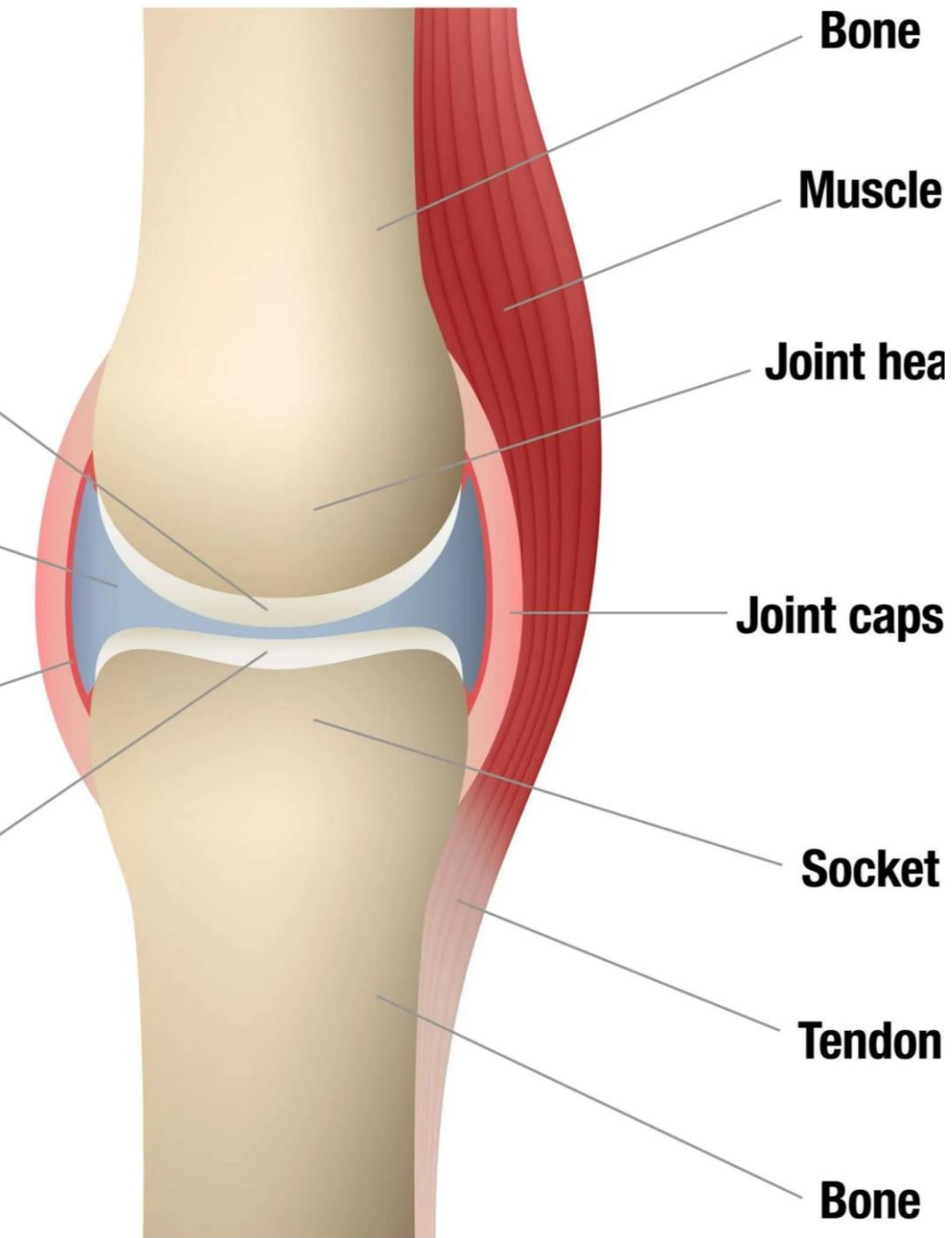
6. Phalanges [fă-LĀN-jēz]: finger bones; three in each finger and two in each thumb.

7. Femur [FĒ-mŭr]: upper leg bone or thigh bone

8. Patella [pă-TĒL-ă]: Kneecap

9. Tibia [TĪB-ē-ă]: shin bone; thicker lower leg bone

10. Fibula [FĪB-yŭ-lă] Thinner long bone in lateral side of lower leg



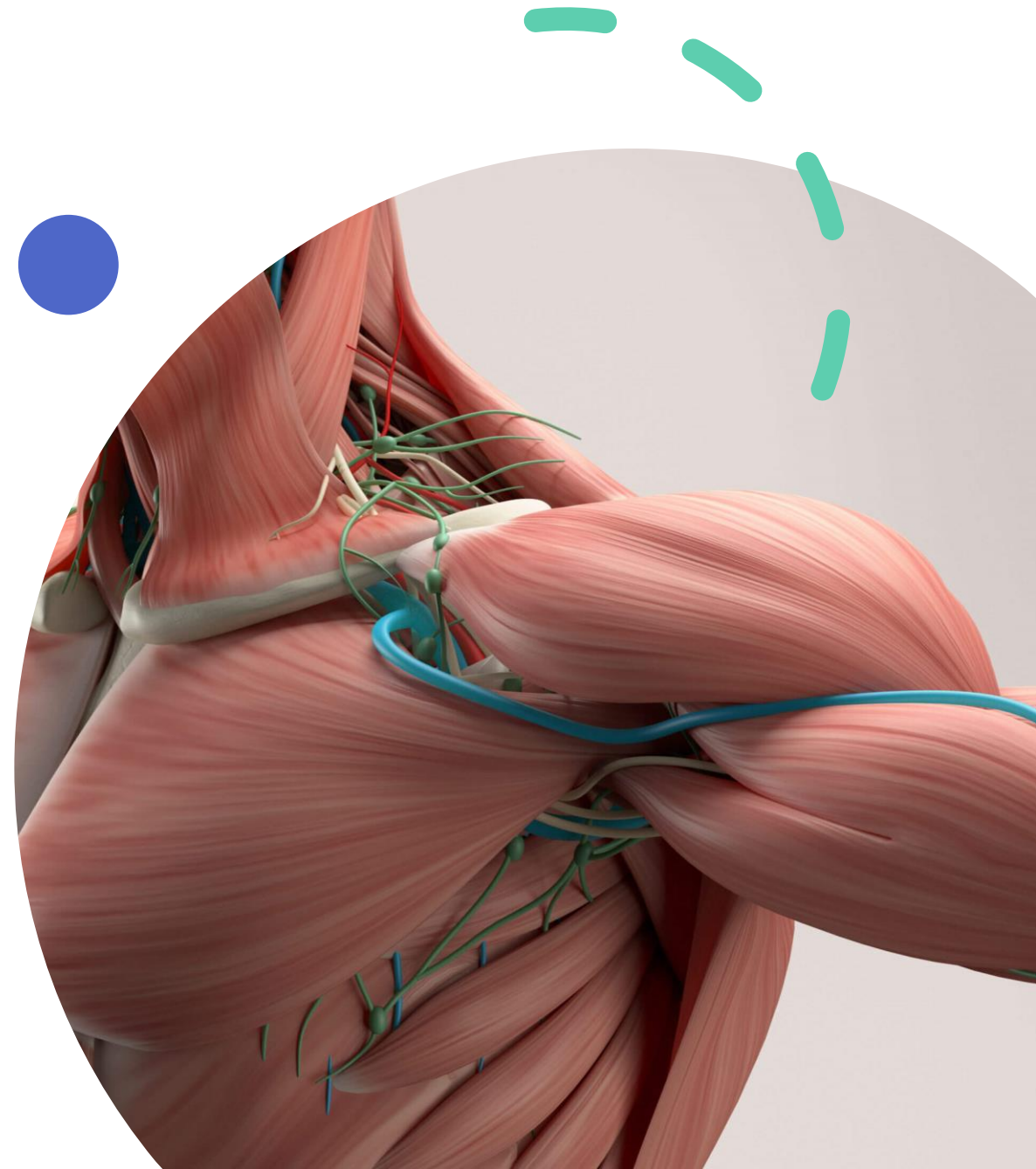
Joints

Joints are formed when two or more bones meet. This is also referred to as an articulation. There are three types of joints determined by the amount of movement allowed between the bones:

1. Synovial joints [sĭ-NŌ-vē-ăĭ jŏynts]: these are freely movable joints such as ball-and-socket joints (seen at the hip and shoulder joints) and hinged type joints (seen at the elbow, knee, or ankle joints).
2. Cartilaginous joints: allow for slight movement but hold bones firmly in place by a solid piece of cartilage.
3. Fibrous joints: these allow almost no movement since the ends of the bones are joined by thick fibrous tissue, which may even fuse into solid bone. The sutures of the skull are an example of a fibrous joint.

The Muscular System

- Muscles are bundles of parallel muscle fibres. As these fibres contract (shorten in length) they produce movement of or within the body. The movement may take the form of bringing two bones closer together, pushing food through the digestive system, or pumping blood through blood vessels. In addition to producing movement, muscles also hold the body erect and generate heat.



Types of Muscles

- The three types of muscle tissue are skeletal muscle, smooth muscle, and cardiac muscle. Muscle tissue may be **either voluntary or involuntary**. Voluntary muscles are those muscles for which a person consciously chooses to contract and for how long and how hard to contract them. The skeletal muscles of the arm and leg are examples of this type of muscle. Involuntary muscles are the muscles under the control of the subconscious regions of the brain. The smooth muscles found in internal organs and cardiac muscles are examples of involuntary muscle tissue

1. Skeletal Muscle

It is directly or indirectly attached to a bone and produces voluntary movement of the skeleton. It is also referred to as a striated muscle because of its striped appearance under a microscope.



Skeletal Muscle Actions



The type of movement a muscle produces is called its action. Muscles are often arranged around joints in antagonistic pairs, meaning that they produce opposite actions. For example, one muscle will bend a joint while its antagonist is responsible for straightening the joint. Some common terminology for muscle actions are described below:

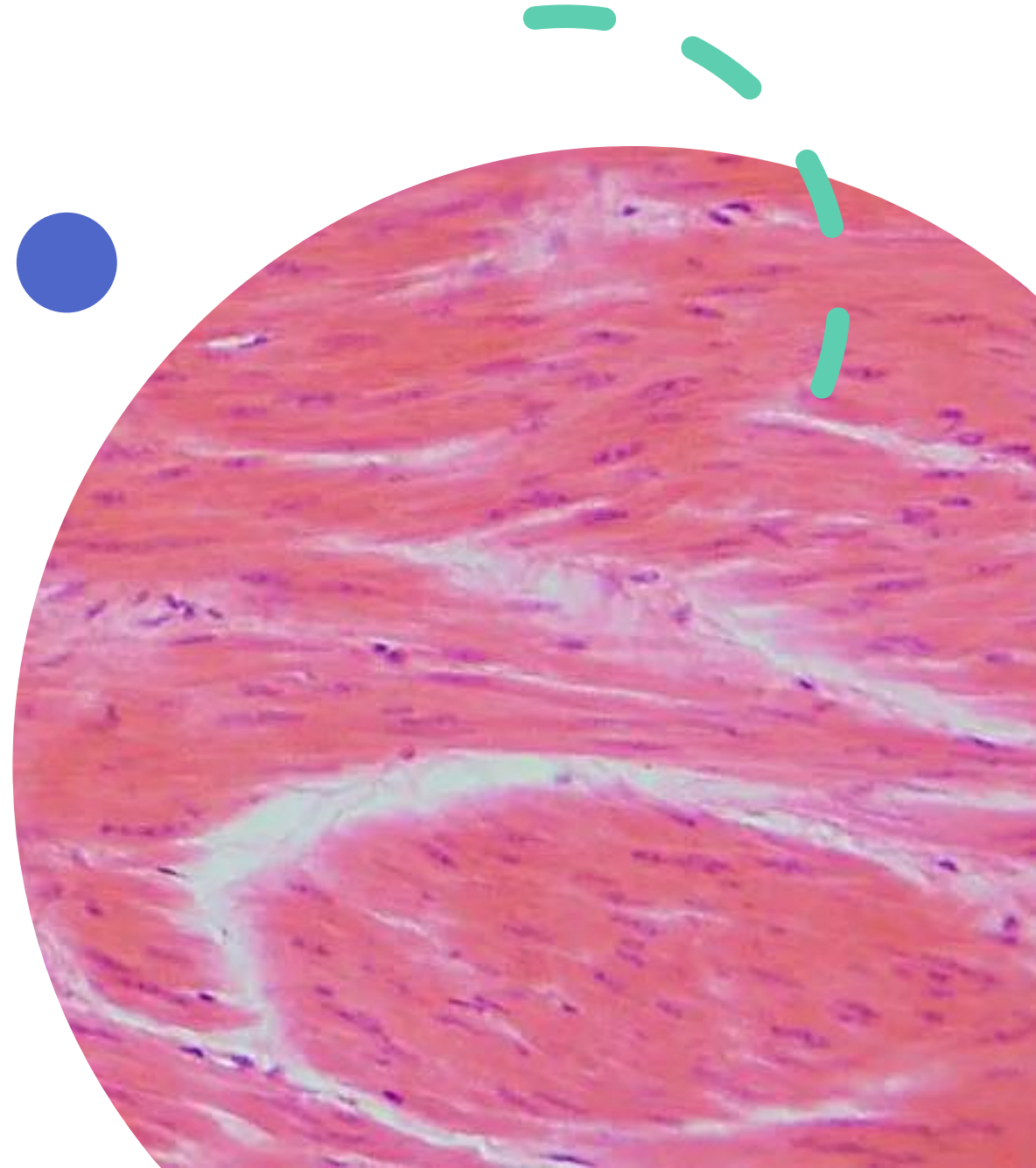


Skeletal muscles are attached to two different bones and overlap a joint. When a muscle contracts, the two bones move, but not usually equally. The less movable of the two bones is considered to be the starting point of the muscle and is called the origin. The more movable bone is considered to be where the muscle ends and is called the insertion.

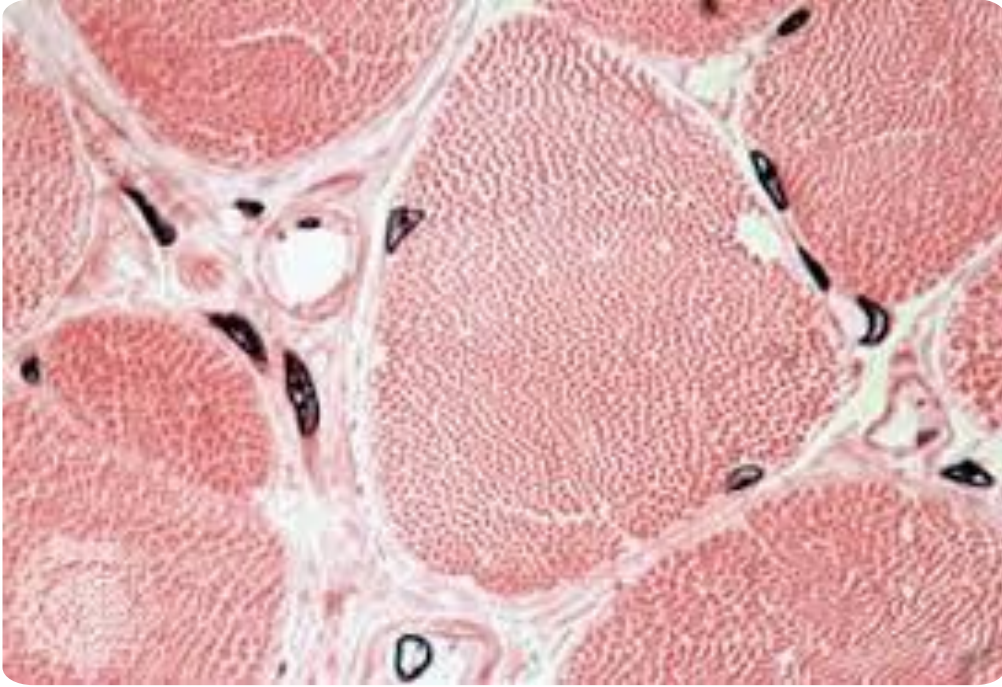
Action	Word parts	Description
abduction (ab-DUK-shun)	ab- = away from duct/o = to bring -ion = action	Movement away from midline of the body
adduction (ah-DUK-shun)	ad- = toward duct/o = to bring -ion = action	Movement toward midline of the body
flexion (FLEK-shun)	flex/o = to bend -ion = action	Act of bending or being bent
extension (eks-TEN-shun)	extens/o = to stretch out - ion = action	Movement that brings limb into or toward a straight condition
elevation		To raise a body part, as in shrugging the shoulders

2. Smooth Muscle (visceral muscle (VISS-er-ral))

This tissue is found in association with internal organs. For this reason, it is also referred to as visceral muscle. The name smooth muscle refers to the muscle's microscopic appearance; it lacks the striations of skeletal muscle. It is responsible for the involuntary muscle action associated with the movement of the internal organs, such as churning food, constricting a blood vessel, and uterine contractions.



3. Cardiac Muscle (myocardium (my-oh-KAR-dee-um))



It makes up the wall of the heart. With each involuntary contraction, the heart squeezes to pump blood out of its chambers and through the blood vessels.

Muscles of mastication

These muscles are associated with movements of the jaw (temporomandibular joint (TMJ)). They are one of the major muscle groups in the head, the other being the muscles of facial expression. There are four muscles:

1. Masseter muscle

The masseter muscle is the most powerful muscle of mastication. It is quadrangular in shape. Actions: Elevates the mandible, and closing the mouth.

2. Temporalis muscle

The temporalis muscle originates from the temporal fossa. It is a fan shape muscle. Actions: Elevates the mandible, closing the mouth. Also retracts the mandible, pulling the jaw posteriorly.

3. Medial pterygoid muscle

The medial pterygoid muscle has a quadrangular shape with two heads: deep and superficial. It is located inferiorly to the lateral pterygoid. Actions: Elevates the mandible, and closing the mouth.

4. Lateral pterygoid muscle

The lateral pterygoid muscle has a triangular shape with two heads: superior and inferior. It has horizontally orientated muscle fibres, and thus is the major protractor of the mandible. Actions: Acting bilaterally (protract the mandible, pushing the jaw forwards). Unilateral action produces the 'side to side' movement of the jaw.

**THANK YOU
FOR YOUR
ATTENTION**

