



13a A&P:

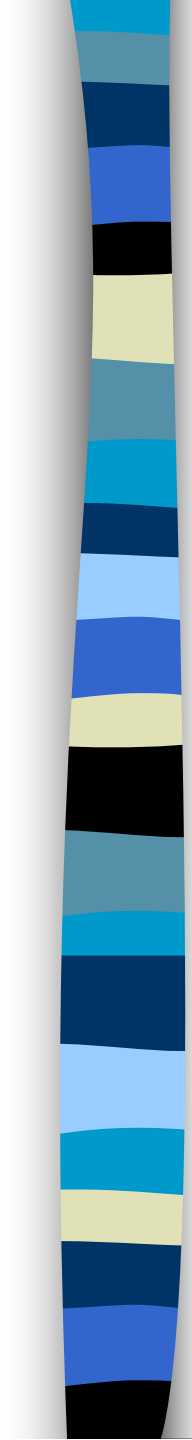
Skeletal System - Cells, Tissues, and Bone Shapes



13a A&P:

Skeletal System - Cells, Tissues, and Bone Shapes Class Outline

5 minutes	Attendance, Breath of Arrival, and Reminders
10 minutes	Lecture:
25 minutes	Lecture:
15 minutes	Active study skills:
60 minutes	Total



13a A&P:

Skeletal System - Cells, Tissues, and Bone Shapes

Class Reminders

Assignments:

- 17a Review Questions (A: 131-140)

Quizzes and Exams:

- 14a Kinesiology Quiz
 - Tibialis anterior, fibularis longus and brevis, quads, rectus abdominis, and pec. major
- 17a Quiz
- 18a Kinesiology Quiz
- 19a Quiz
- 21a Exam

Preparation for upcoming classes:

- 14a H&H: Compassionate Care for All People
 - Trail Guide: biceps brachii and coracobrachialis
 - Packet H: 55-64
- 14b Swedish: Technique Review and Practice - Feet, Anterior Lower Body, and Abs
 - Packet F: 45-46, and 58



Classroom Rules

Punctuality - everybody's time is precious

- Be ready to learn at the start of class; we'll have you out of here on time
- Tardiness: arriving late, returning late after breaks, leaving during class, leaving early

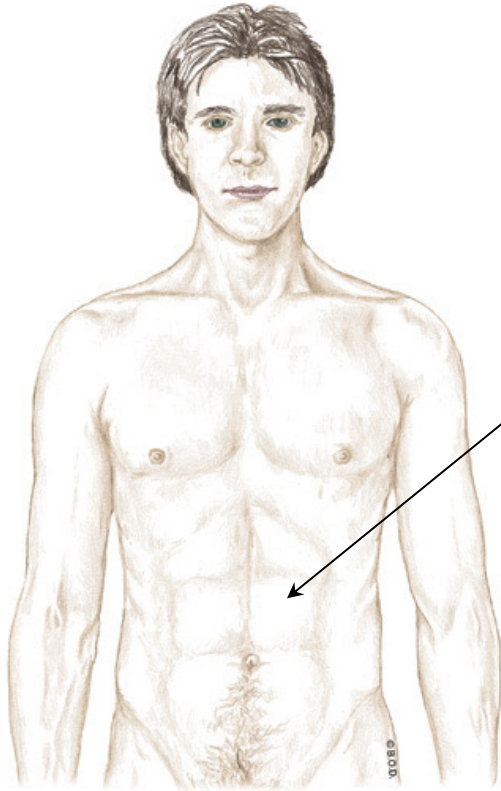
The following are not allowed:

- Bare feet
- Side talking
- Lying down
- Inappropriate clothing
- Food or drink except water
- Phones that are visible in the classroom, bathrooms, or internship

You will receive one verbal warning, then you'll have to leave the room.

Rectus Abdominis

Trail Guide, Page 210



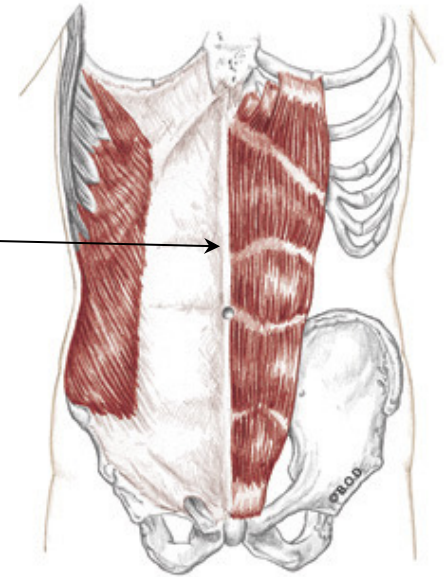
Anterior View

Rectus abdominis

has multiple superficial bellies that are often referred to as a “washboard belly”.

The abdominals as a group of muscles consist of four muscles:

- Rectus abdominis
- External oblique
- Internal oblique
- Transversus abdominis



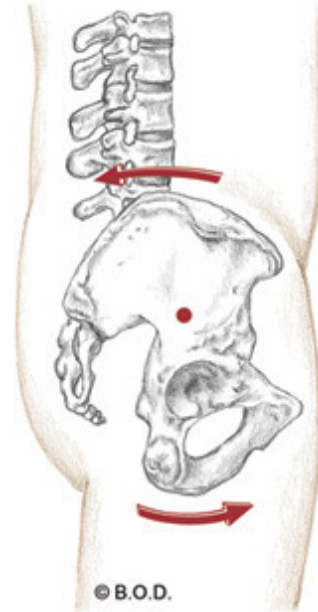
Anterior View

When do you use your rectus abdominis?

Actions of the Rectus Abdominis



Flexion of the vertebral column



Posterior pelvic tilt

Rectus Abdominis, page 210

A

Flex the vertebral column

Tilt the pelvis posteriorly

O

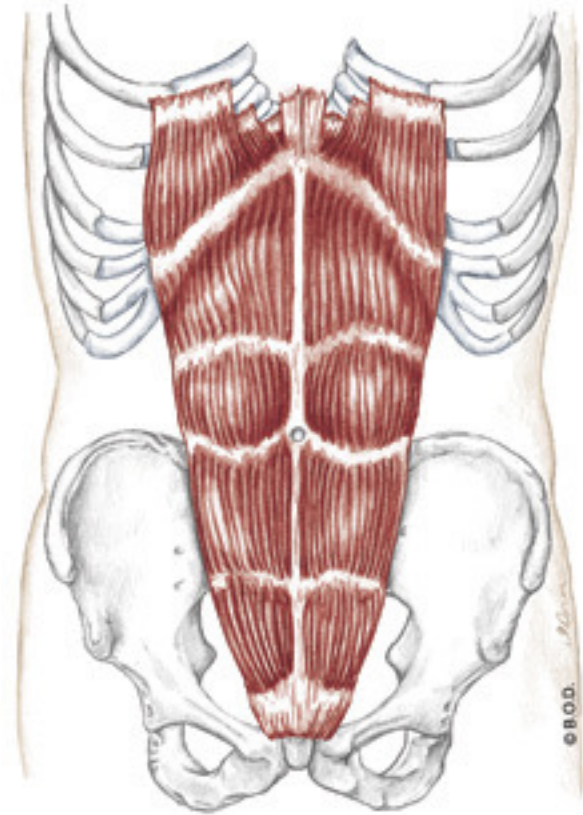
Pubic crest

Pubic symphysis

I

Cartilage of 5th, 6th, and 7th ribs

Xiphoid process



Anterior View



Rectus Abdominis, page 210

A

Flex the vertebral column

Tilt the pelvis posteriorly

O

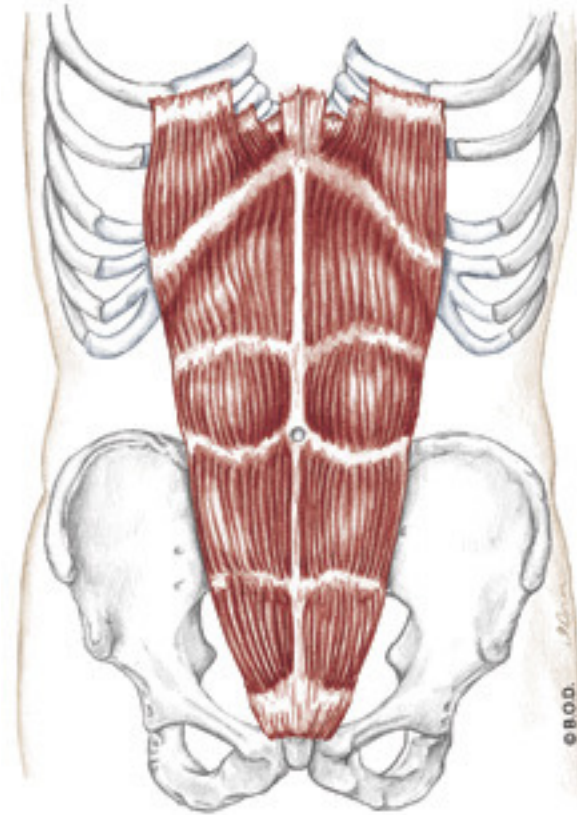
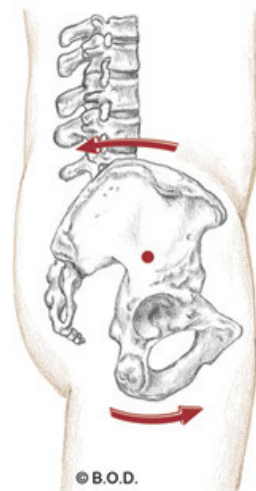
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Anterior View

Rectus Abdominis, page 210

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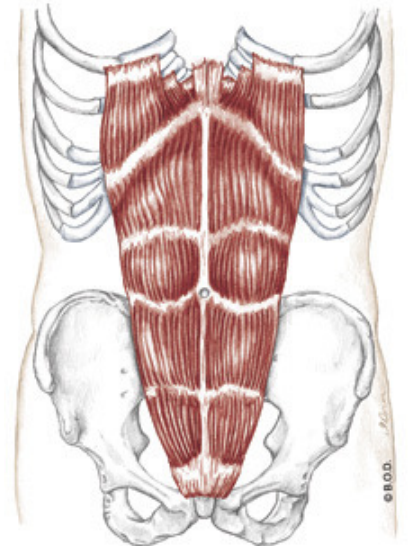
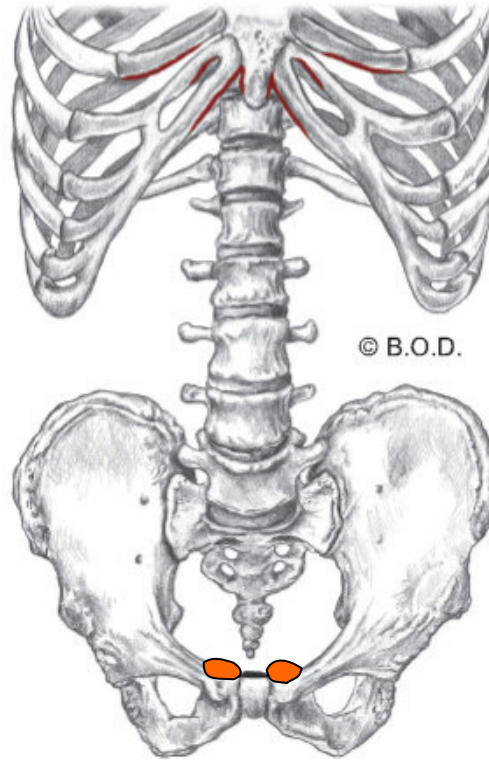
Cartilage of 5th, 6th, and 7th ribs

Xiphoid process

Ilium

Pubis

Ischium



Anterior View

Rectus Abdominis, page 210

A

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Tilt the pelvis posteriorly

C

Pubic crest

Pubic symphysis

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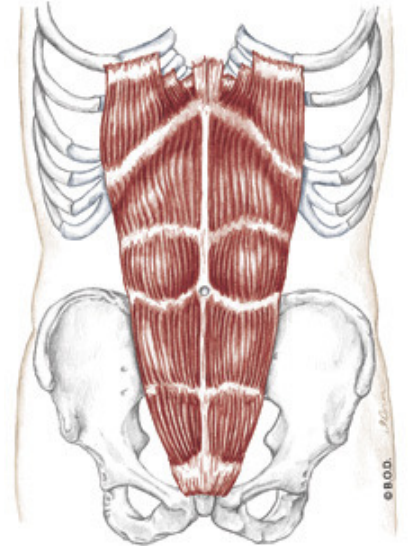
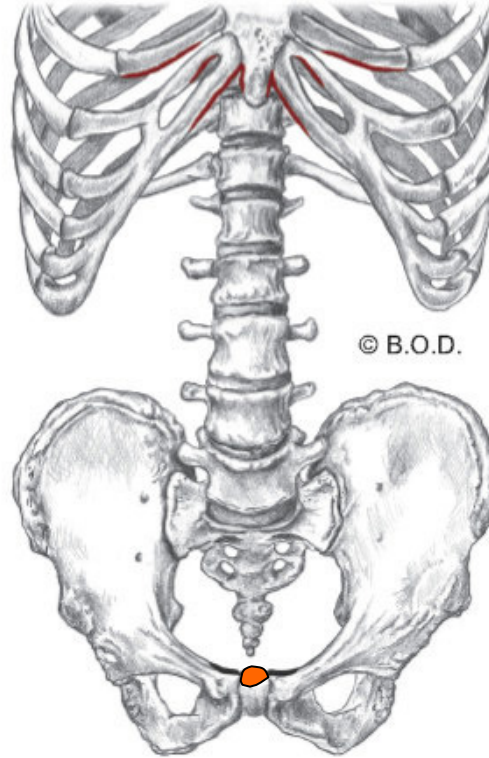
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Anterior View

Rectus Abdominis, page 210

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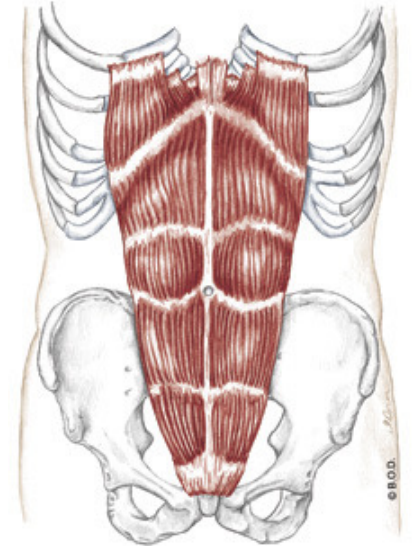
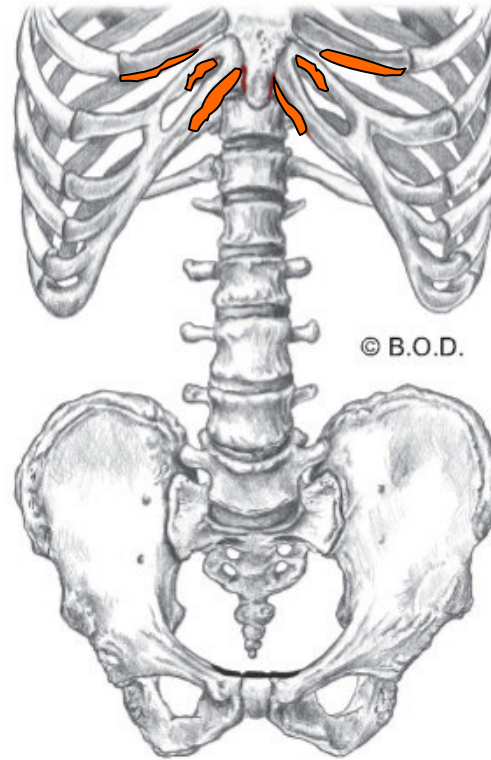
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Rectus Abdominis, page 210

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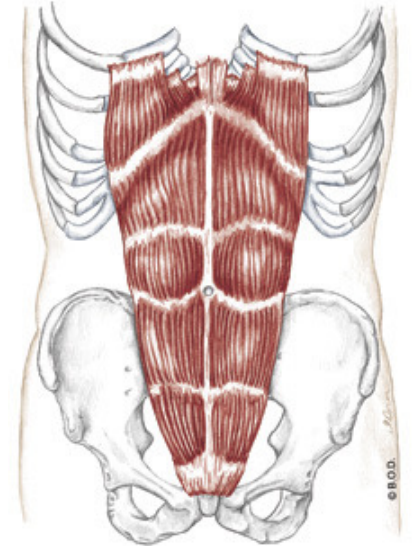
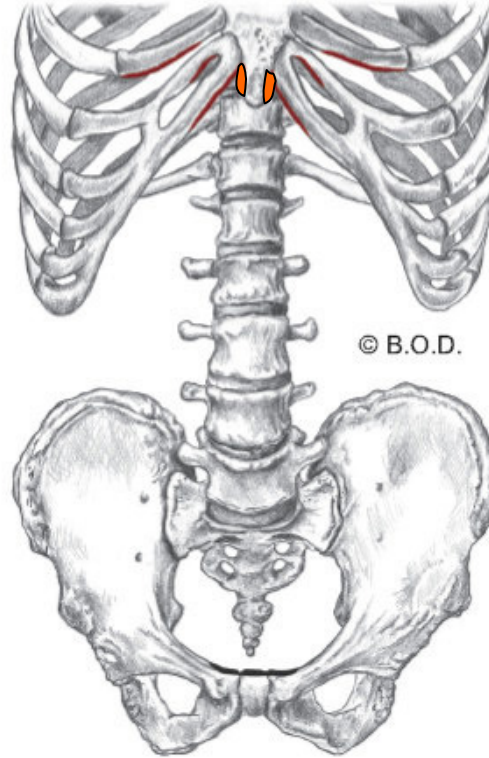
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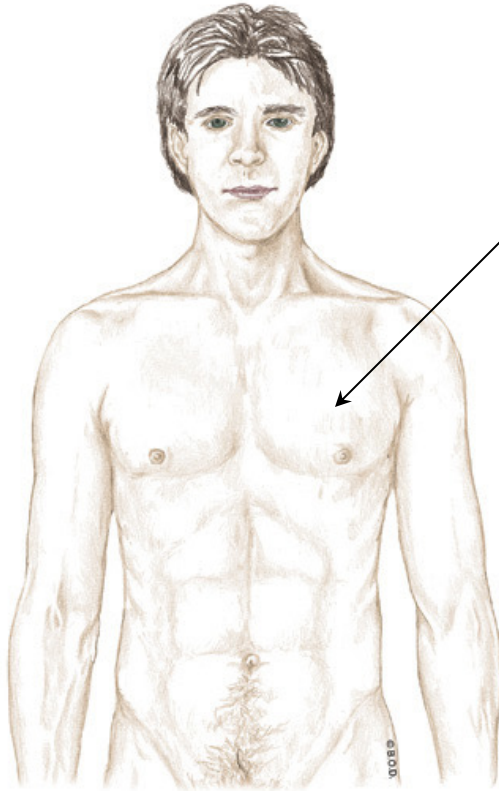
Xiphoid process



Anterior View

Pectoralis Major

Trail Guide, Page 89



Anterior View

Pectoralis Major

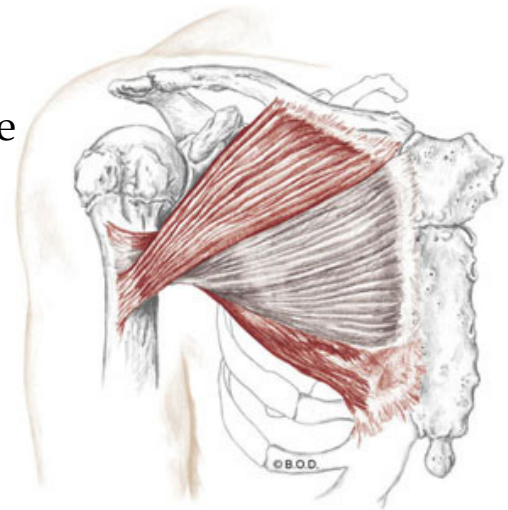
is a broad, powerful muscle located on the chest.

Pec major consists of three segments:

- Clavicular (clavicle)
- Sternal (sternum)
- Costal (rib cartilage)

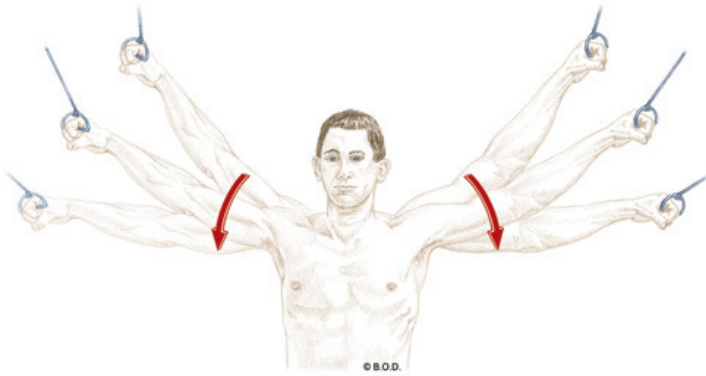
Pec major is also an antagonist to itself:
Upper fibers flex the glenohumeral joint.
Lower fibers extend the glenohumeral joint.

When do you use your pecs?

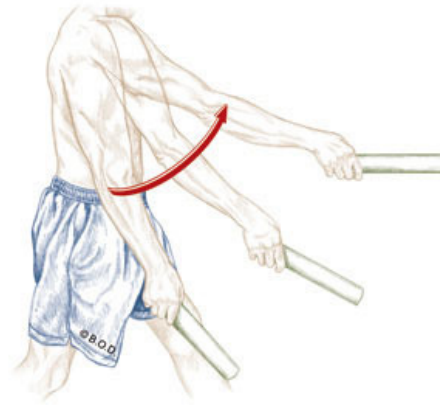


Anterior View

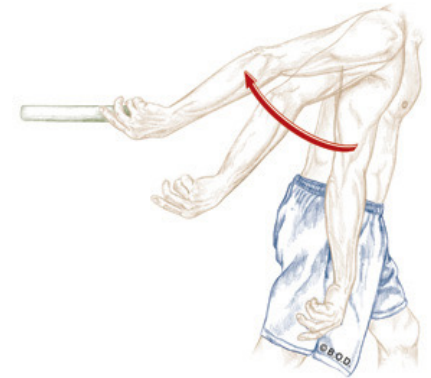
Actions of the Pectoralis Major



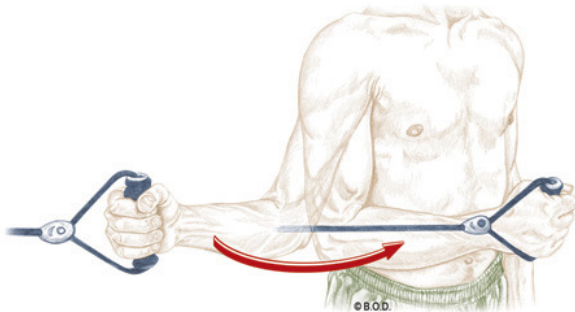
Adduct the glenohumeral joint



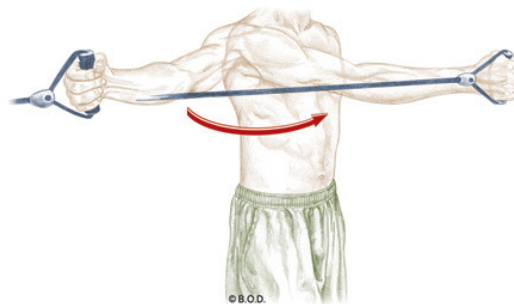
Flex the glenohumeral joint



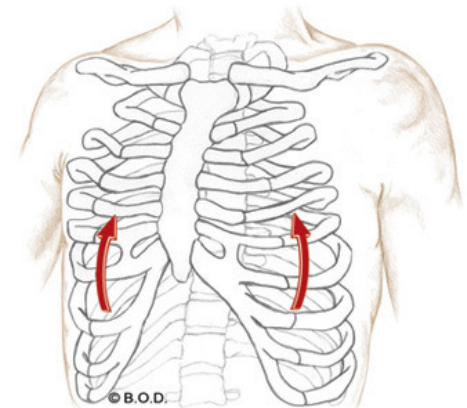
Extend the glenohumeral joint



Medially rotate the glenohumeral joint



Horizontally adduct the glenohumeral joint



Assist to elevate the thorax during forced inhalation

Pectoralis Major, page 89

A All fibers:

Adduct the glenohumeral joint

Medially rotate the glenohumeral joint

Assist to **elevate** the thorax during forced inhalation (with the arm fixed)

Upper fibers:

Flex the glenohumeral joint

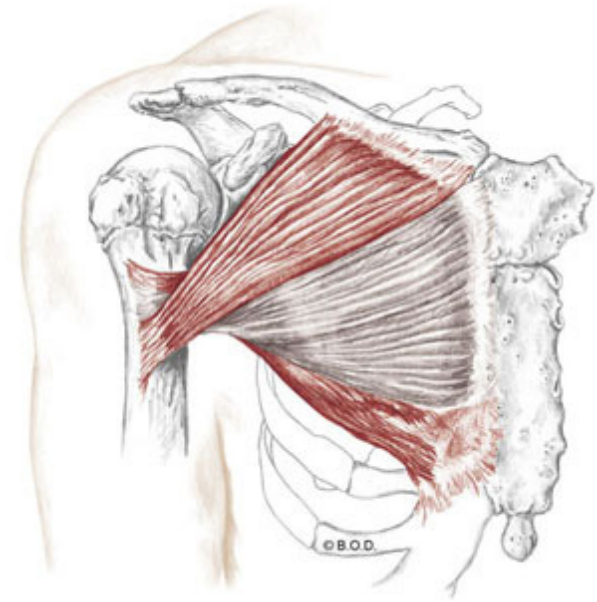
Horizontally adduct the glenohumeral joint

Lower fibers:

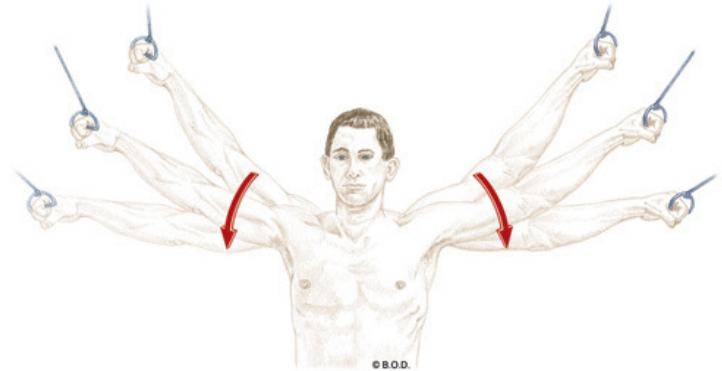
Extend the glenohumeral joint

O Medial half of the clavicle
Sternum
Cartilage of ribs 1-6

I Crest of greater tubercle of humerus



Anterior View



Pectoralis Major, page 89

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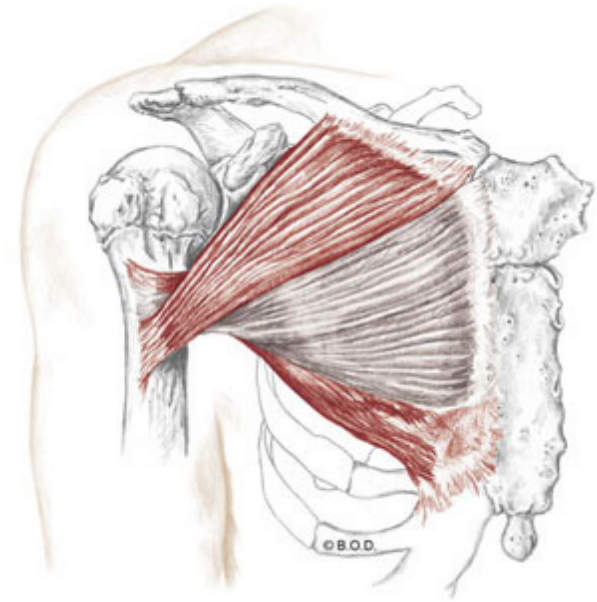
Horizontally adduct the glenohumeral joint

Lower fibers:

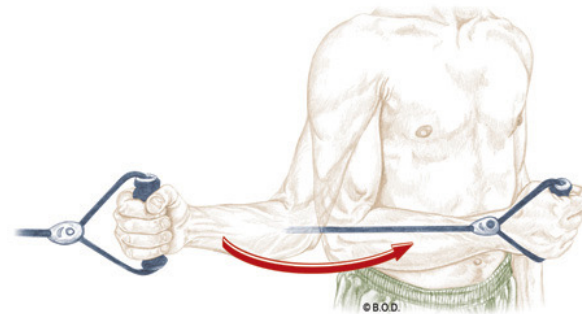
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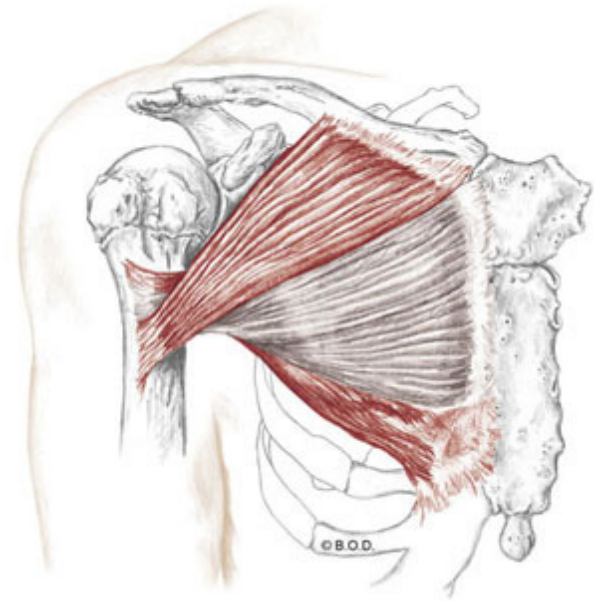
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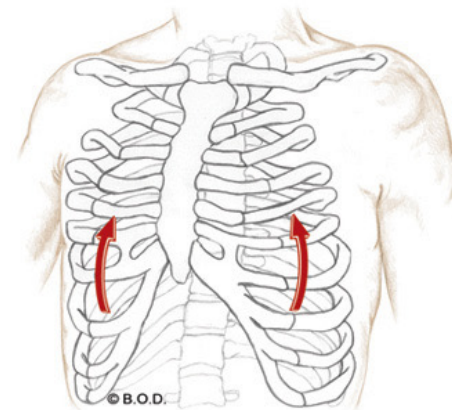
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Pectoralis Major, page 89

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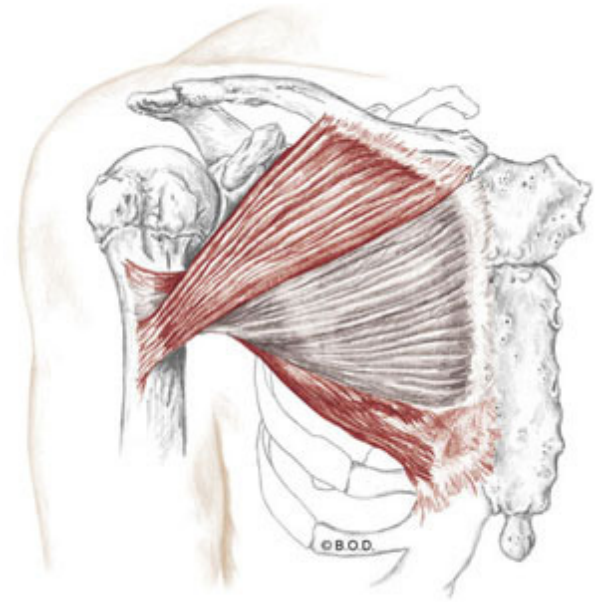
Horizontally adduct the glenohumeral joint

Lower fibers:

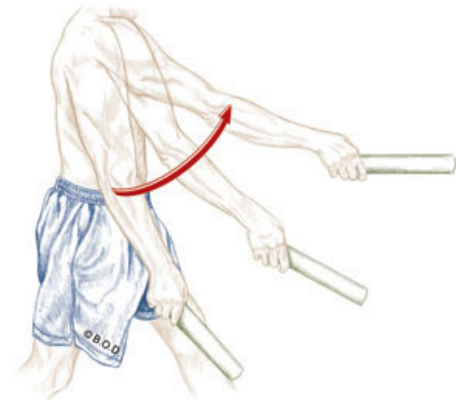
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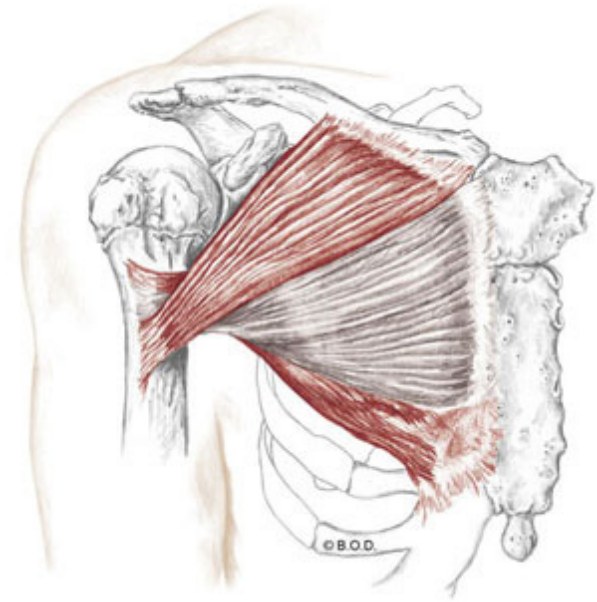
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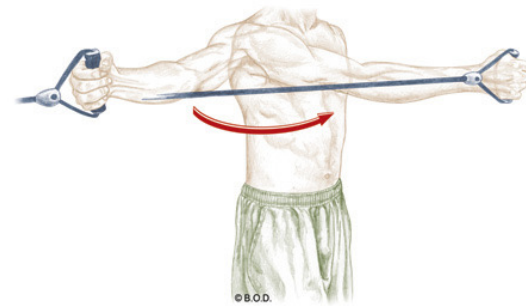
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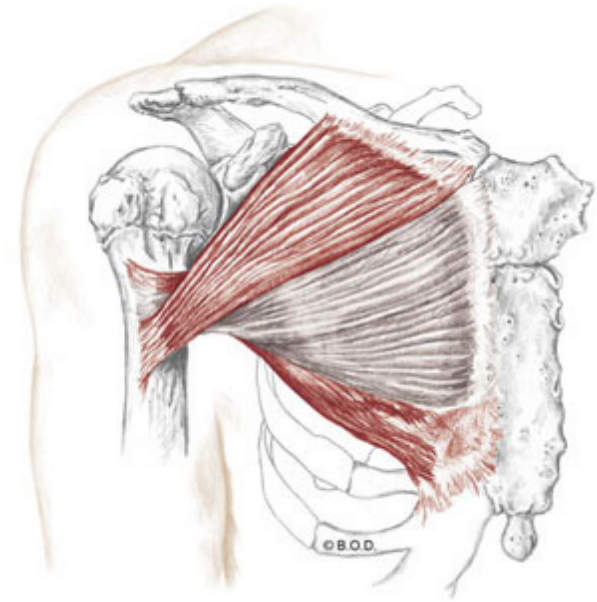
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Lower fibers:

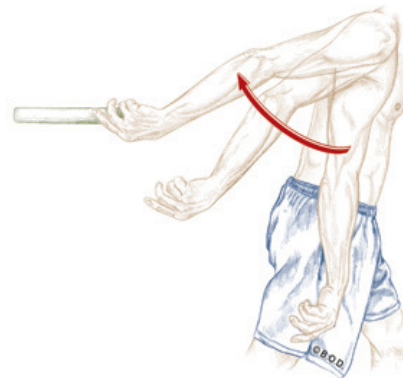
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Anterior View



Pectoralis Major, page 89

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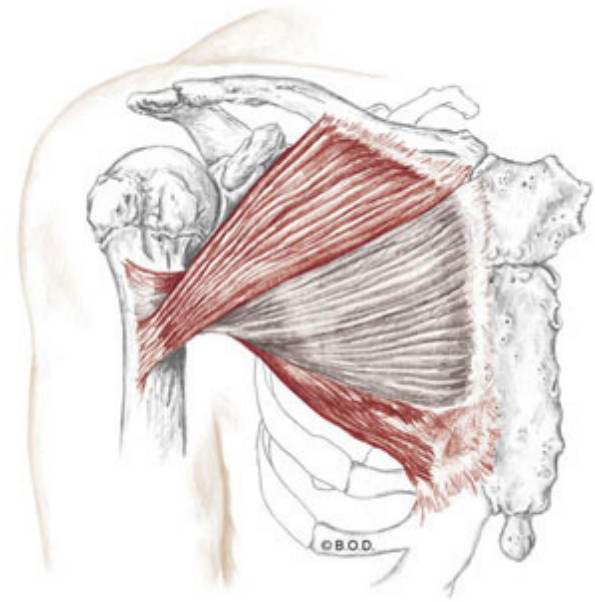
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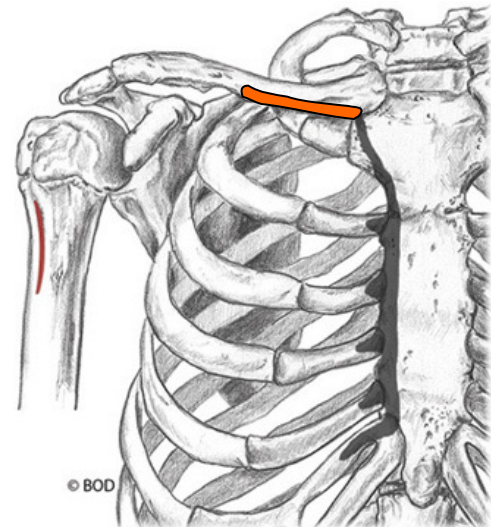
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Anterior View



Pectoralis Major, page 89

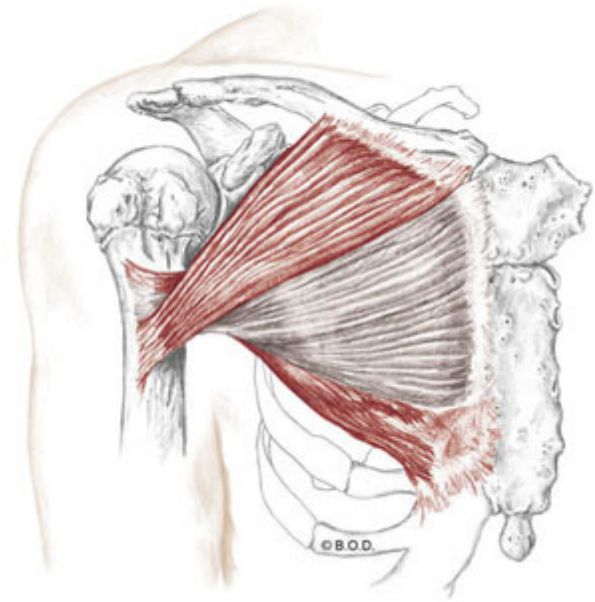
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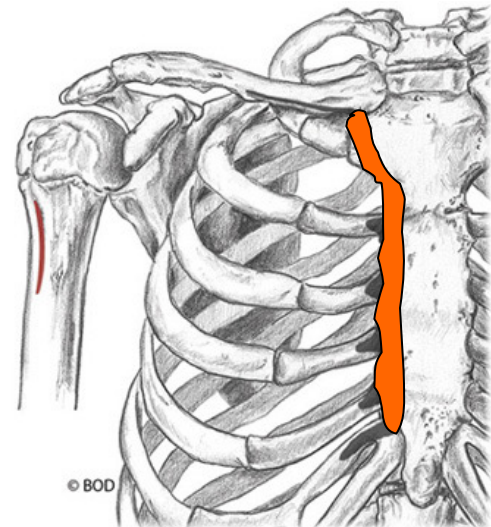
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Anterior View



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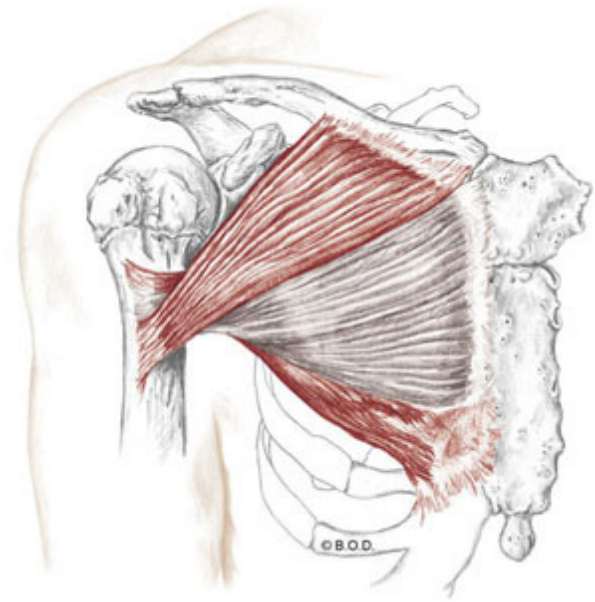
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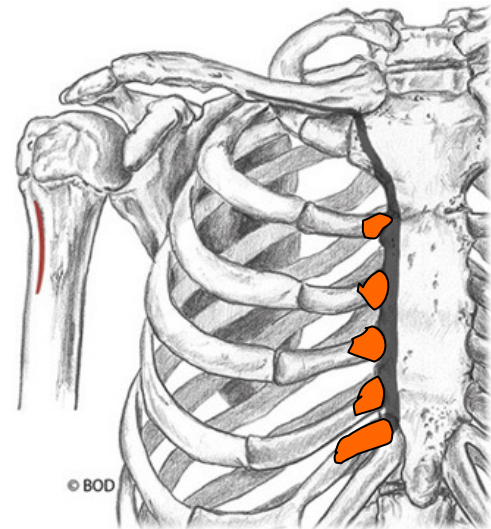
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Anterior View



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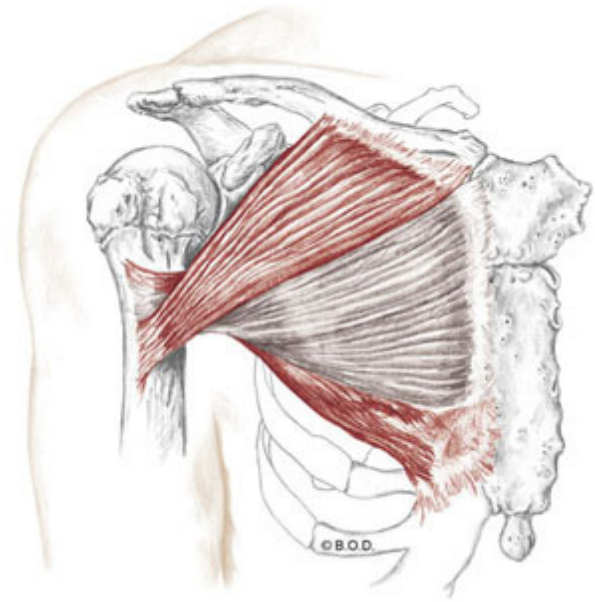
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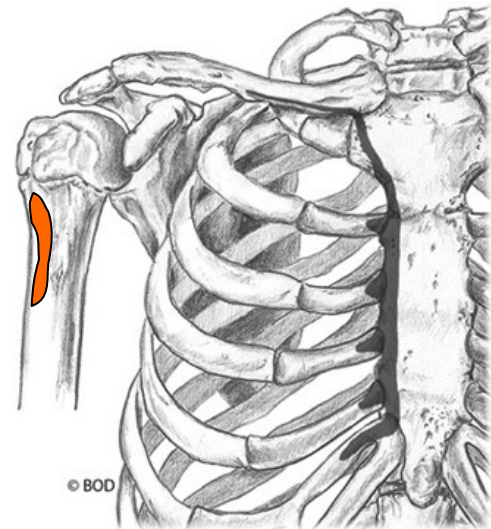
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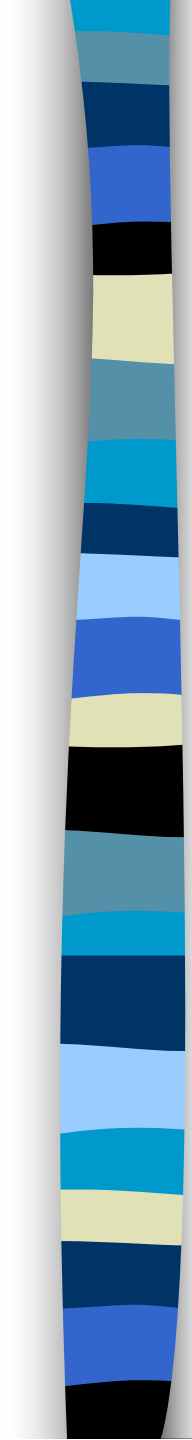
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Anterior View





13a A&P:

Skeletal System - Cells, Tissues, and Bone Shapes

E-15

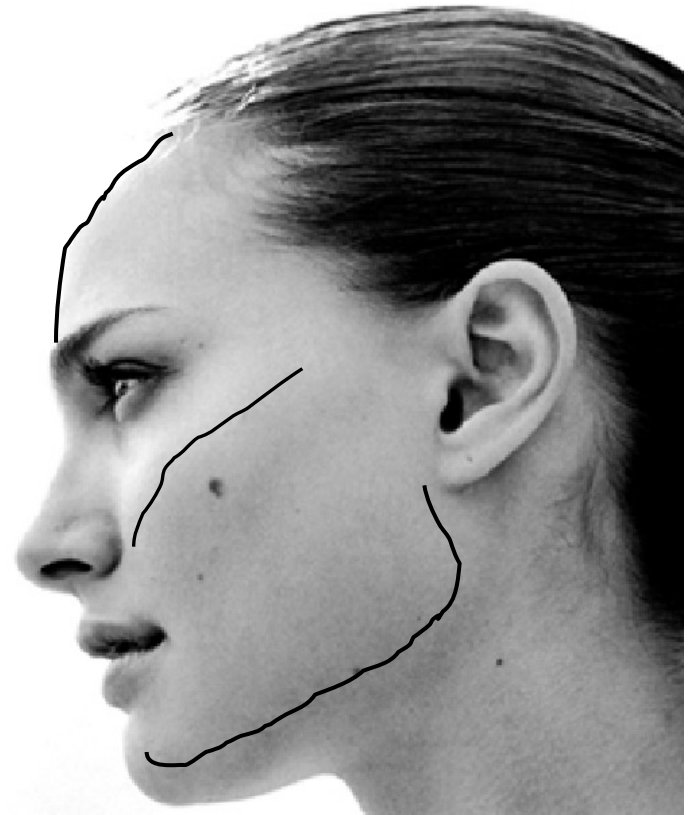
Bones

The structural foundation of our bodies



Bones

The structural foundation of our bodies



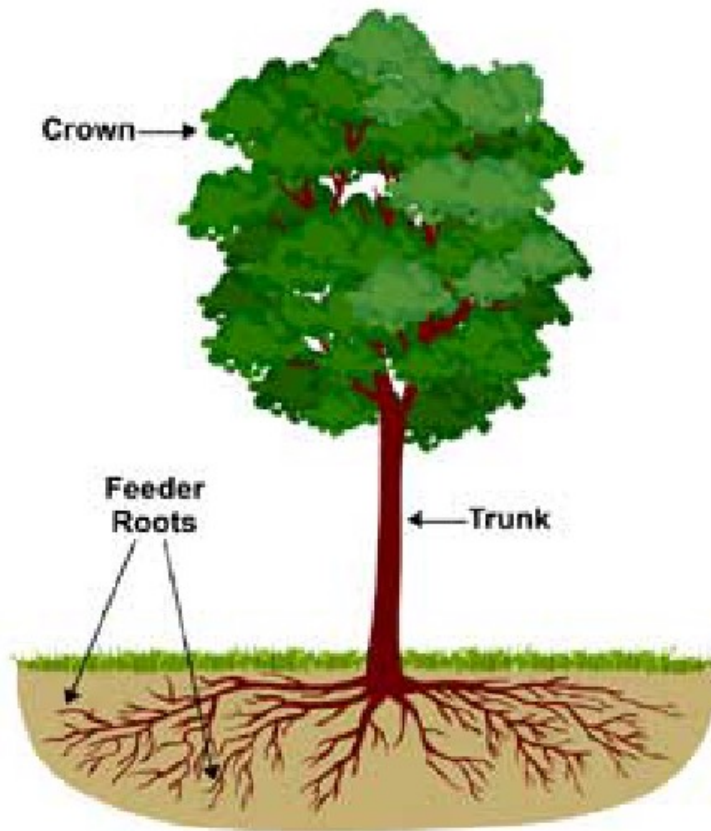
Contacting bones with confidence



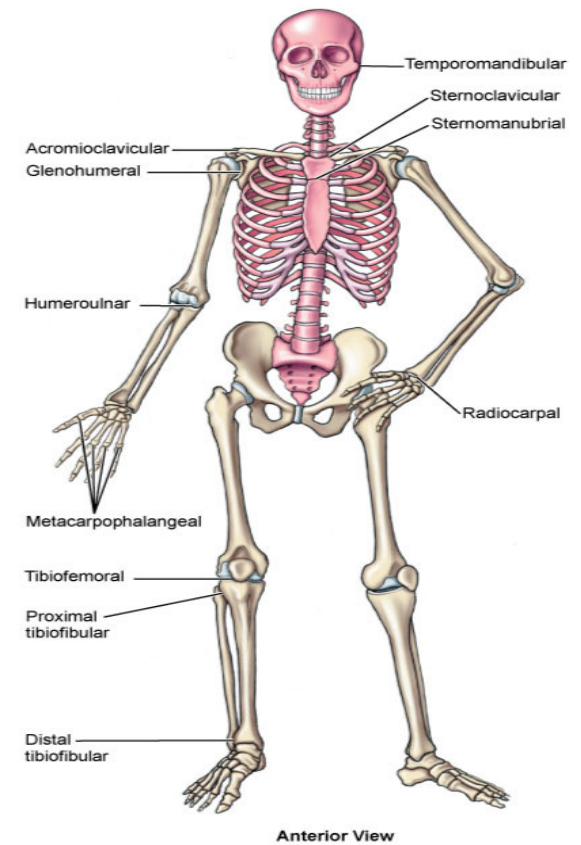
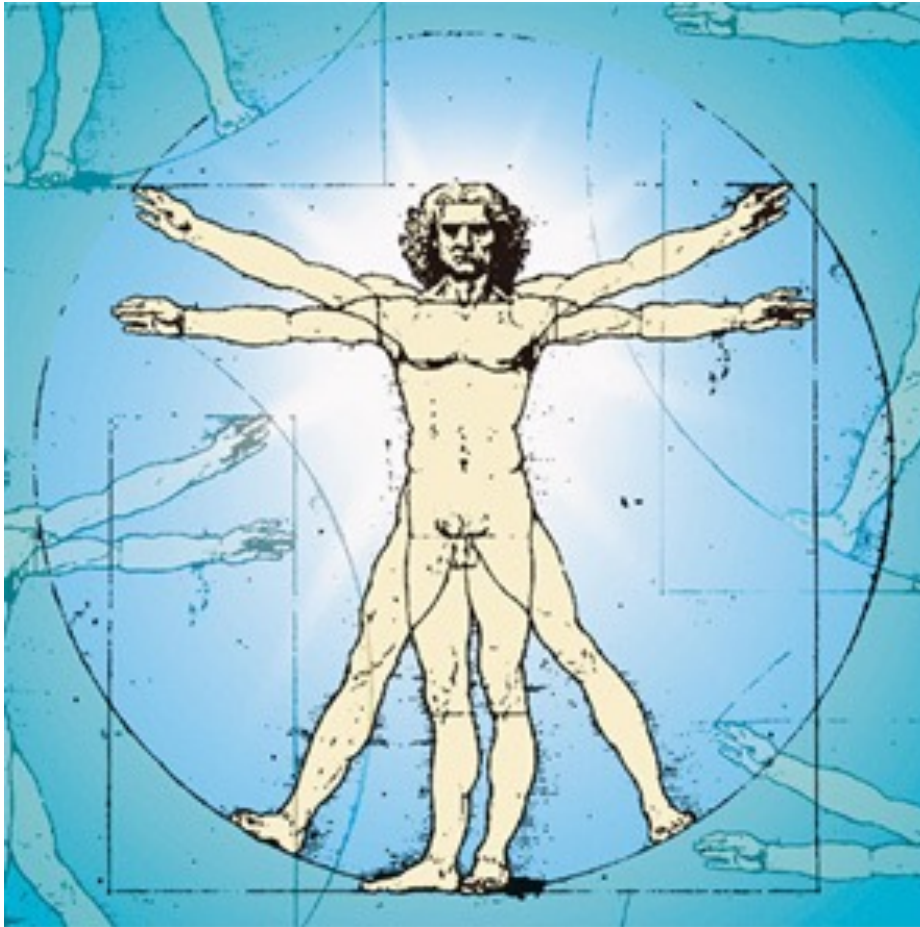
Bones acts as handles for moving the body



Living Tree versus Telephone Pole



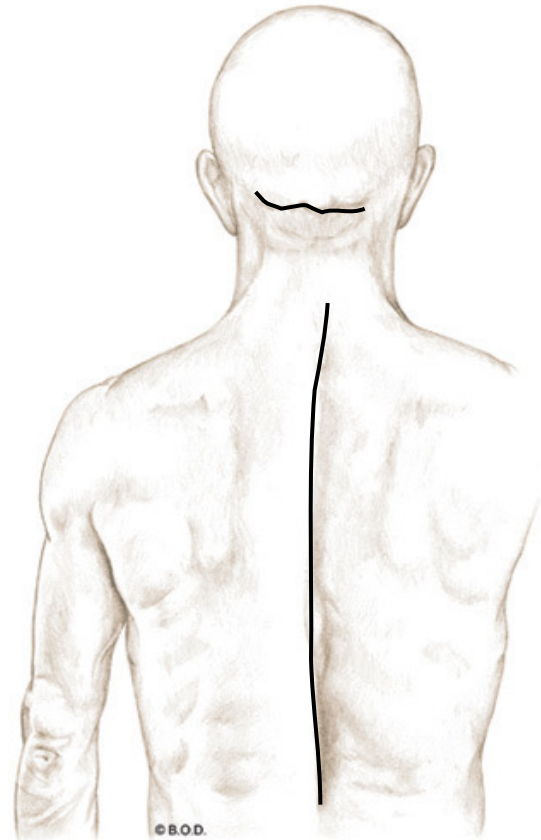
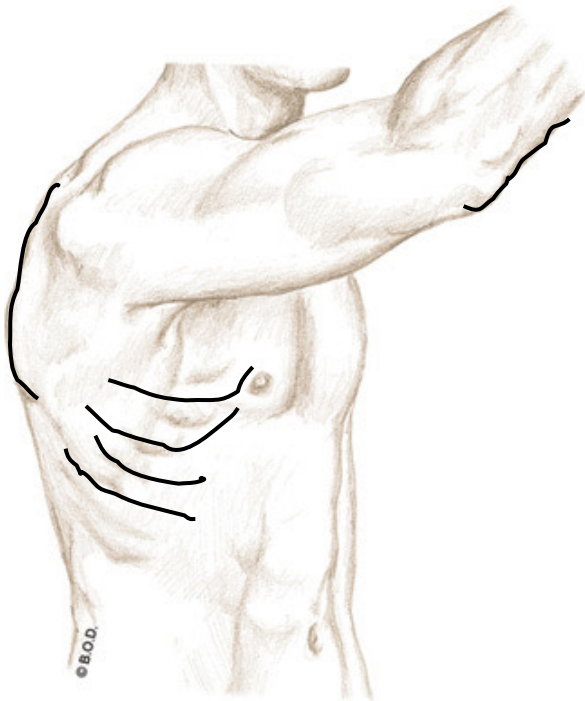
Living Bone versus Human Skeleton



From Herlihy B: *The human body in health and illness*, ed 4, St. Louis, 2011, Saunders.

Fig. 21-40. Select joints.

Bony landmarks are used to locate other structures

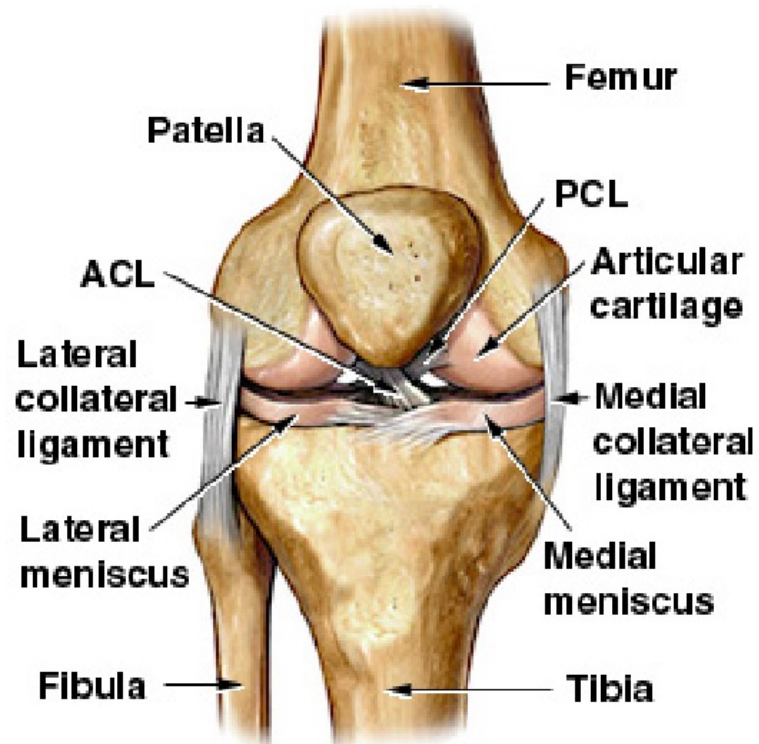




Anatomy

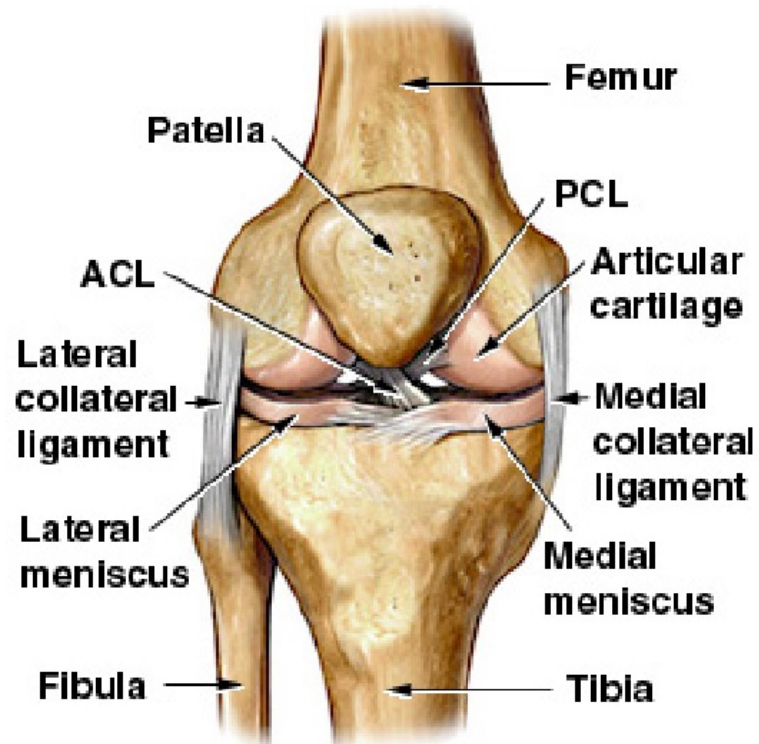
Anatomy

Bones Connective tissue that consists of compact bone, spongy bone, collagenous fibers, and mineral salts.



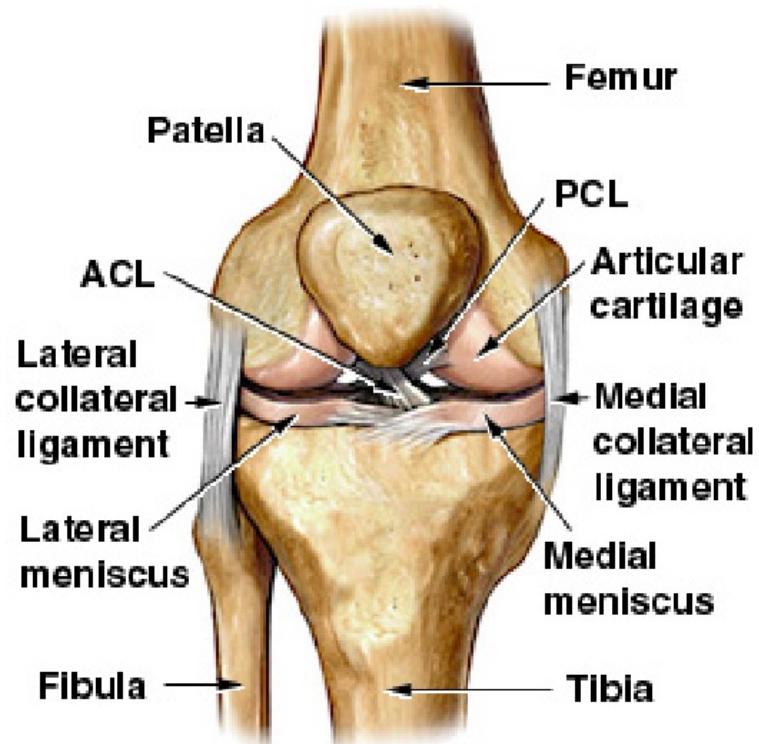
Anatomy

Joints (AKA: articulation or arthrosis) Where bones come together or join.



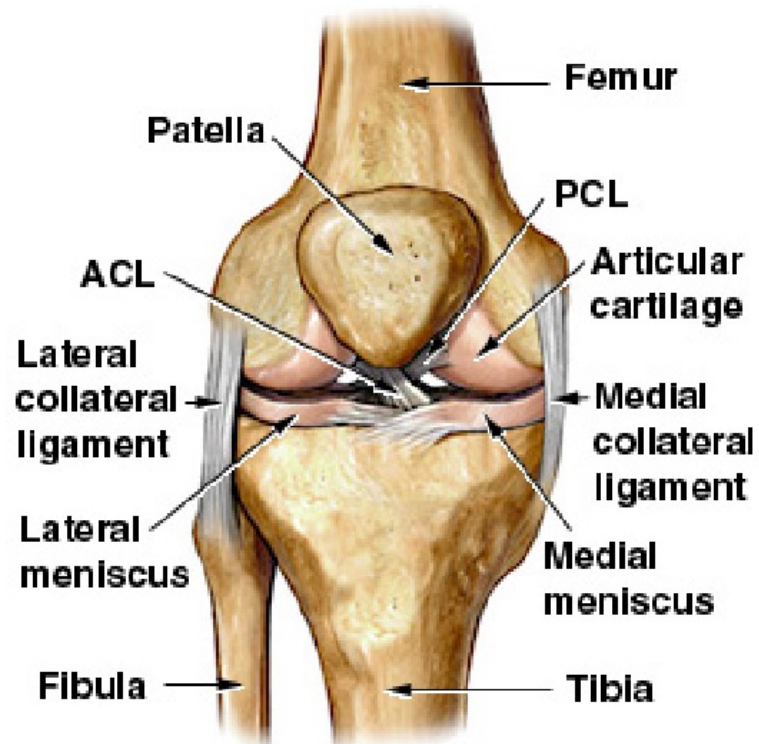
Anatomy

Cartilage Avascular, tough, protective connective tissue found in the thorax, joints, and some rigid tubes of the body such as the trachea and larynx.



Anatomy

Ligaments Dense regular connective tissue that attaches bones to one another.

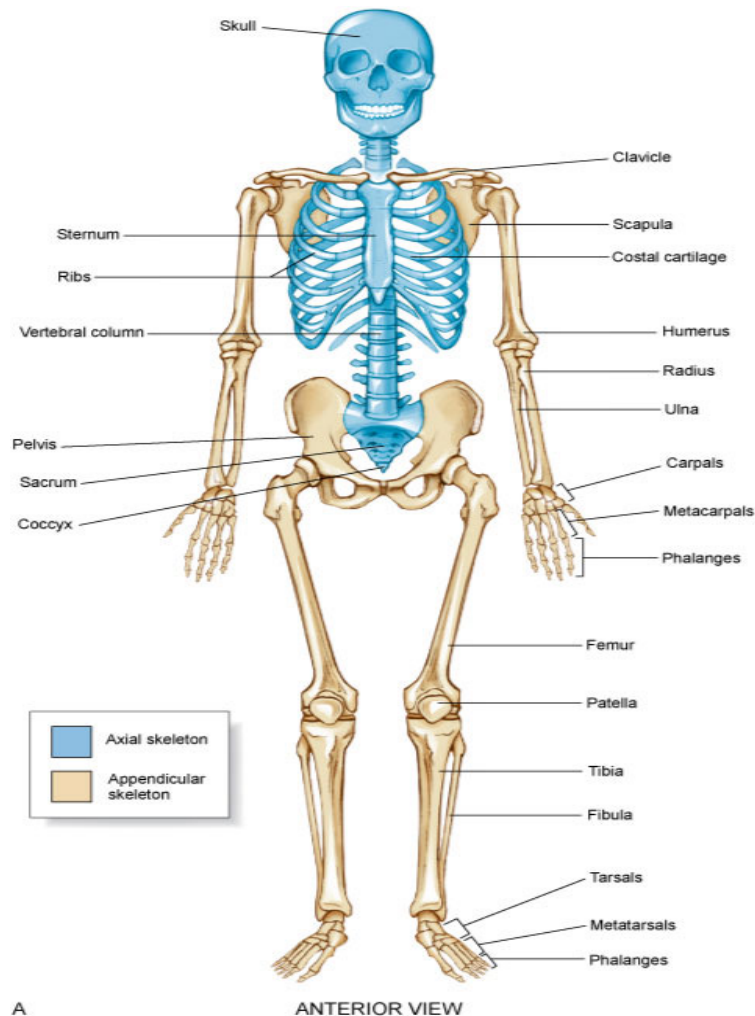




Physiology

Physiology

Support Supports the body through a bony framework.



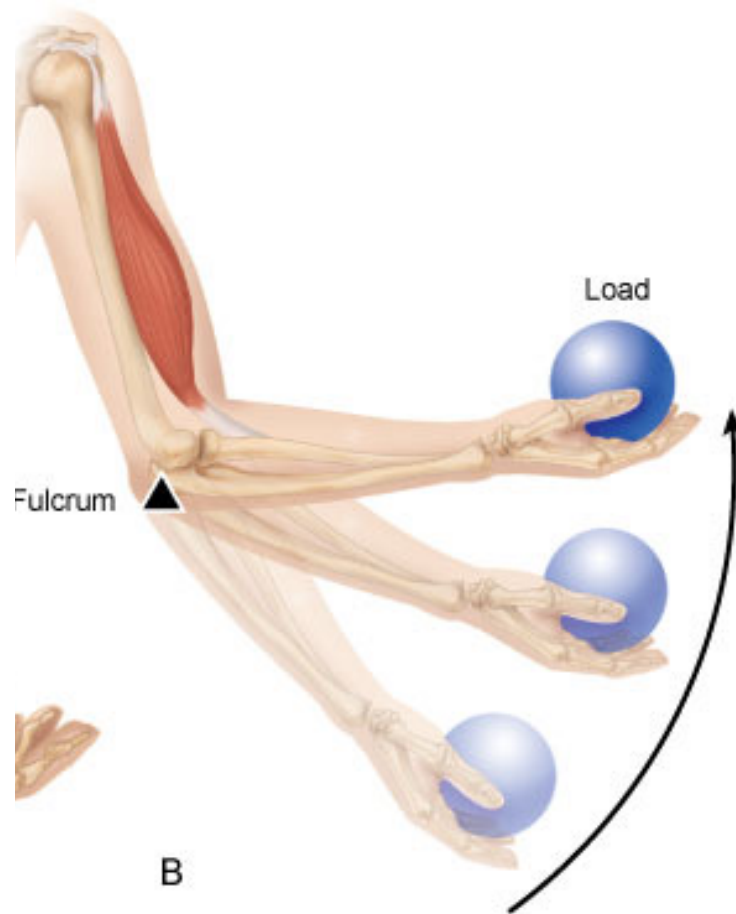
Physiology

Protection Protects vital organs.



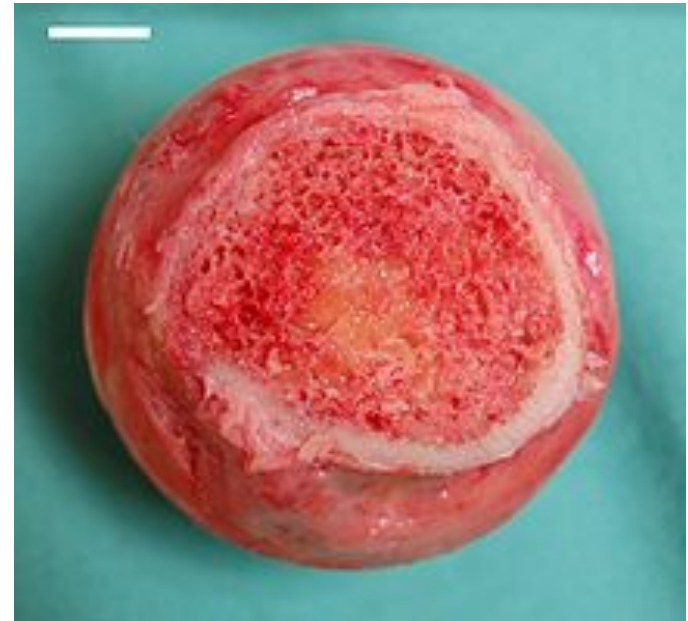
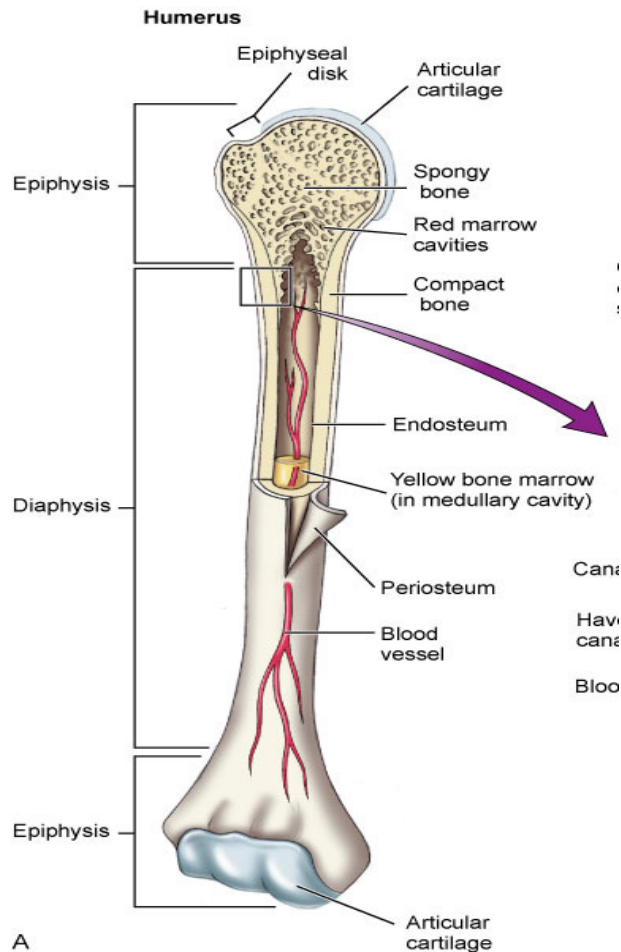
Physiology

Movement Contracting muscles pull on bones to cause movements at joints.



Physiology

Blood cell production (AKA: hemopoiesis) Blood cells are produced in the red marrow of certain bones, especially long bones.



Physiology

Locations of red bone marrow:

humerus

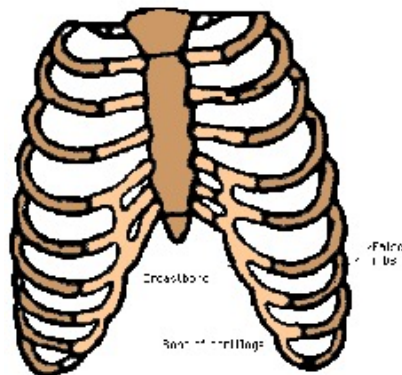
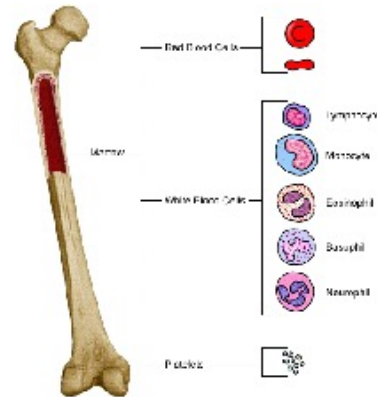
femur

pelvis

sternum / ribs

scapula

cranial bones

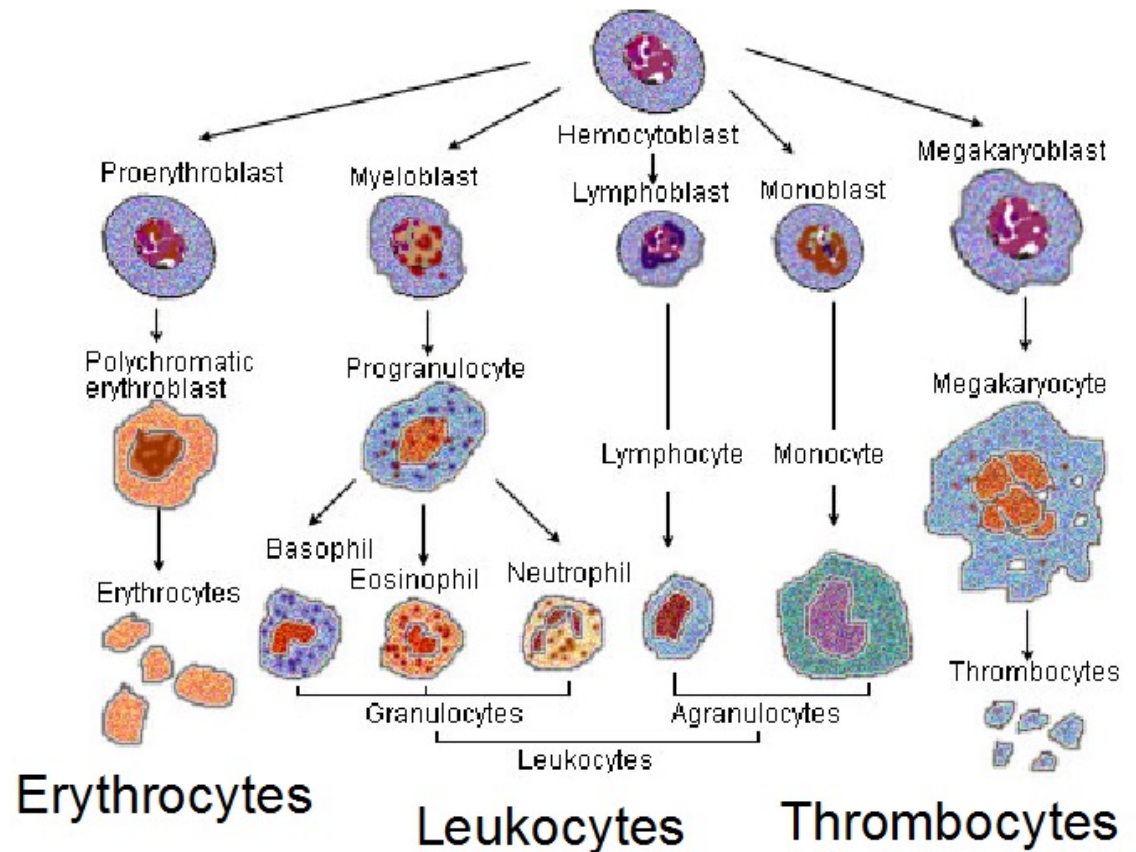


Physiology

All mature blood cells begin as stem cells.

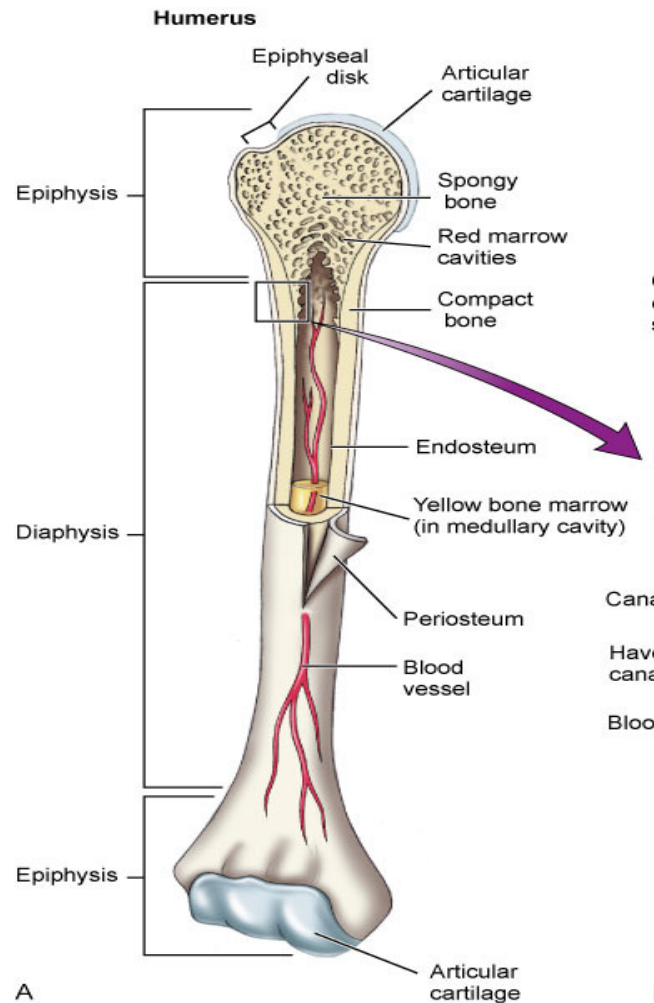
They mature to become one of the following:

1. More stem cells
2. Erythrocytes
3. Leukocytes
4. Thrombocytes



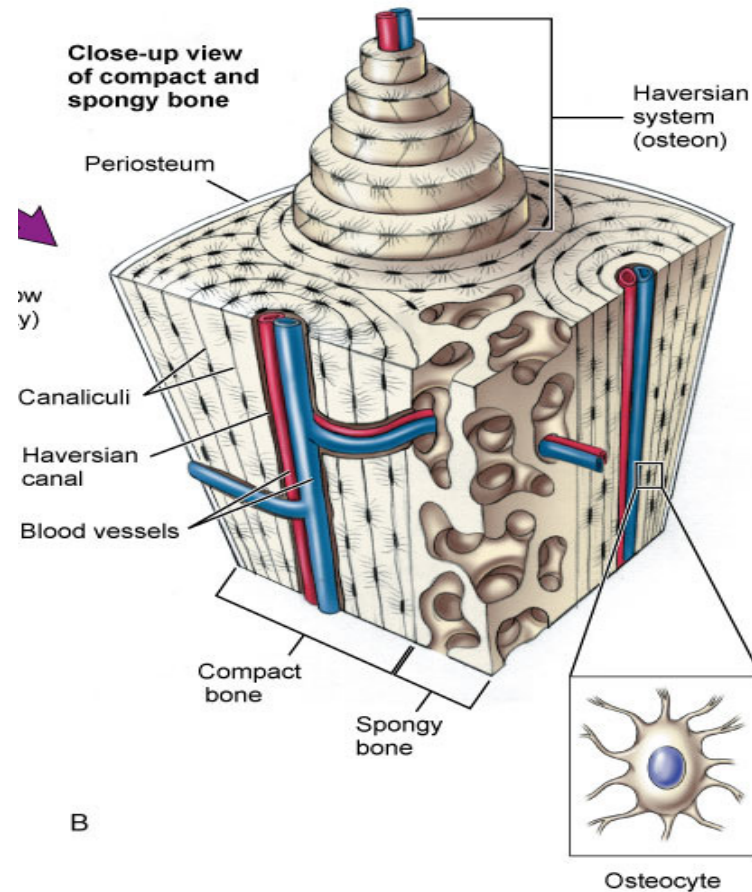
Physiology

Fat storage Fats are stored in yellow bone marrow.



Physiology

Mineral storage Vital minerals and mineral compounds are stored in bone.



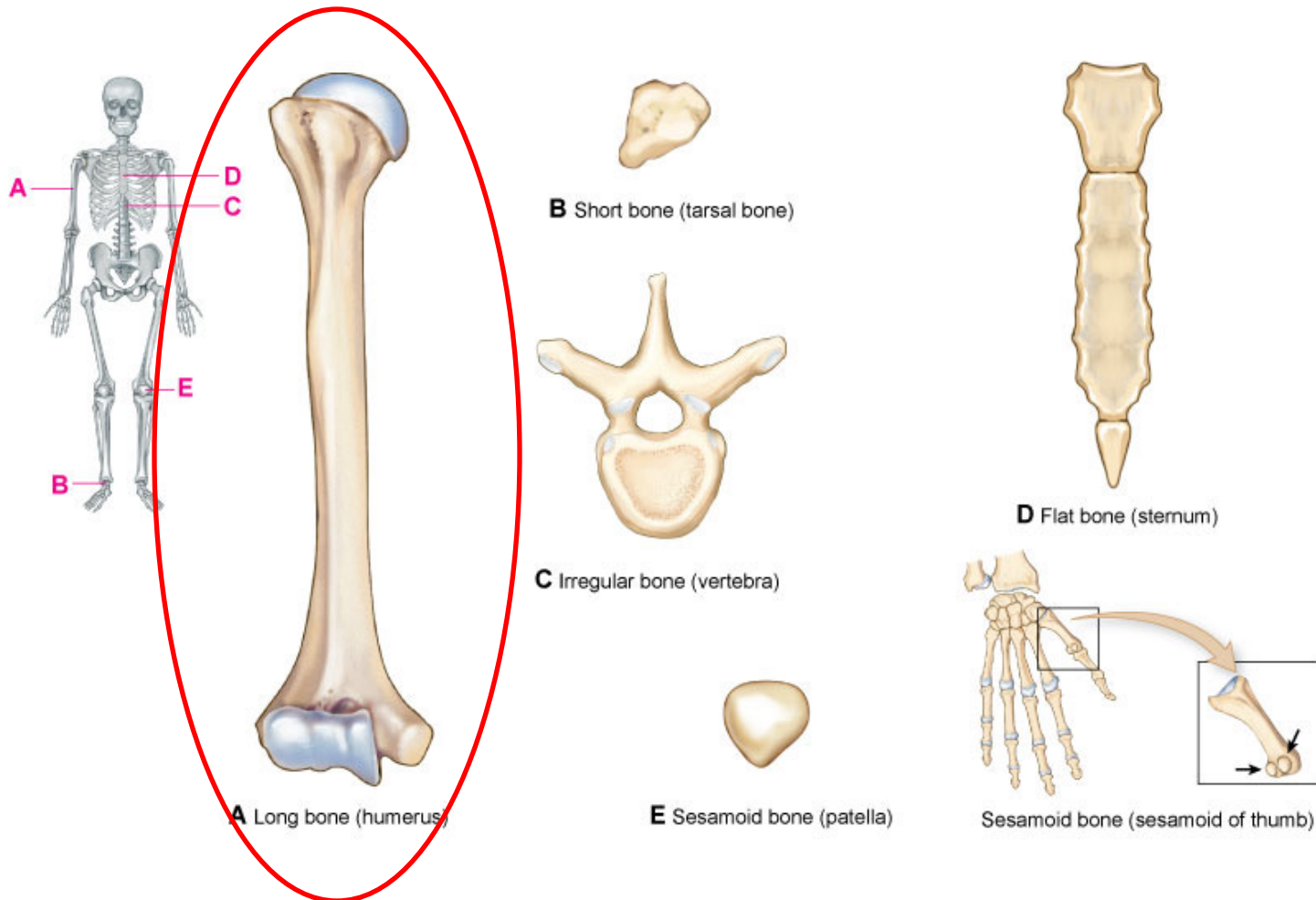


Classification of Bones

Classification of Bones

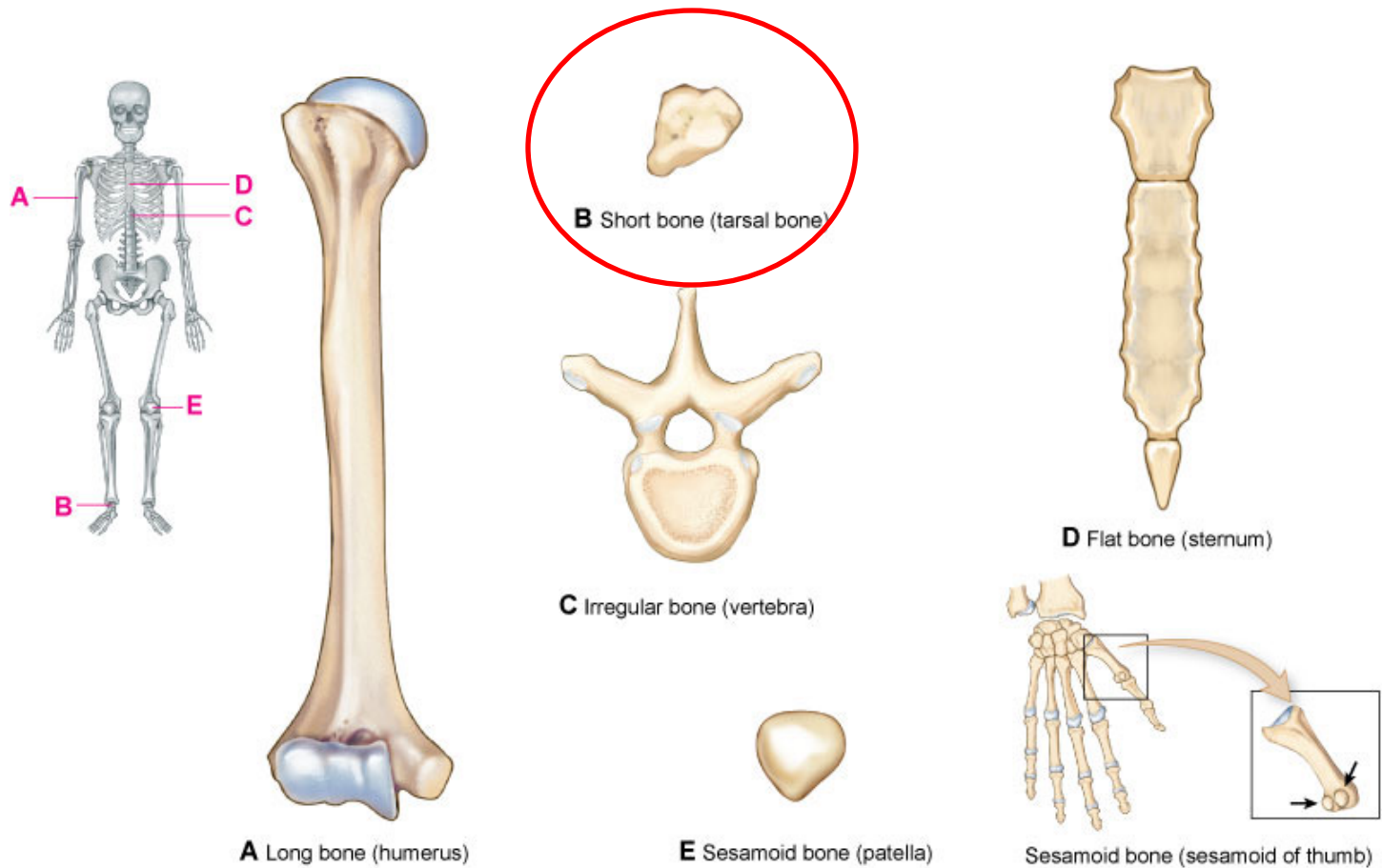
Long Longer than they are wide.

Examples: *humerus*, femur, and tibia.



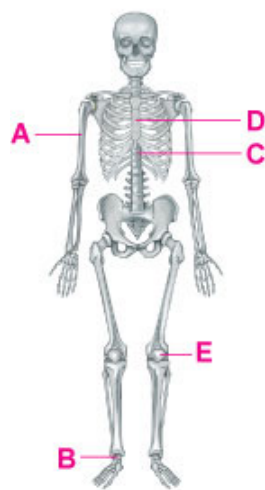
Classification of Bones

Short Small, cube-shaped, and contain multiple articulating surfaces.
Examples: carpals and *tarsals*.



Classification of Bones

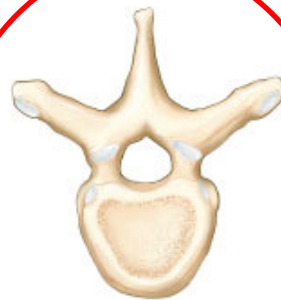
Irregular Catch-all category for bone that do not fit in other categories.
Examples: facial bones and *vertebrae*.



A Long bone (humerus)



B Short bone (tarsal bone)



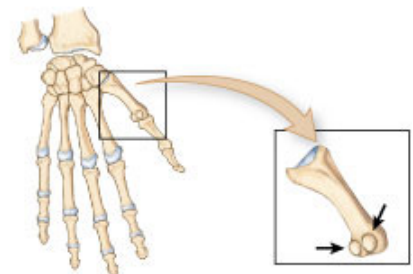
C Irregular bone (vertebra)



E Sesamoid bone (patella)



D Flat bone (sternum)

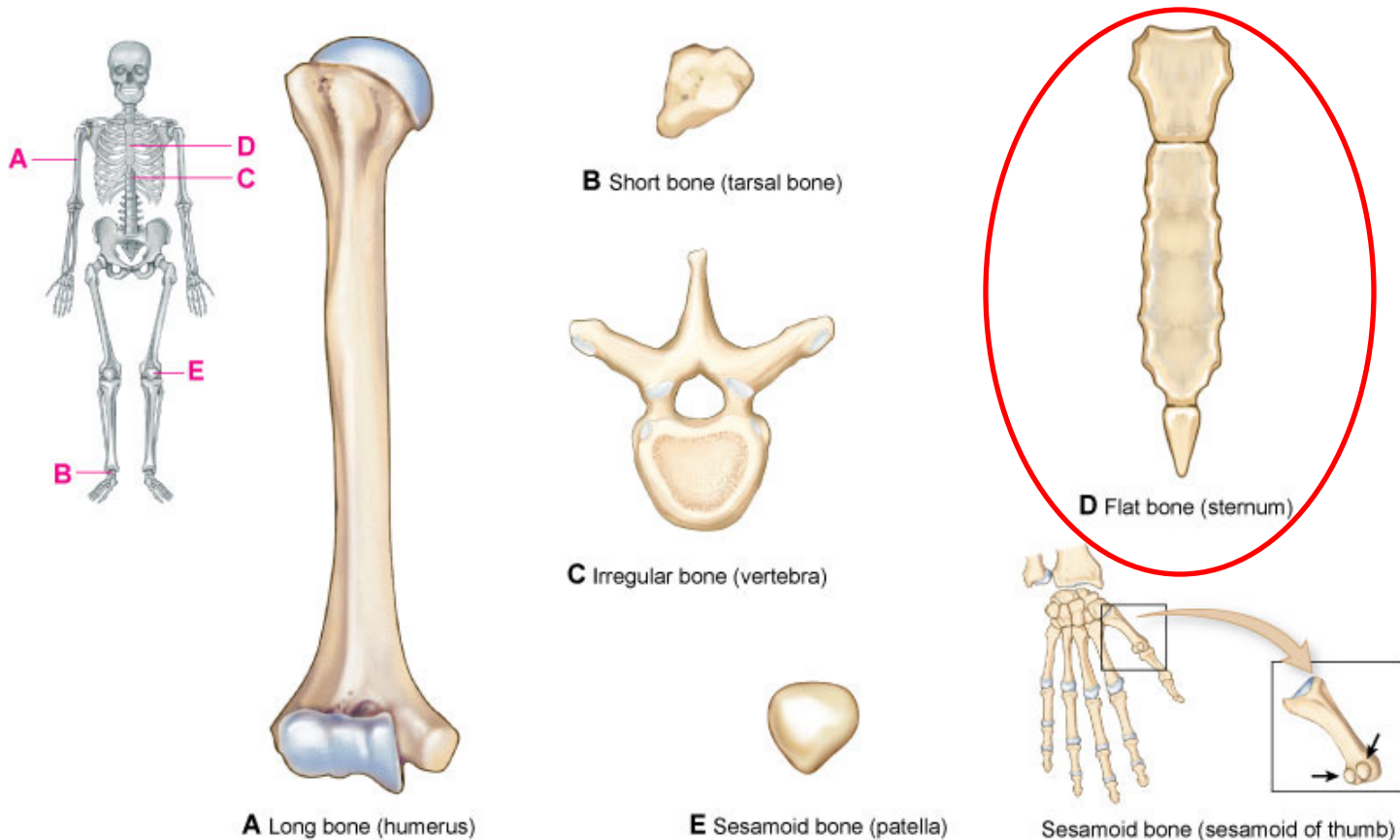


Sesamoid bone (sesamoid of thumb)

Classification of Bones

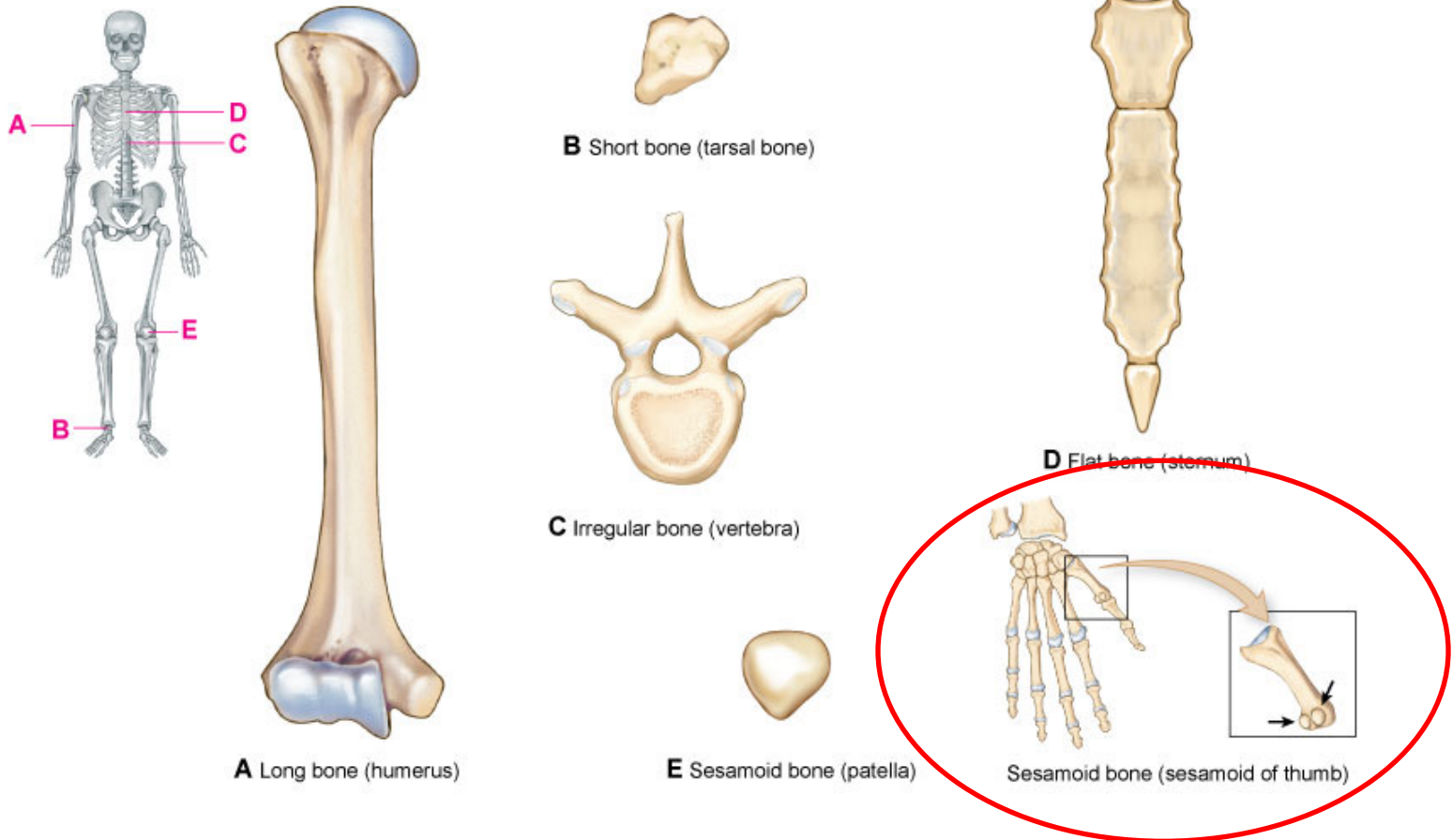
Flat Possess a broad, flat surface for muscle attachment or protection of underlying organs.

Examples: *sternum*, scapula, ribs, and most cranial bones.



Classification of Bones

Sesamoid Small, round bones that are embedded in certain tendons.
Example: *patella*.

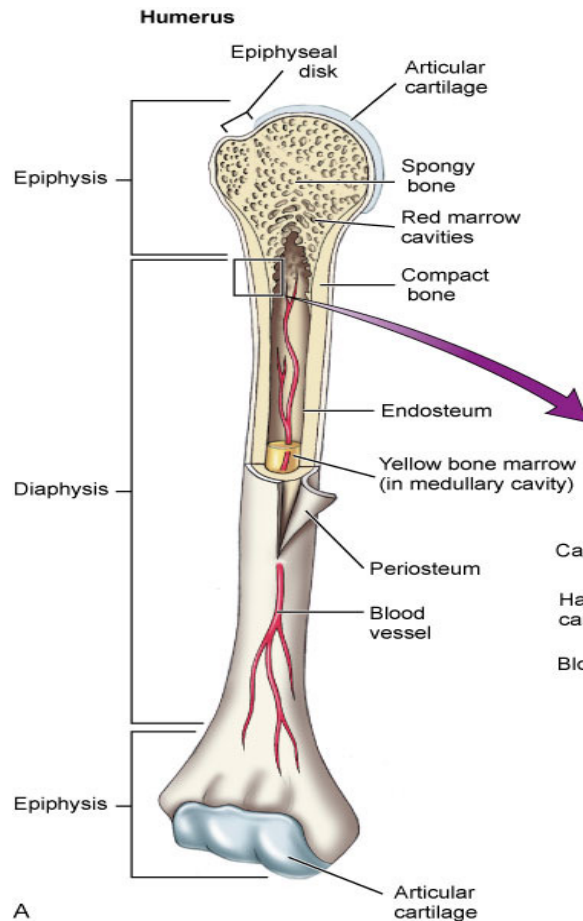




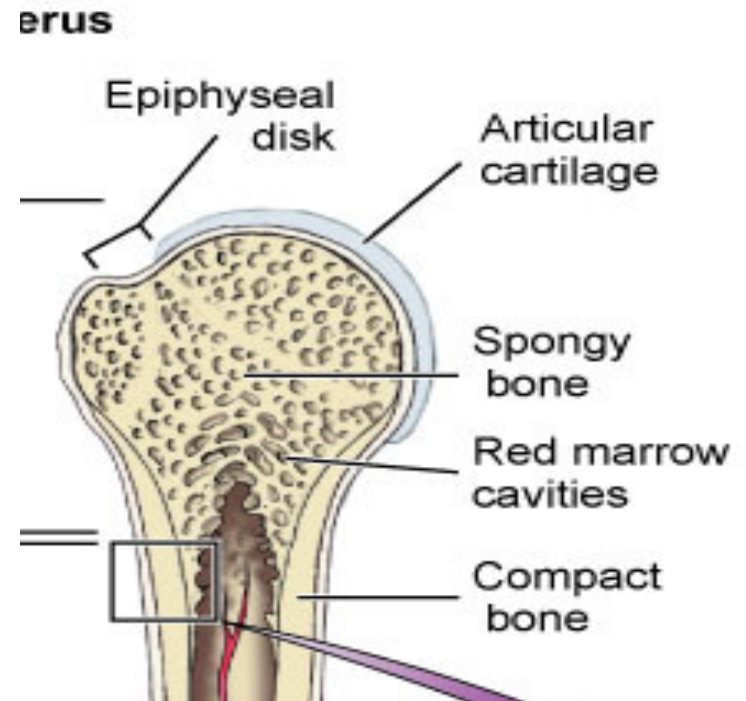
Bone Tissue

Bone Tissue

Compact Forms the hard outer shell of all bones and a small portion of the shaft of long bones. Provides protection, support, and resistance to stress of weight and movement.

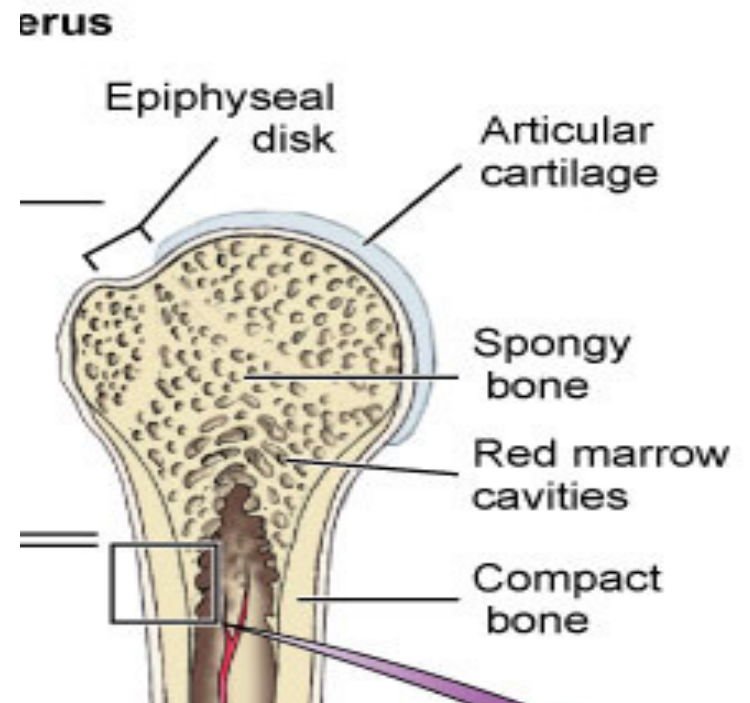
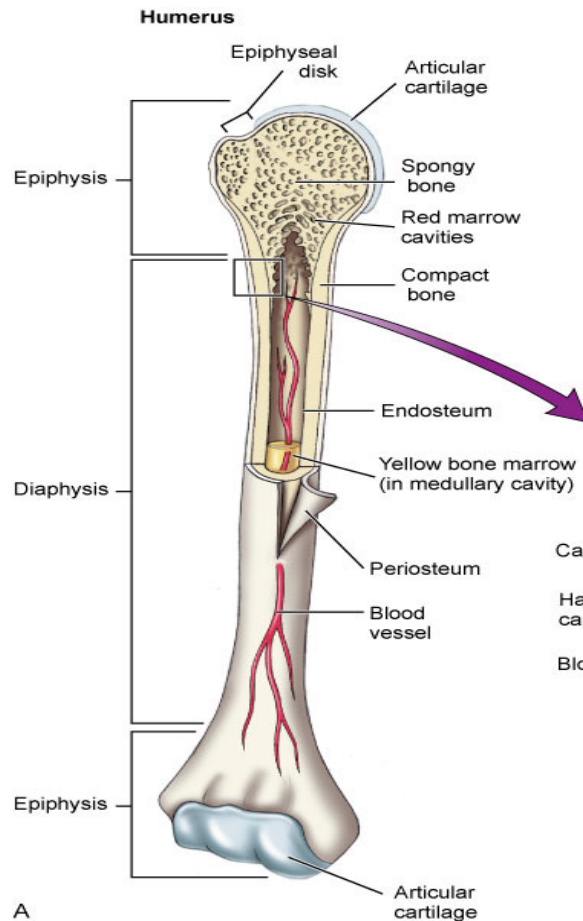


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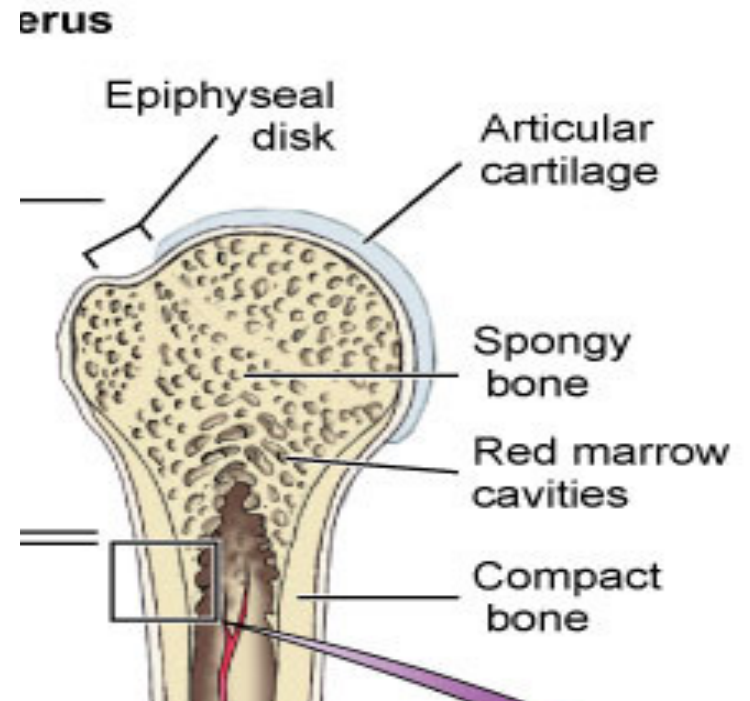
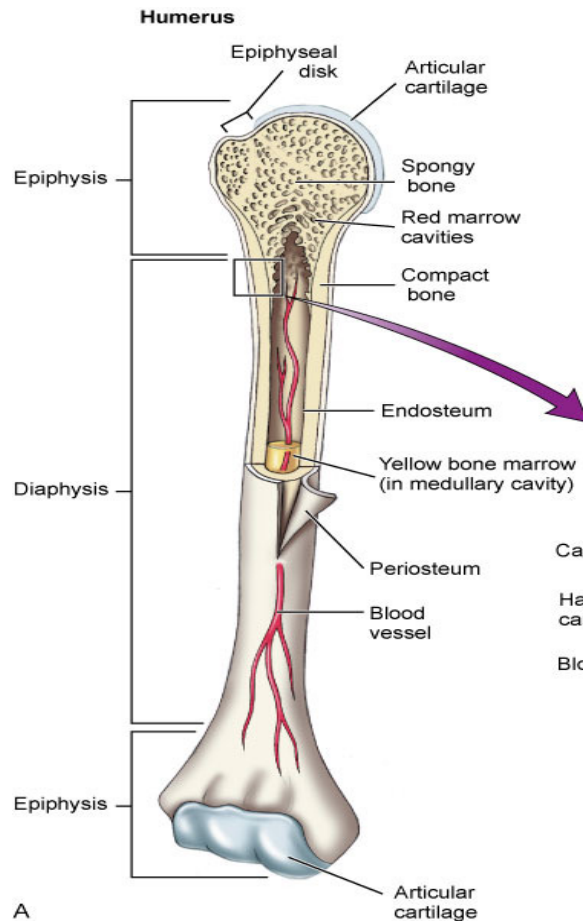
Bone Tissue

Spongy (AKA: cancellous) A lattice of thin beams of bone within bones. Lightens the bone and is filled with red bone marrow.



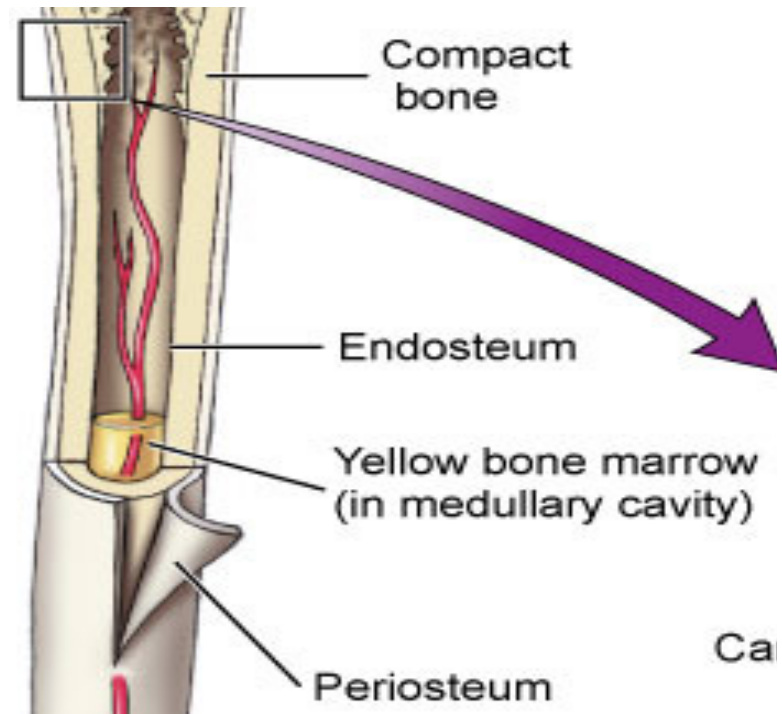
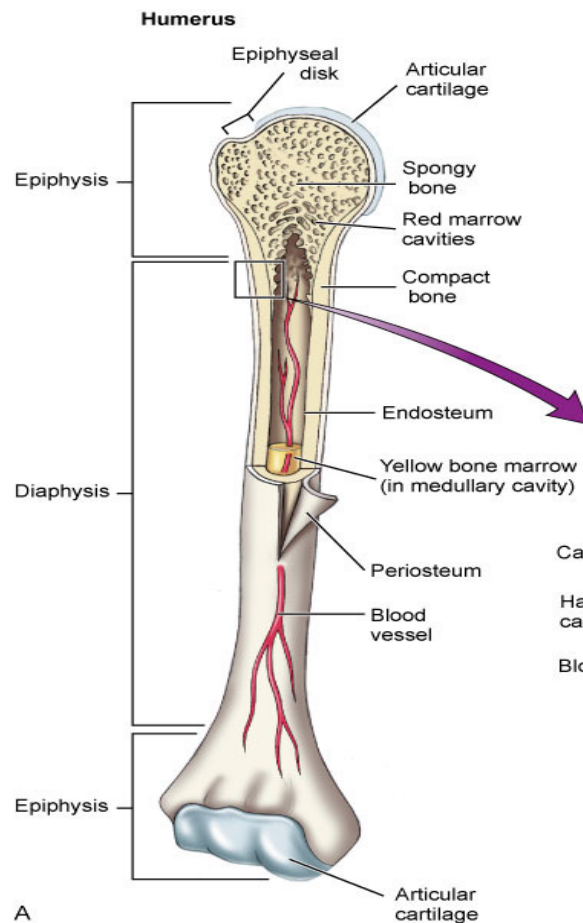
Bone Tissue

Red bone marrow Blood forming cells found in flat and long bones.
Produce red blood cells, platelets, and white blood cells.



Bone Tissue

Yellow bone marrow Adipose fibrous connective tissue that contains mainly fat cells and is found in the medullary cavity.



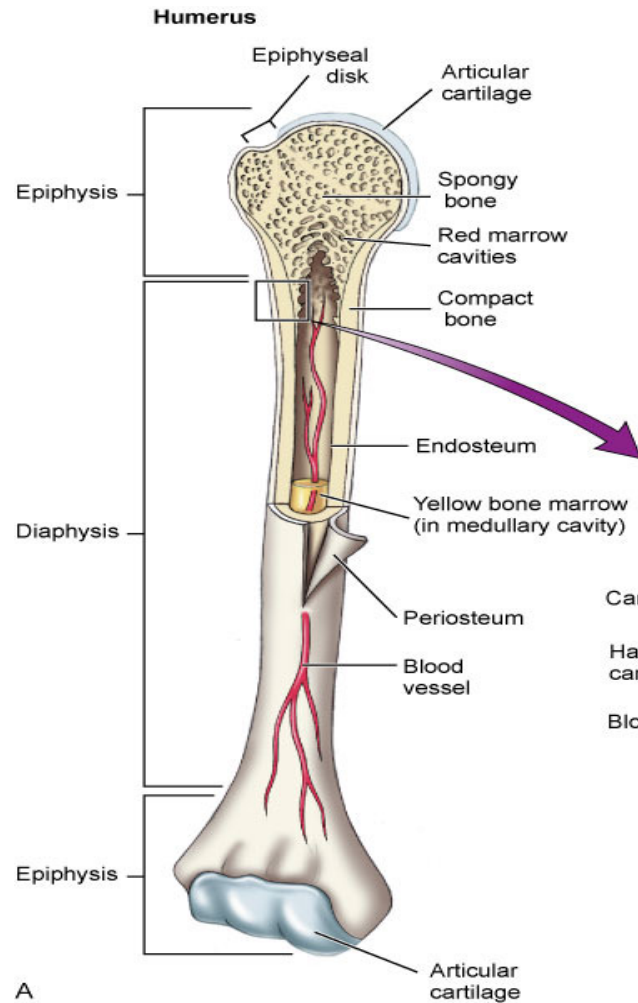


Anatomy of a Long Bone

Anatomy of a Long Bone

Diaphysis Cylindrical shaft of a long bone.

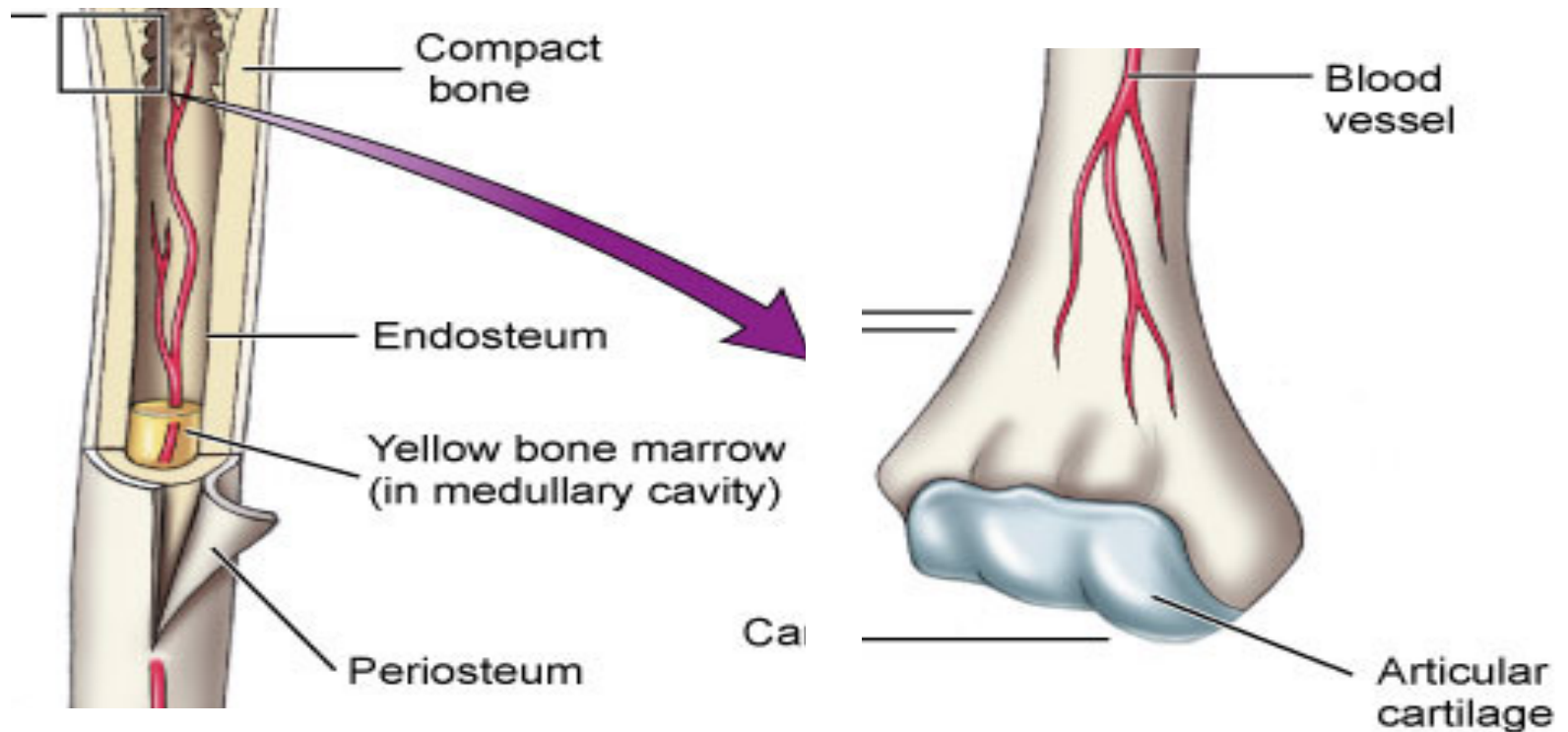
Epiphysis The ends of a long bone.



Anatomy of a Long Bone

Articular cartilage Hyaline cartilage covering an epiphysis.

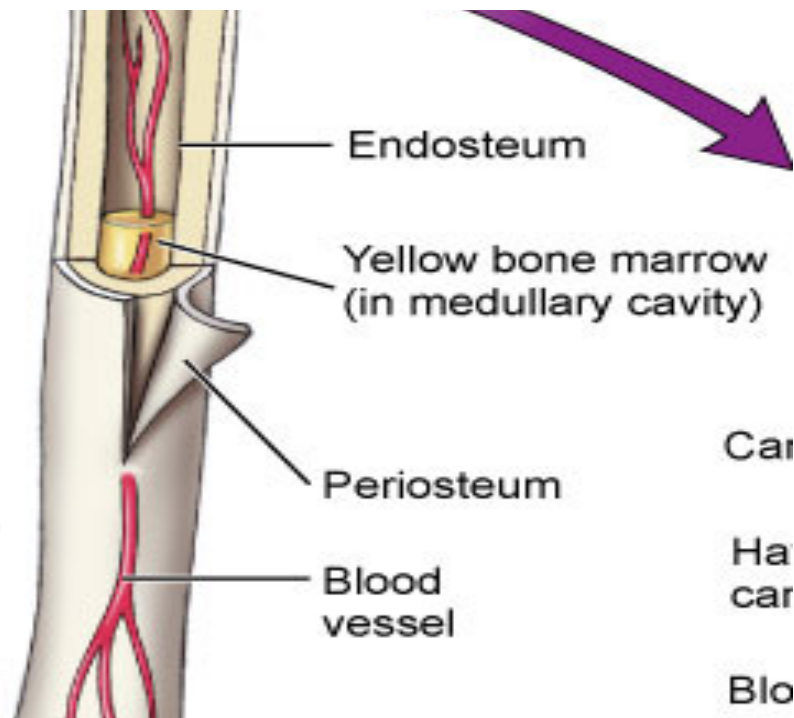
Medullary cavity Hollow space within the diaphysis.



Anatomy of a Long Bone

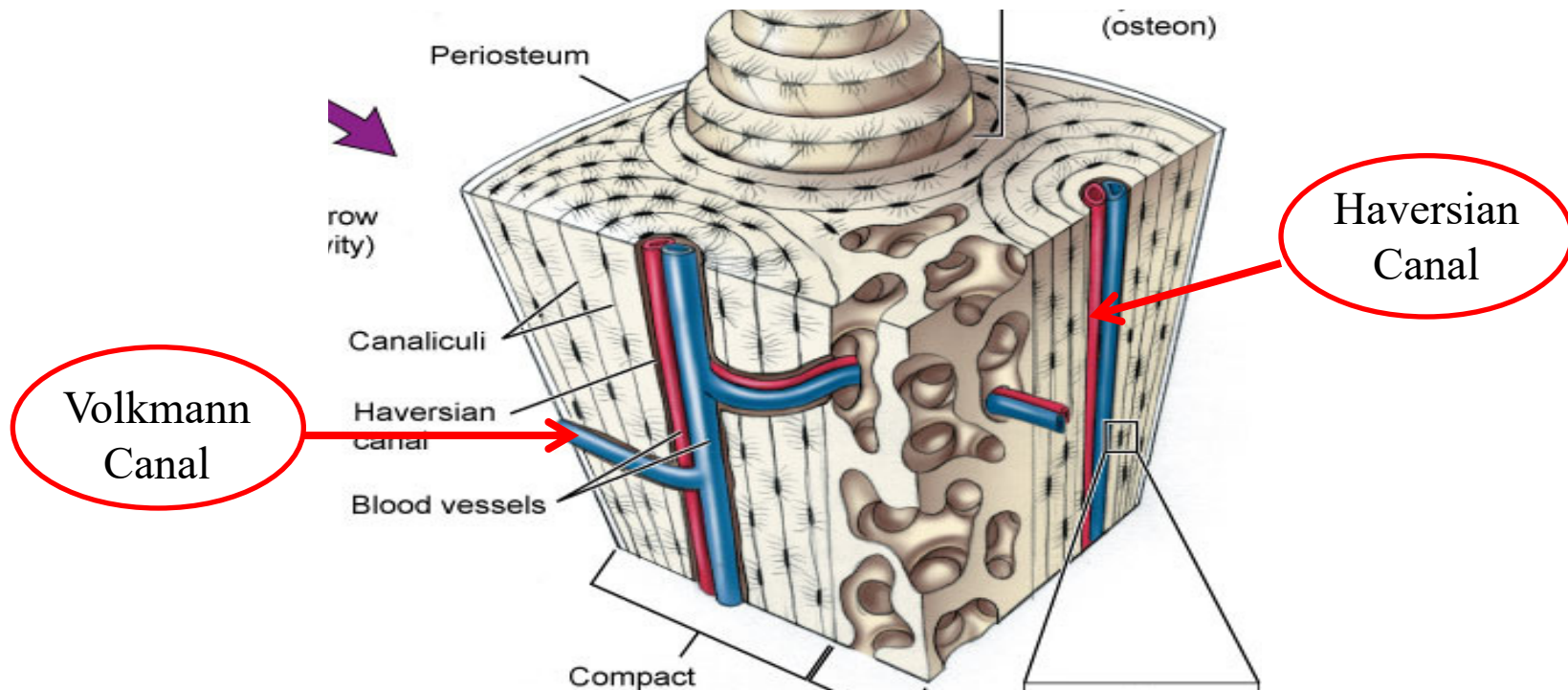
Periosteum Fibrous sheath surrounding the bone's shaft containing blood and lymphatic vessels, nerves, and bone-forming cells for growth and fracture healing.

Endosteum Lining of the medullary cavity.



Haversian canal Vascular canal that runs longitudinally through a bone.

Volkman canal Vascular canal that runs horizontally through a bone, connecting Haversian canals.





Bone Remodeling



Bone Remodeling

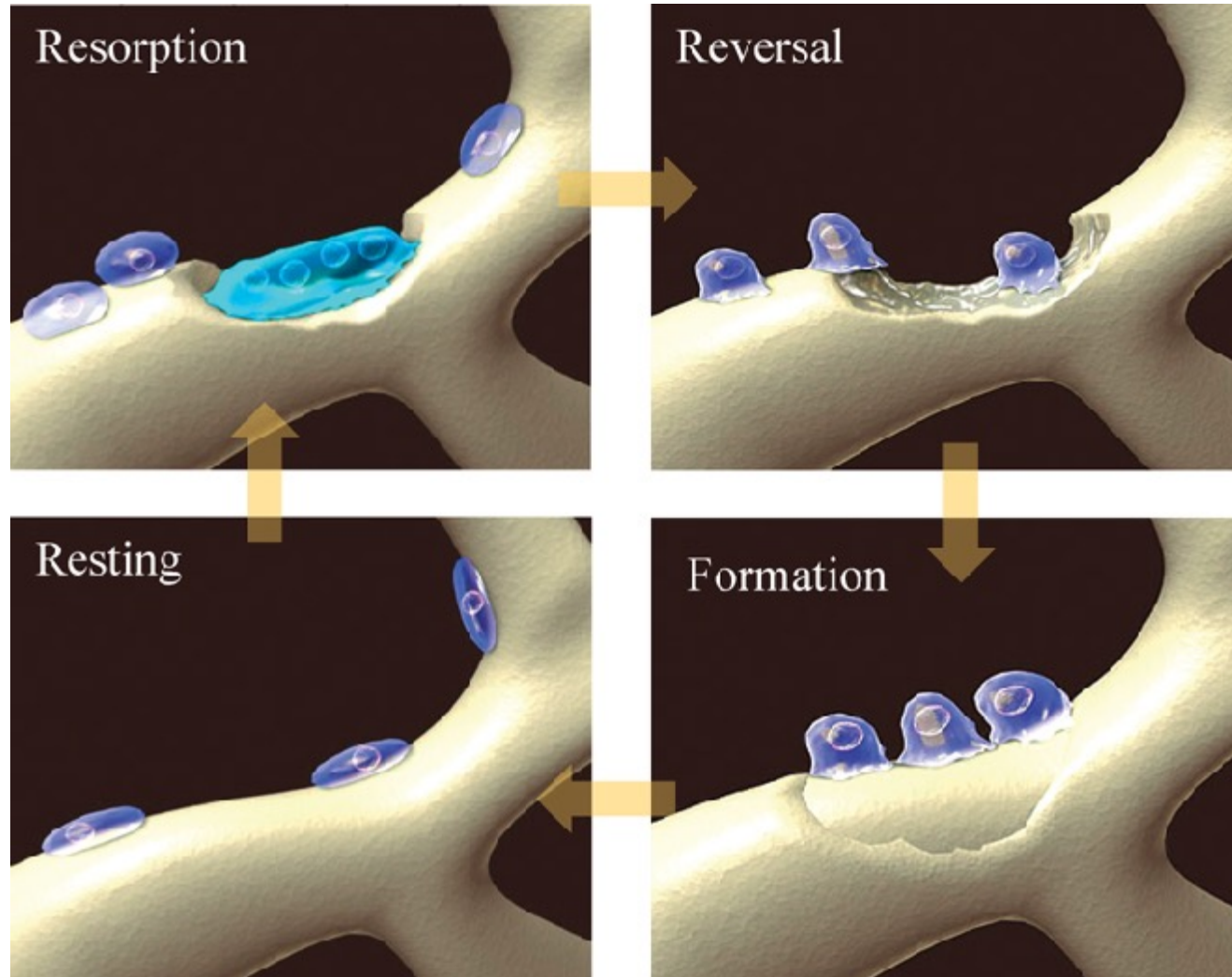
Osteoblasts Bone-forming cells.

Osteoclasts Bone-destroying cells.

Osteocytes Mature bone cell.

Osteoblasts Bone-forming cells.

Osteoclasts Bone-destroying cells.





13a A&P:

Skeletal System - Cells, Tissues, and Bone Shapes