SKELETAL SYSTEM

SKELETAL SYSTEM

THE STRUCTURES OF THE SKELETAL SYSTEM INCLUDE:

BONES, JOINTS, AND LIGAMENTS.

SKELETAL SYSTEM

FUNCTIONS OF THE SKELETAL SYSTEM

1. SUPPORT
2. PROTECTION
3. MOVEMENT
4. MINERAL STORAGE
5. BLOOD CELL FORMATION

CLASSIFICATION OF BONES BY POSITION

THE 206 BONES OF THE HUMAN BODY ARE GROUPED INTO THE AXIAL AND THE APPENDICULAR SKELETONS.

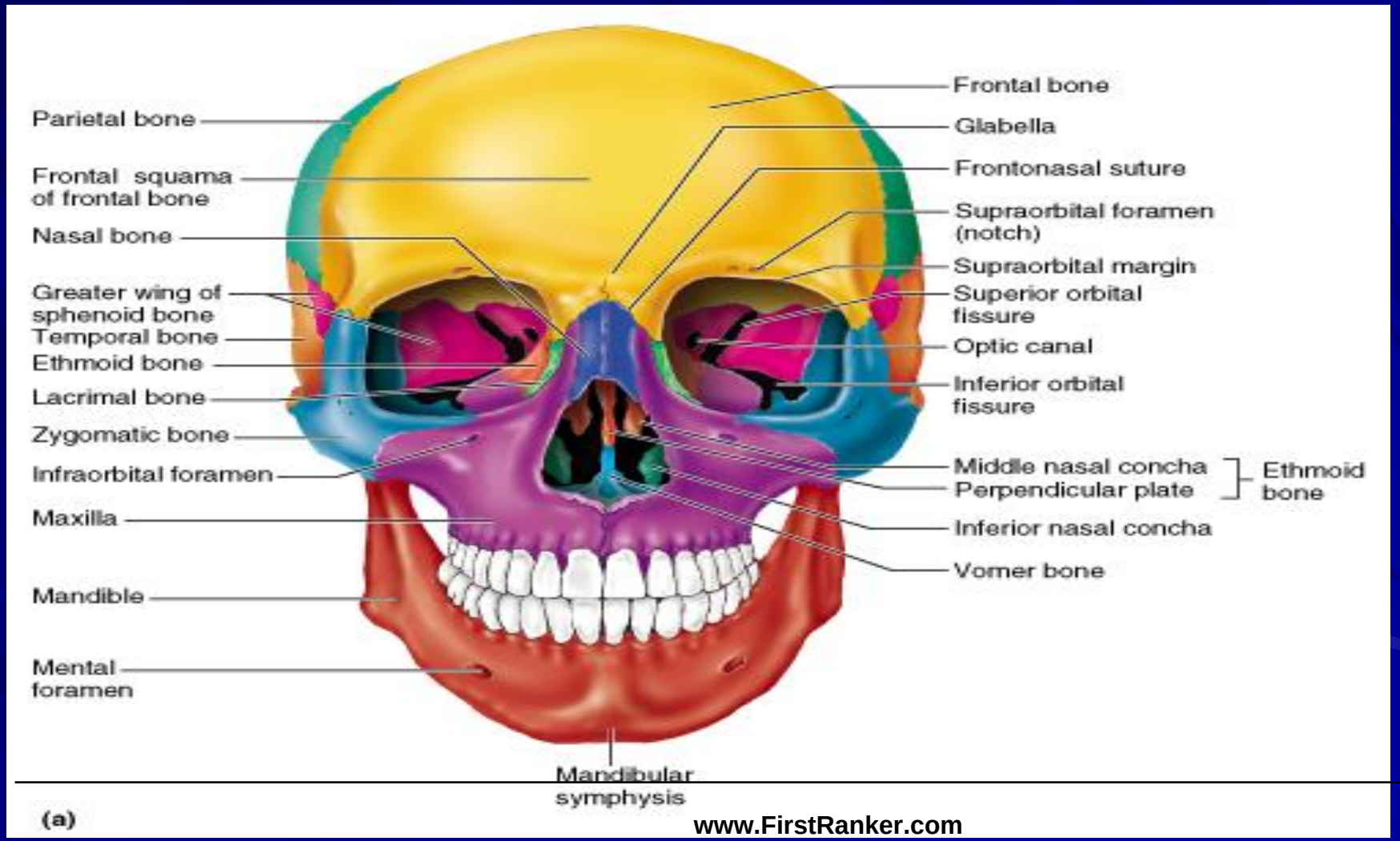
AXIAL SKELETON

THE AXIAL SKELETON FORMS THE LONG AXIS OF THE BODY AND INCLUDES THE BONES OF THE SKULL, VERTEBRAL COLUMN, AND THE RIB CAGE.

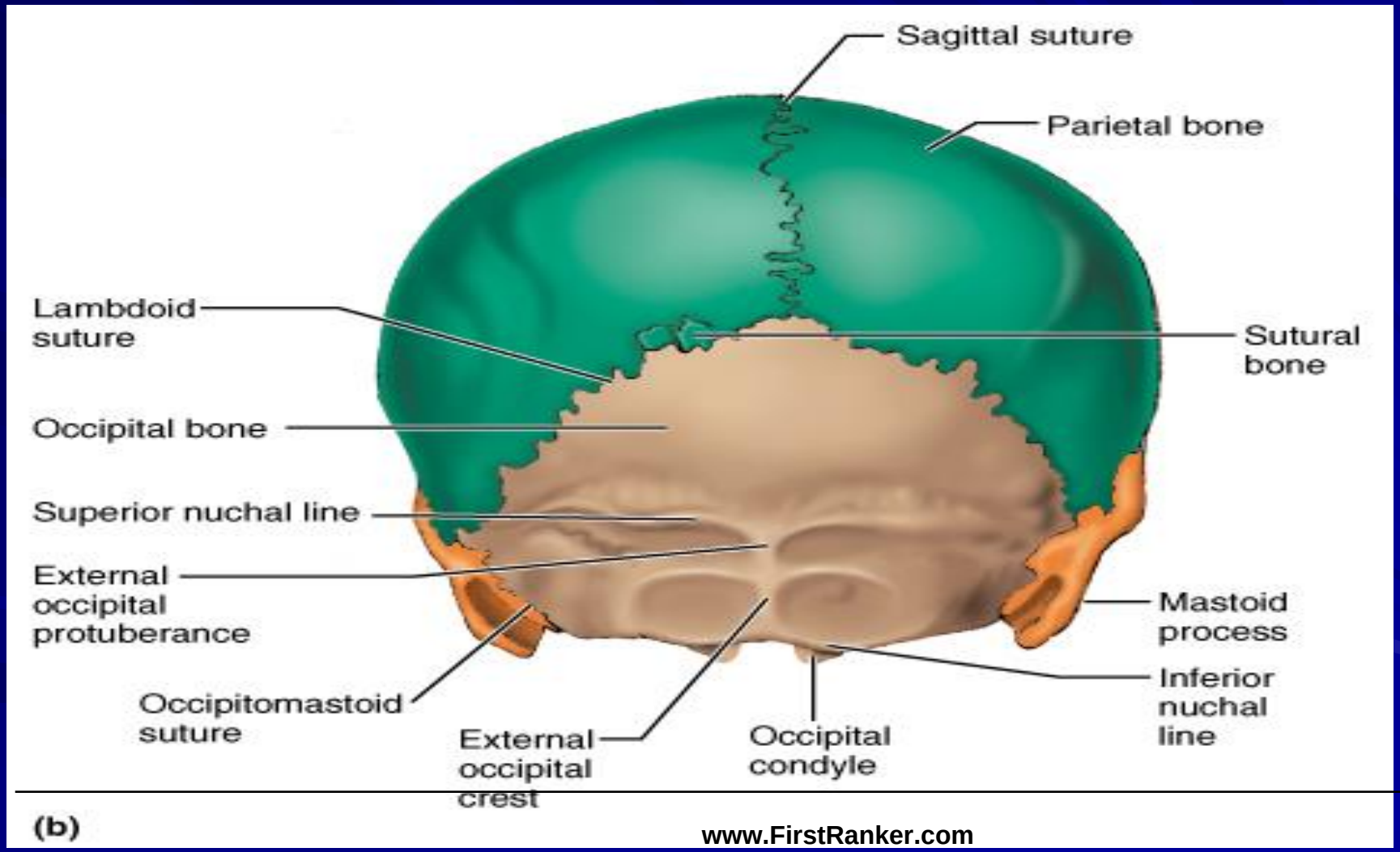
AXIAL SKELETON

GENERALLY THESE BONES ARE MOST INVOLVED IN PROTECTING, AND SUPPORTING.

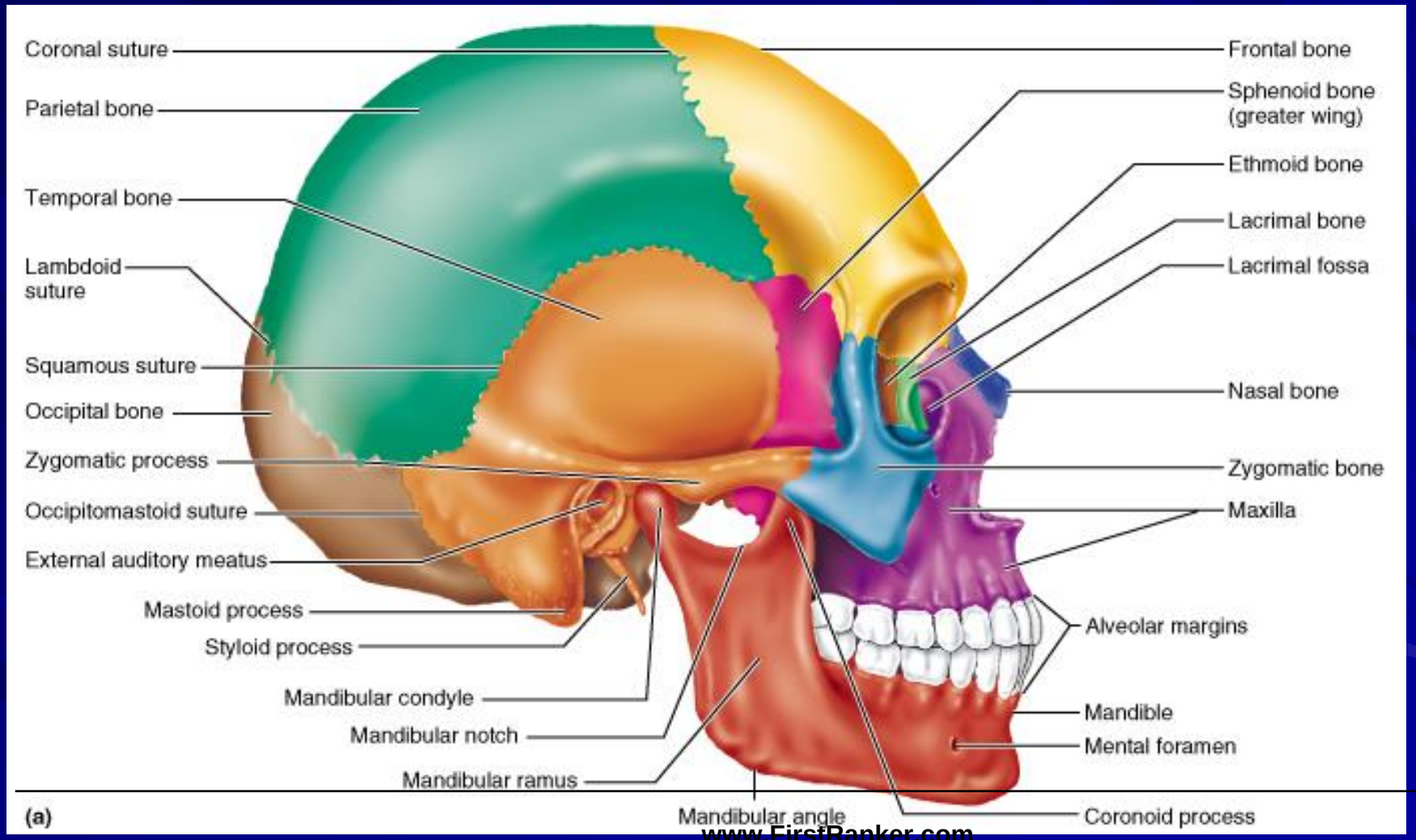
AXIAL SKELETON



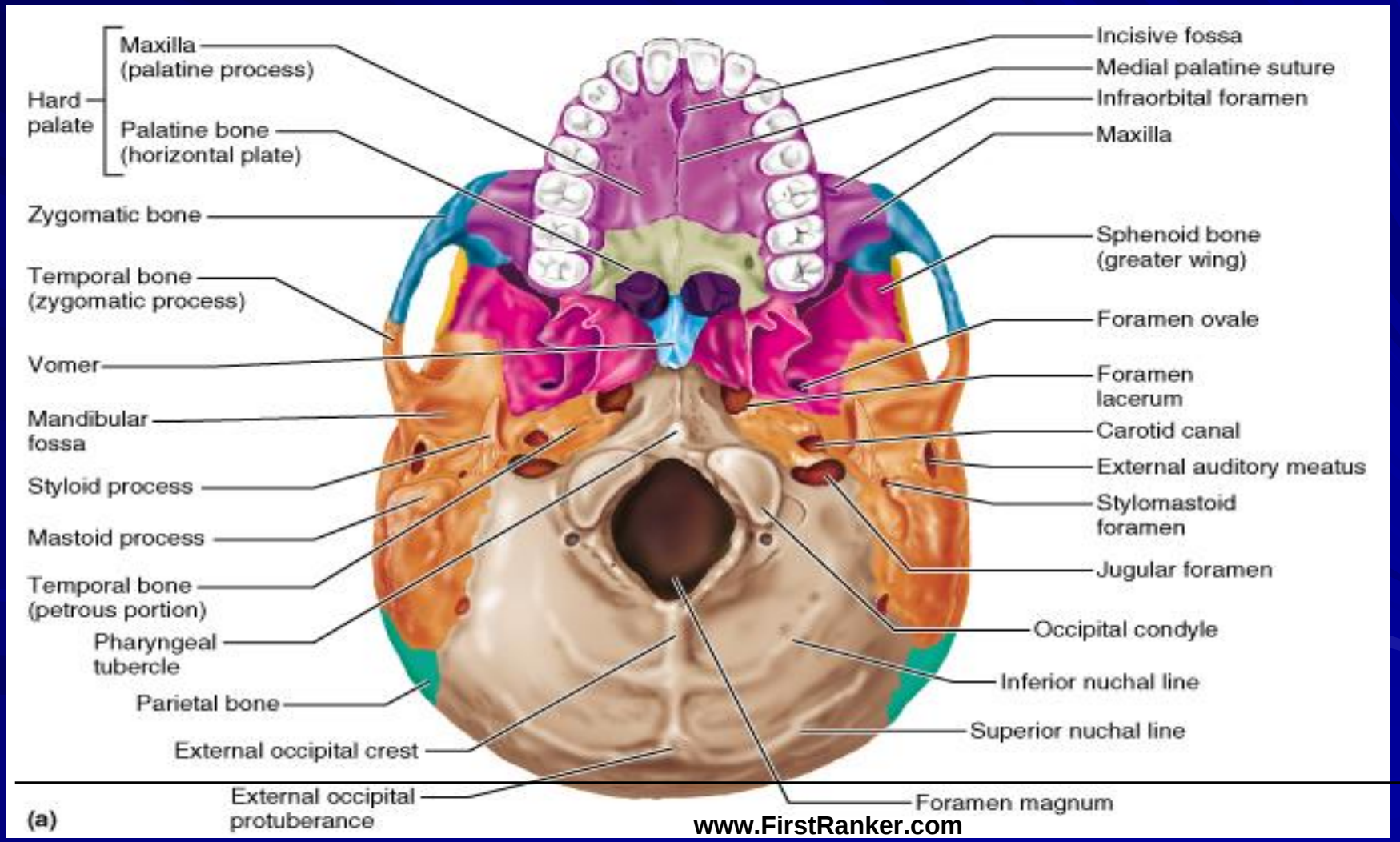
AXIAL SKELETON



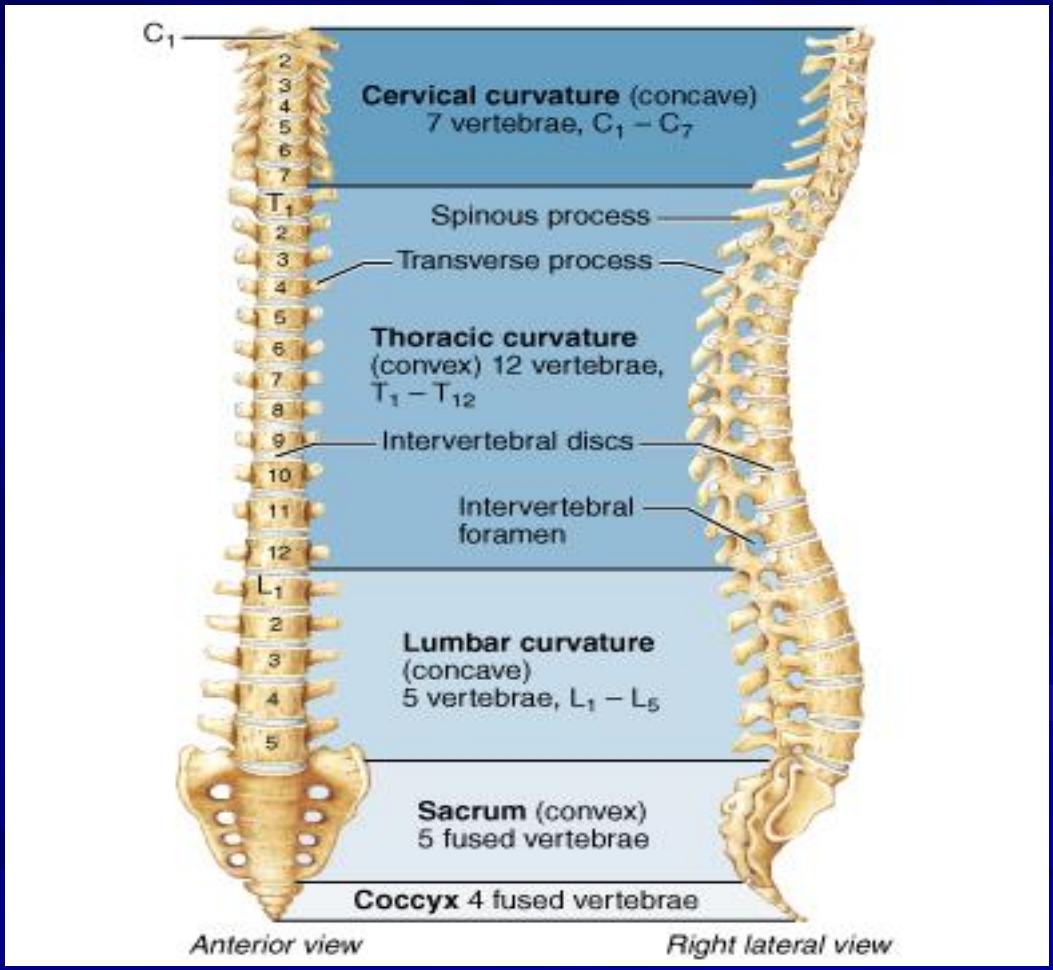
AXIAL SKELETON



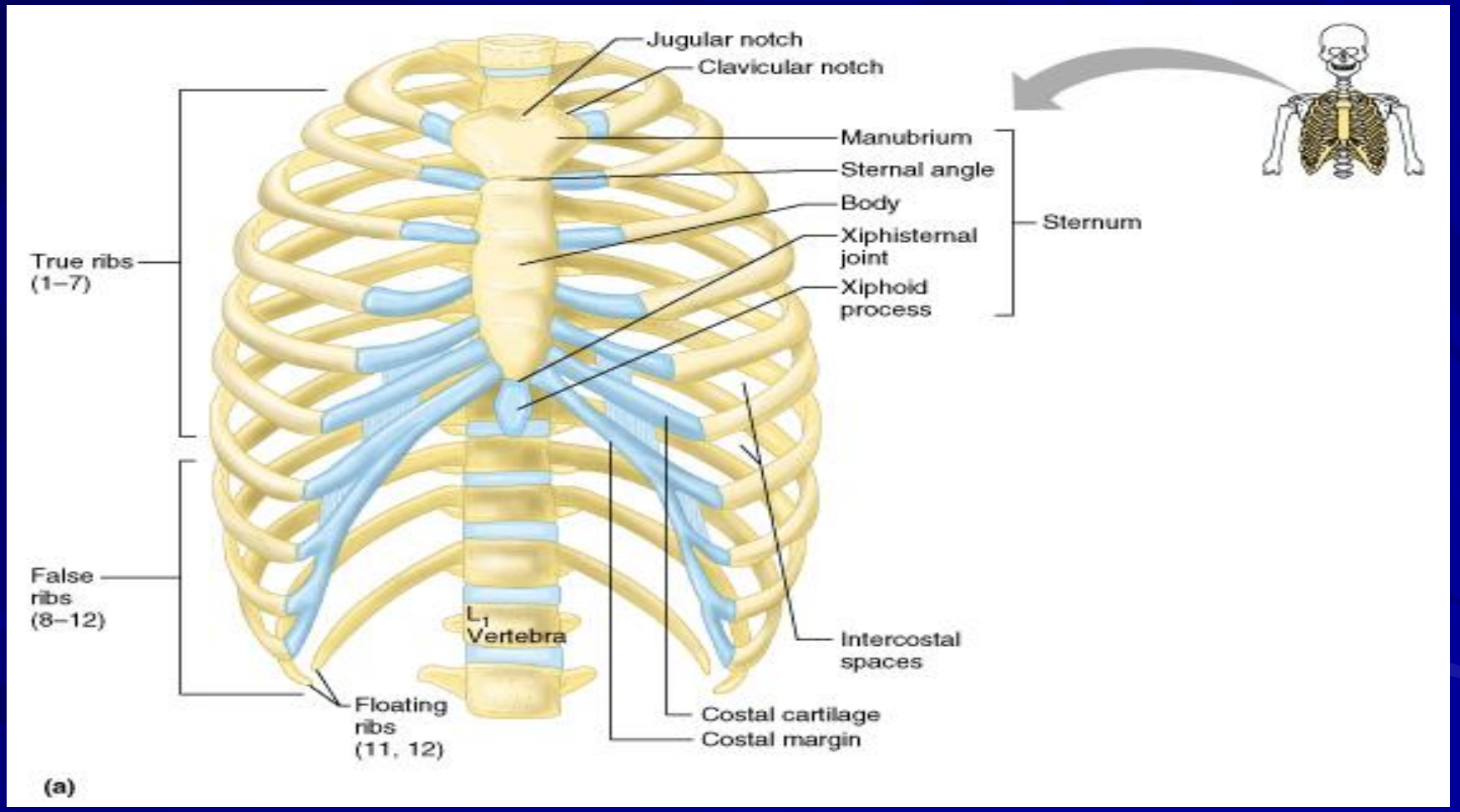
AXIAL SKELETON



AXIAL SKELETON



AXIAL SKELETON



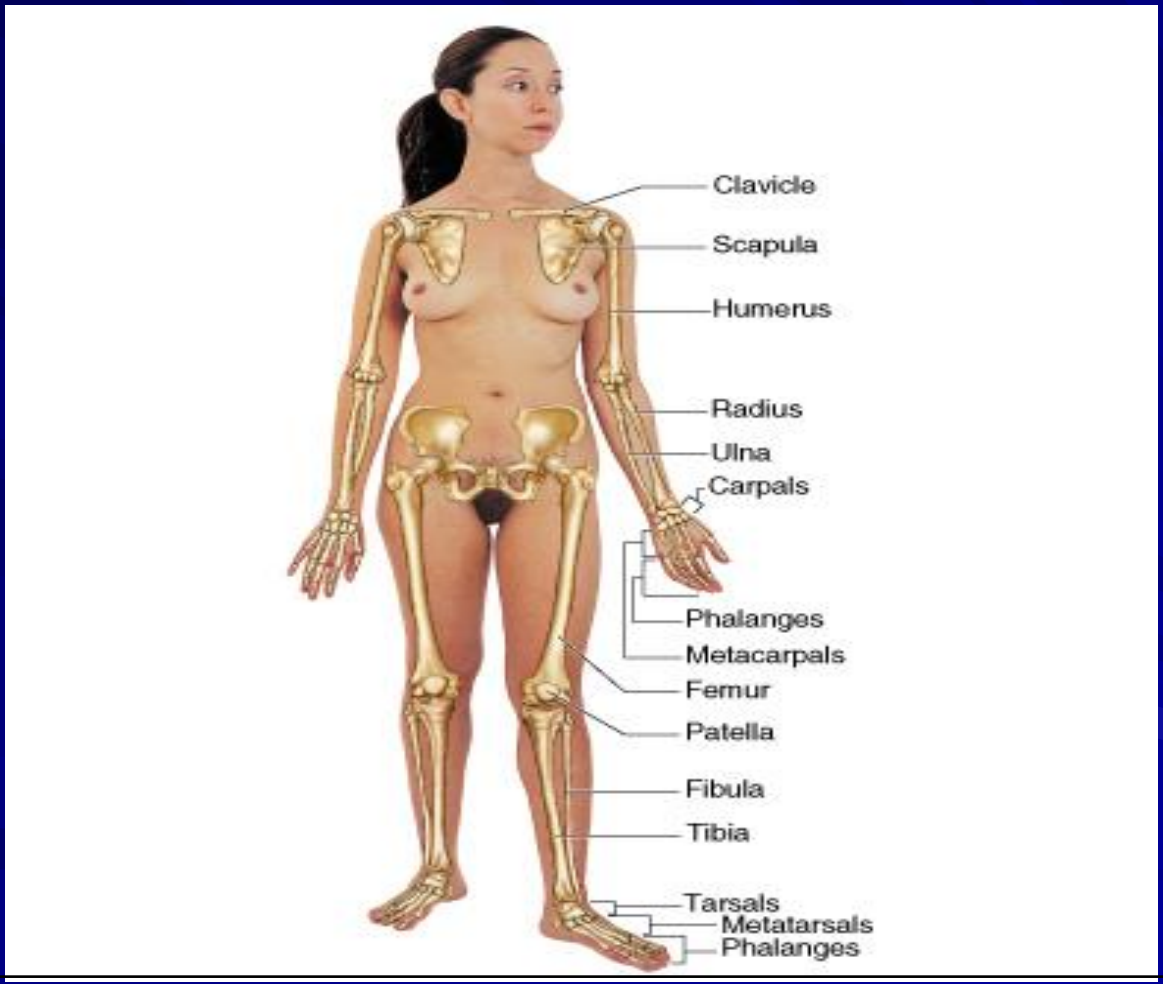
APPENDICULAR SKELETON

THE APPENDICULAR SKELETON CONSISTS OF THE BONES OF THE UPPER AND LOWER LIMBS, AND THE GIRDLES THAT ATTACH THE LIMBS TO THE AXIAL SKELETON.

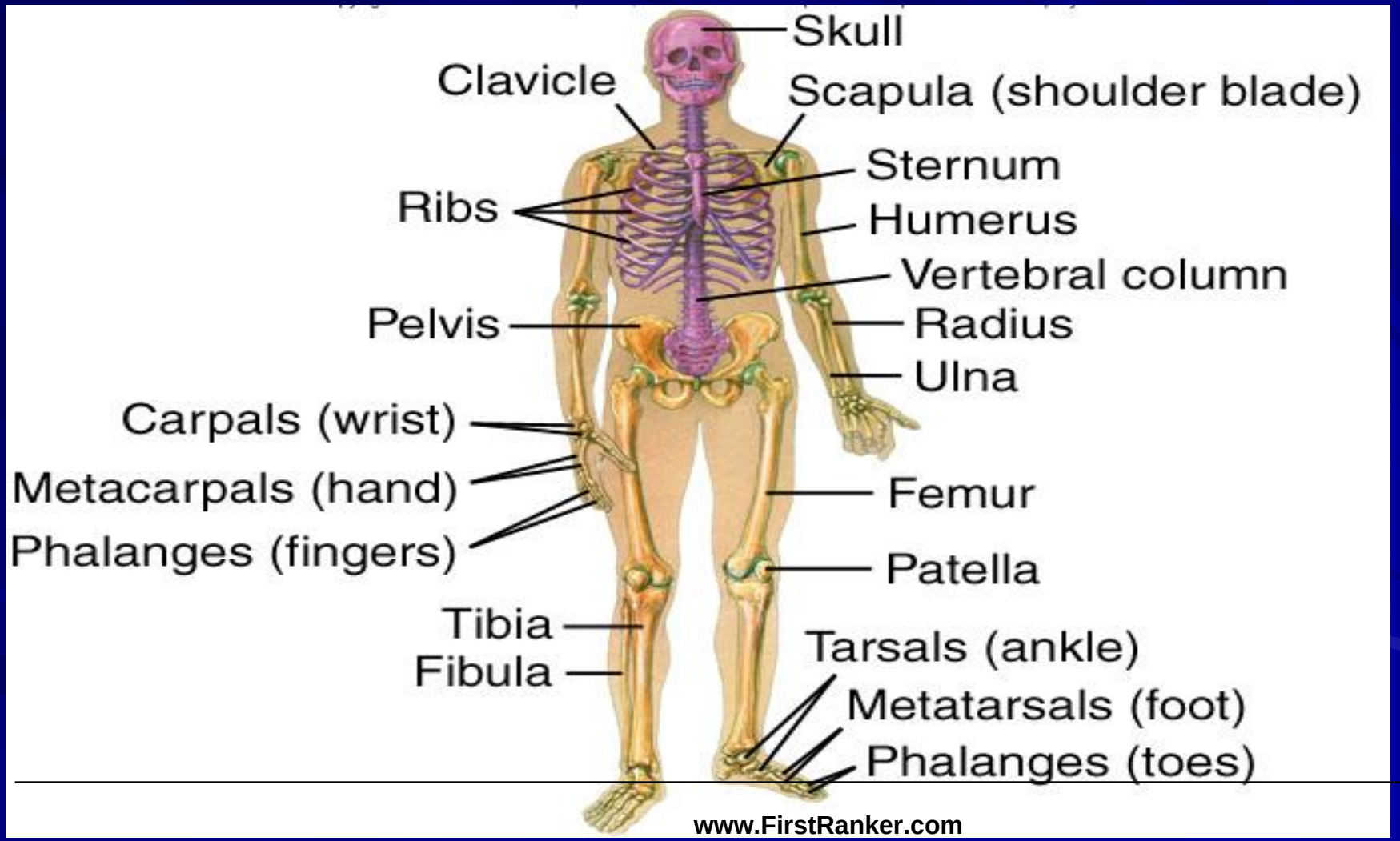
APPENDICULAR SKELETON

THE APPENDICULAR SKELETON CONSISTS OF 126 BONES. IT FUNCTIONS TO HELP IN MOVEMENT.

APPENDICULAR SKELETON



AXIAL and APPENDICULAR SKELETONS



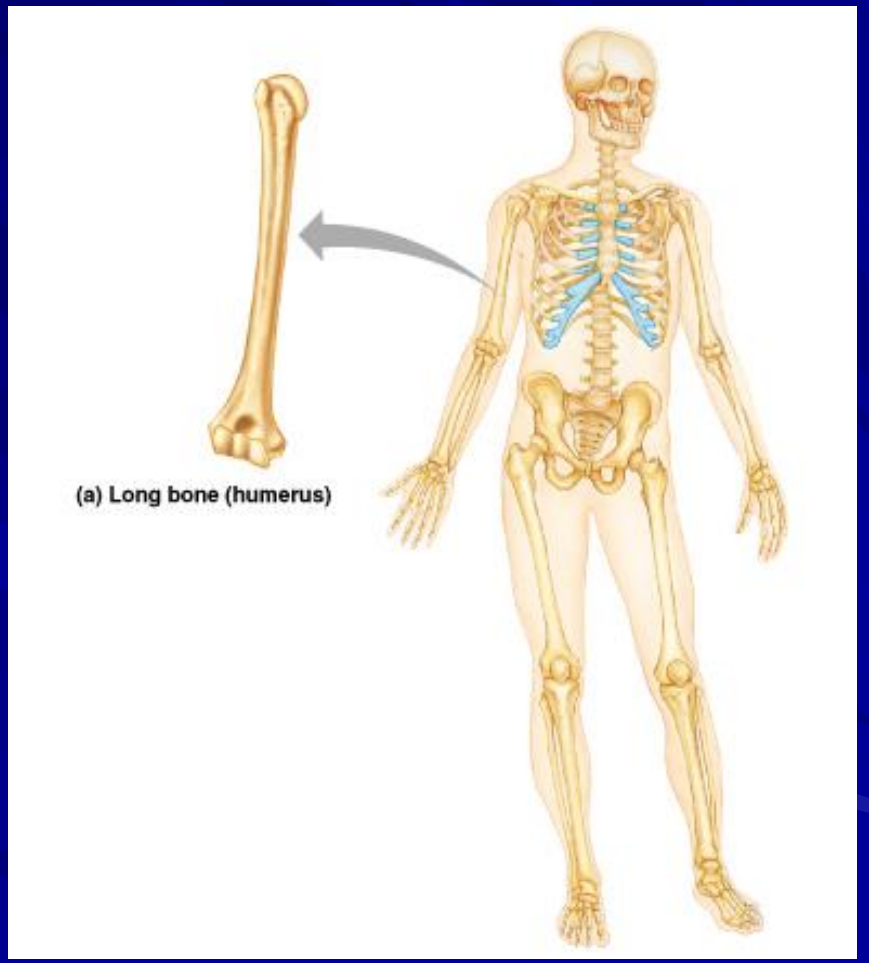
CLASSIFICATION OF BONE BY SHAPE

THE BONES OF THE HUMAN SKELETON COME IN MANY SIZES AND SHAPES. BONES CAN BE CLASSIFIED BY SHAPE INTO:

LONG; SHORT; FLAT; IRREGULAR.

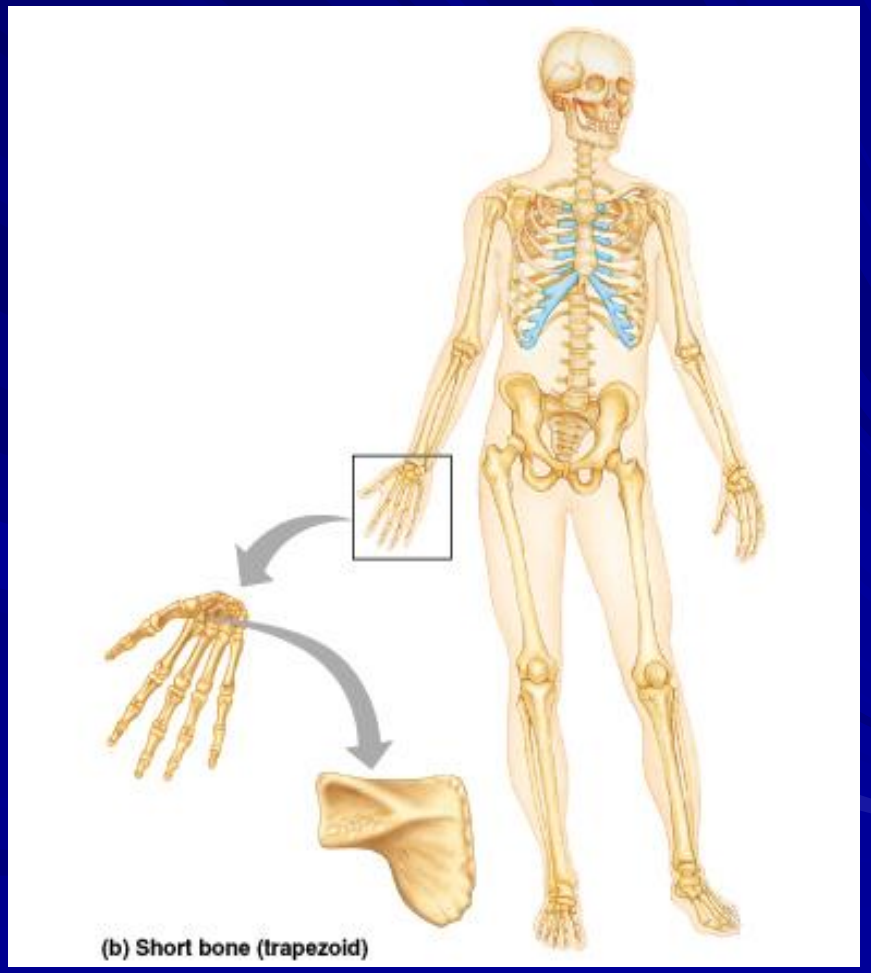
LONG BONES

- Long bones are longer than they are wide.
- Long bones have 2 epiphyses, and a diaphysis.
- All of the bones of the limbs, except the patella, ankle, and wrist, are long bones.



SHORT BONES

- Short bones are cube shaped, nearly equal in length and width.
- The bones of the wrist and ankle are examples of short bones.



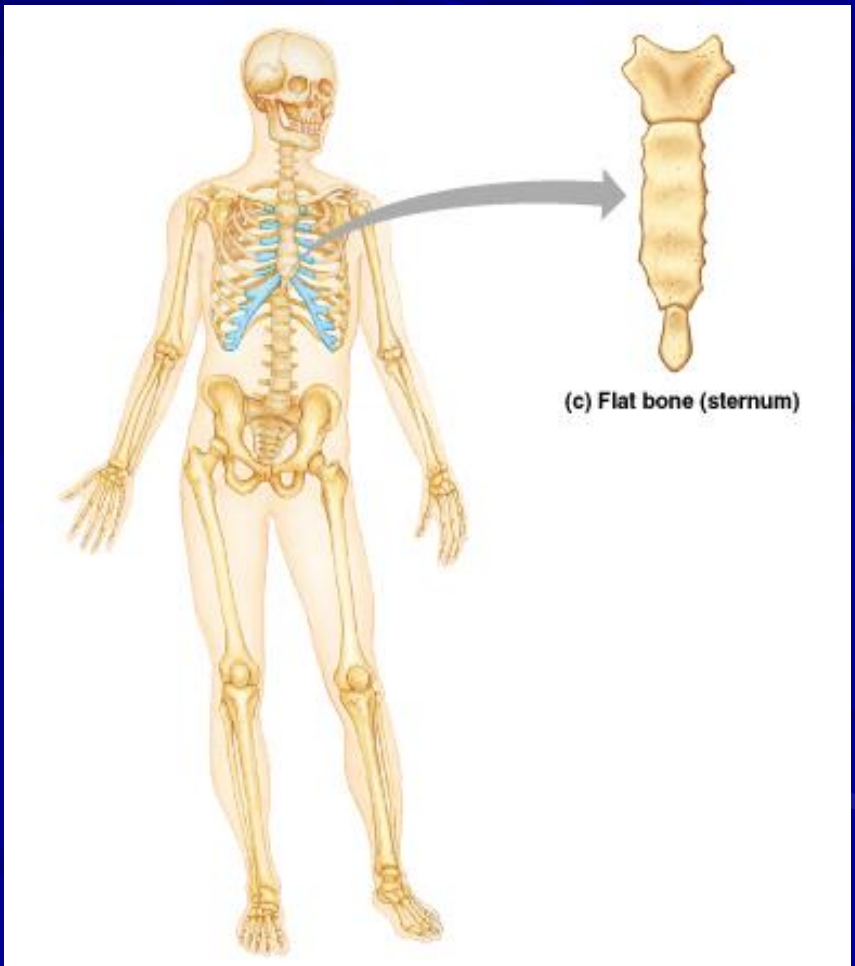
www.FirstRanker.com

SHORT BONES

A SPECIAL TYPE OF SHORT BONE IS A SESAMOND BONE. THIS TYPE OF BONE IS A SHORT BONE WHICH FORMS WITHIN A TENDON. AN EXAMPLE IS THE PATELLA, AND THE PISIFORM.

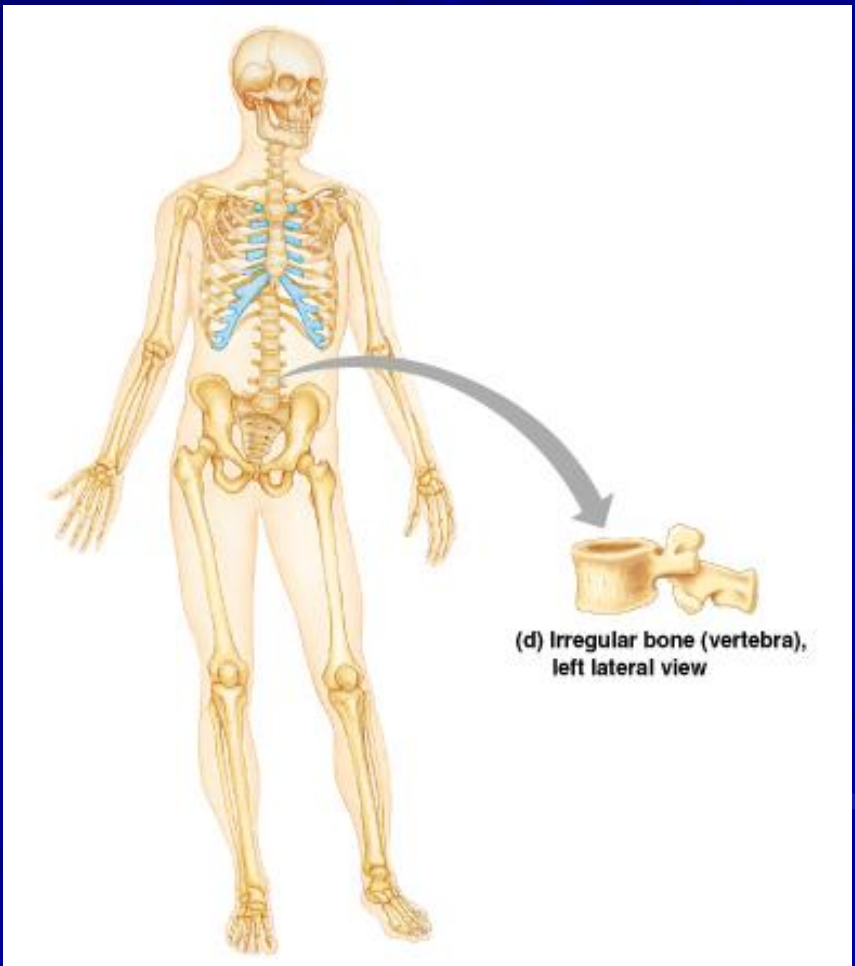
FLAT BONES

- Flat bones are thin, flattened, and a bit curved.
- The sternum, scapulae, ribs, and most of the bones of the skull are flat bones.



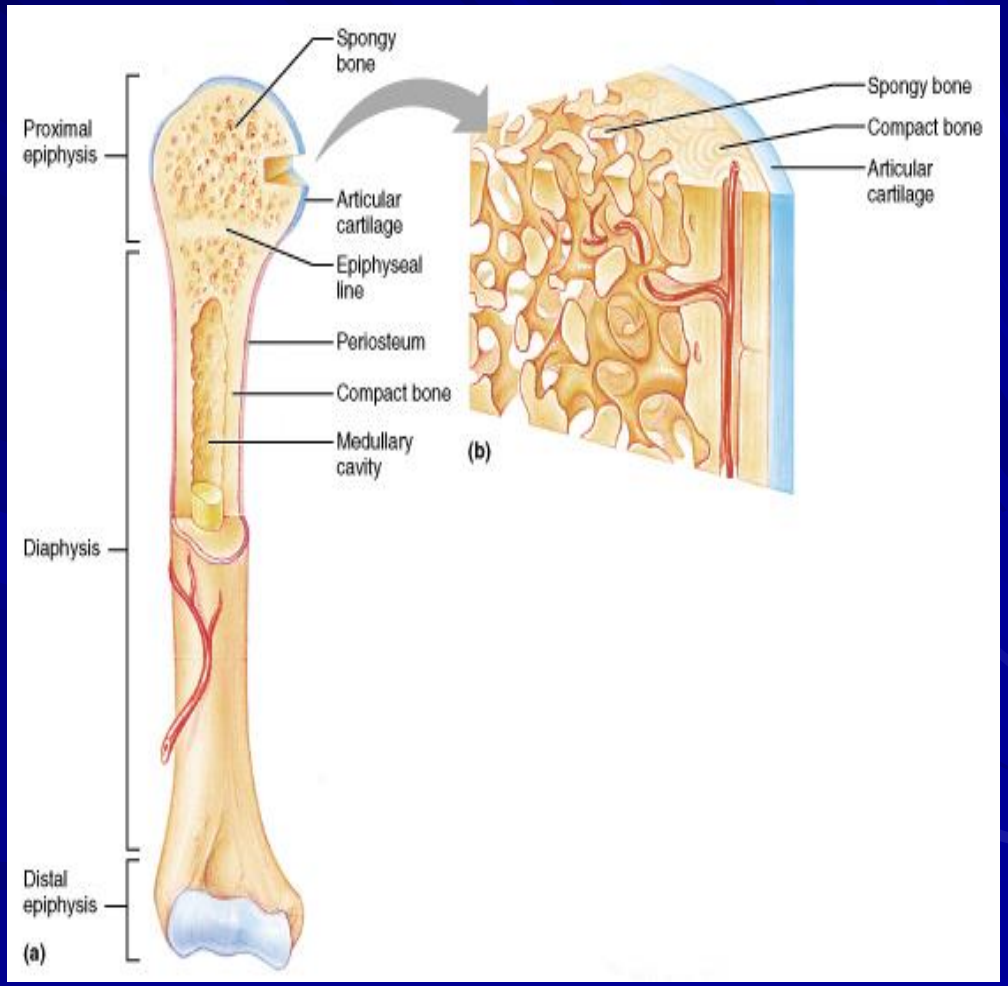
IRREGULAR BONES

- Irregular bones have complicated shapes that fit none of the preceding classes.
- The vertebrae, the bones of the hip, and some facial bones.



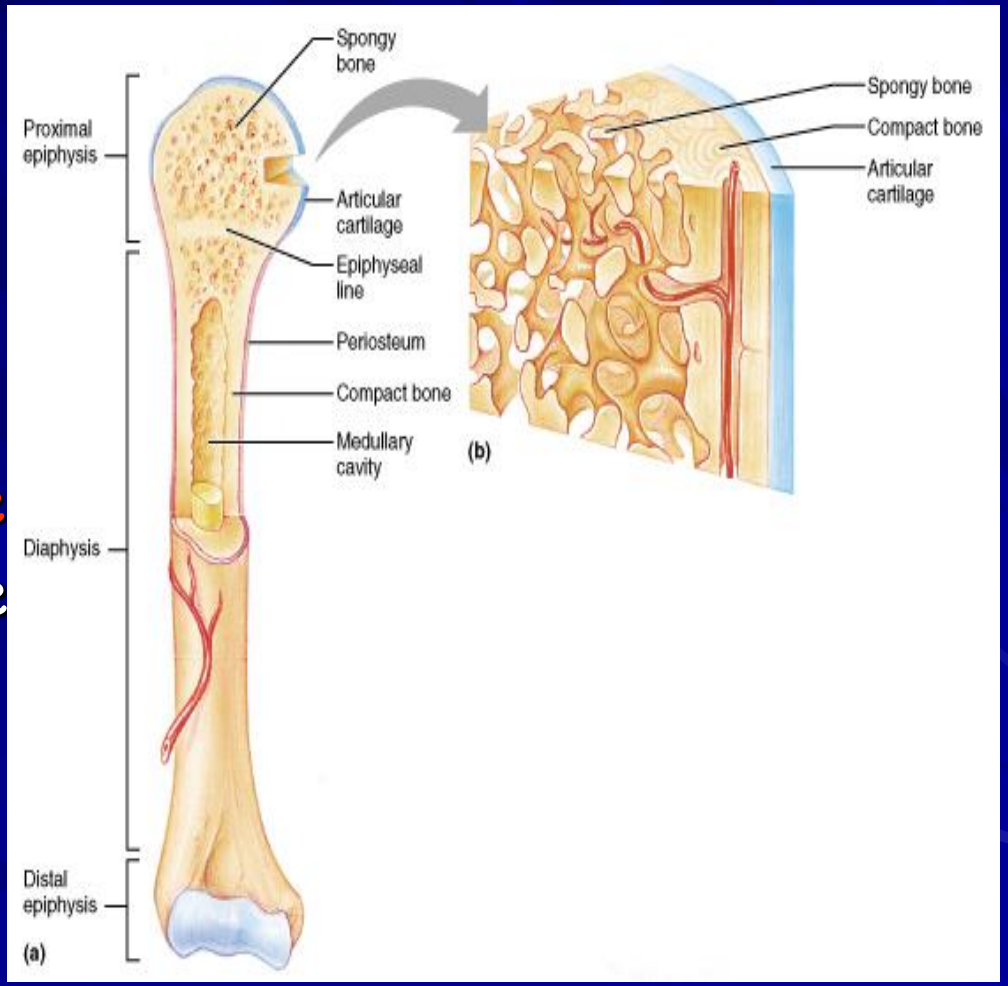
GROSS ANATOMY OF A LONG BONE

- A long bone has a shaft, the Diaphysis, and two ends,the epiphyses.
- Covering a long bone in all area, except the articular surfaces, is Periosteum.



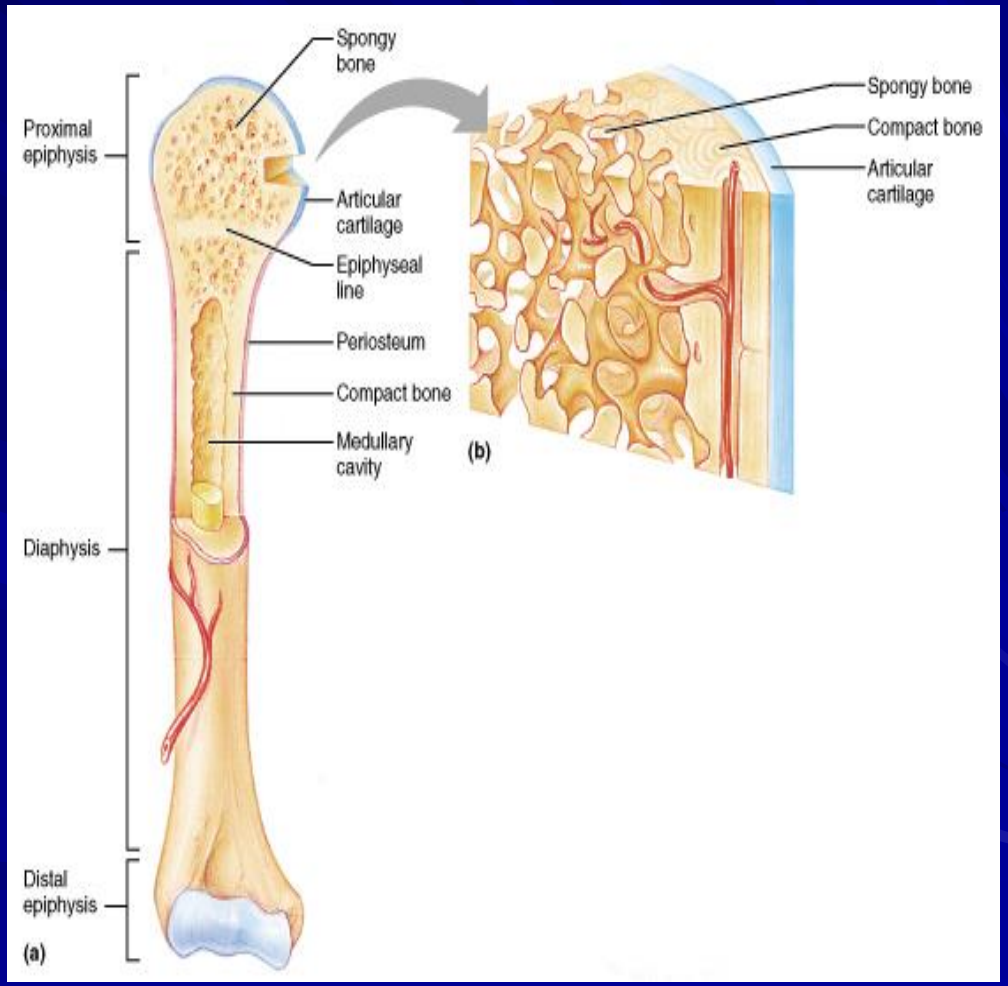
GROSS ANATOMY OF A LONG BONE

- Covering the articular surfaces is articular,or hyaline, cartilage.
- Deep to the periosteum is a layer of compact bone this layer is thicker in the diaphysis than the epiphysis.



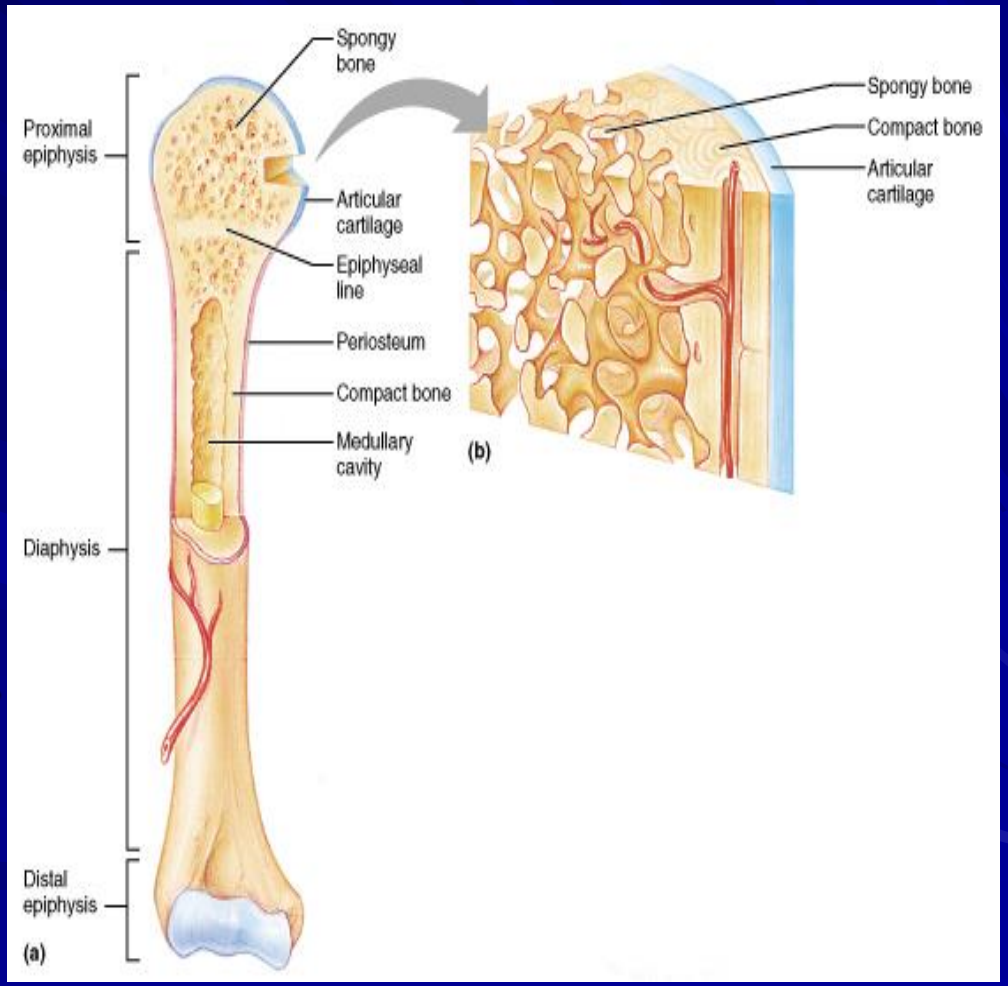
GROSS ANATOMY OF A LONG BONE

- In the diaphysis of the long bone deep to the compact bone is the medullary cavity.
- in an adult it is full of yellow bone marrow.
- The medullary cavity is lined with endosteum.

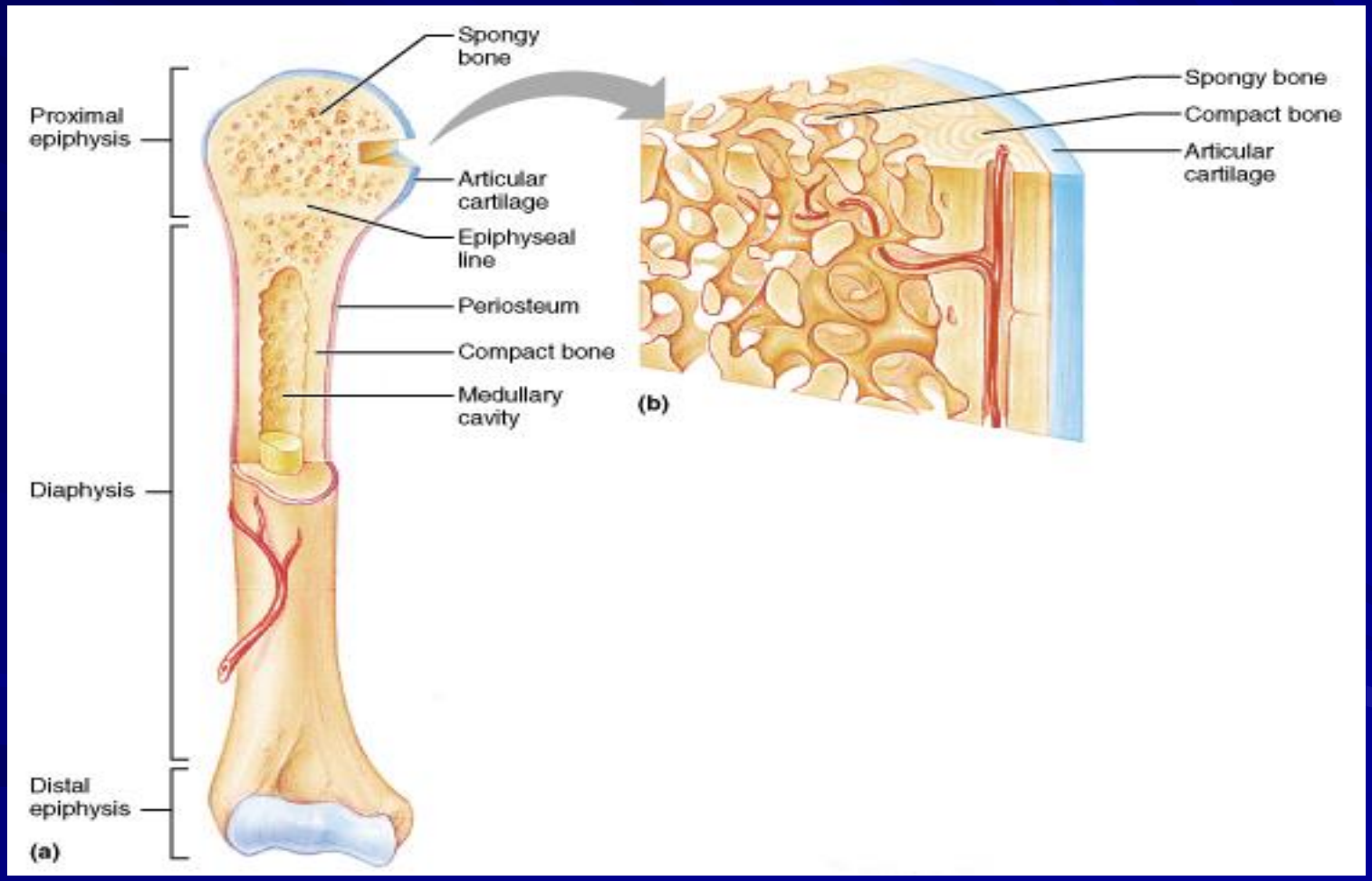


GROSS ANATOMY OF A LONG BONE

- In the epiphyses deep to the layer of compact bone is spongy bone.
- Between the trabecula of the spongy bone is red bone marrow.



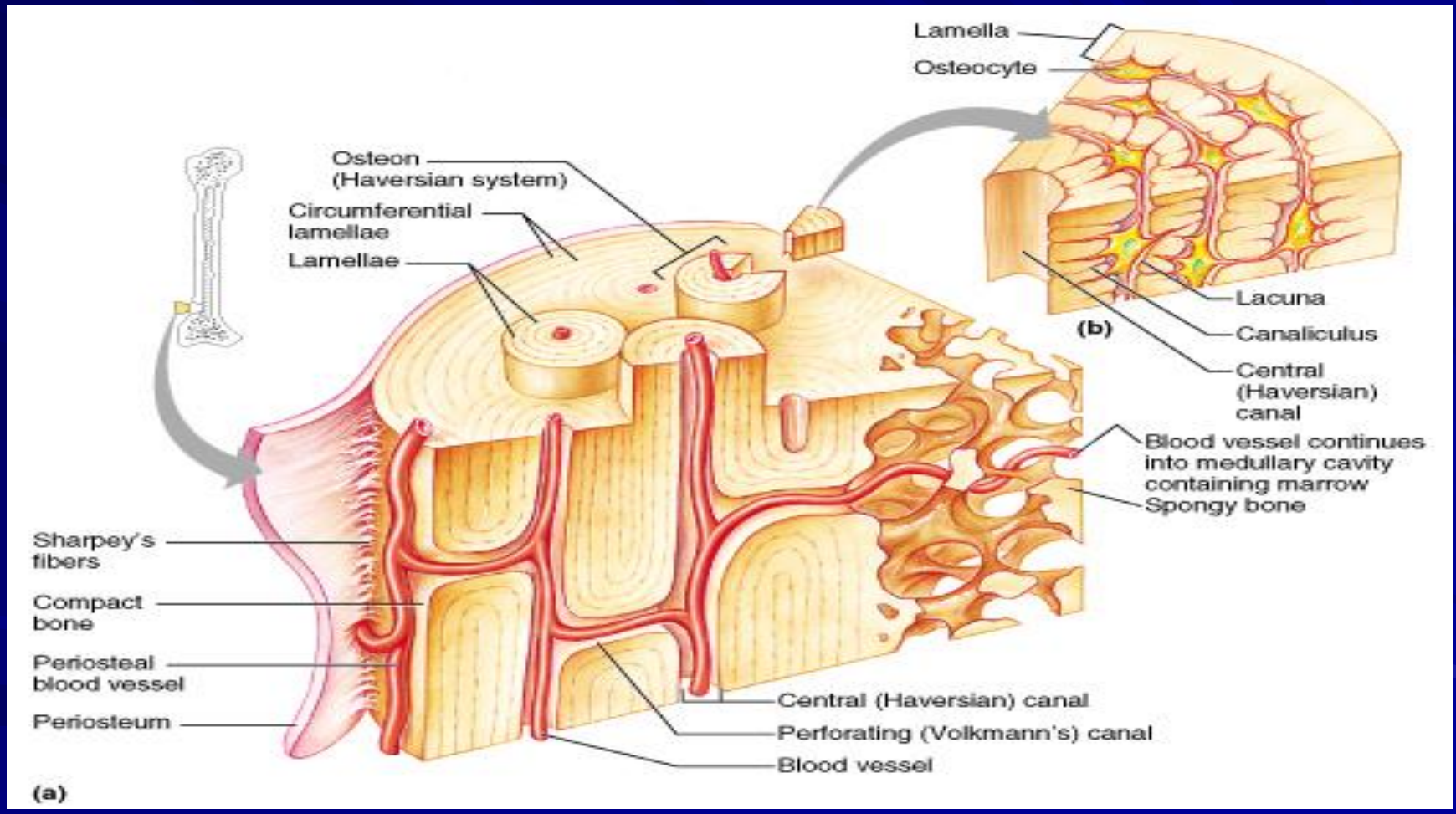
GROSS ANATOMY OF A LONG BONE



MICROSCOPIC STRUCTURE OF COMPACT BONE

THE STRUCTURAL UNIT OF COMPACT BONE IS THE OSTEON, OR HAVERSIAN SYSTEM. EACH OSTEON IS AN ELONGATED CYLINDER ORIENTED PARALLEL TO THE LONG AXIS OF THE BONE.

MICROSCOPIC STRUCTURE OF COMPACT BONE



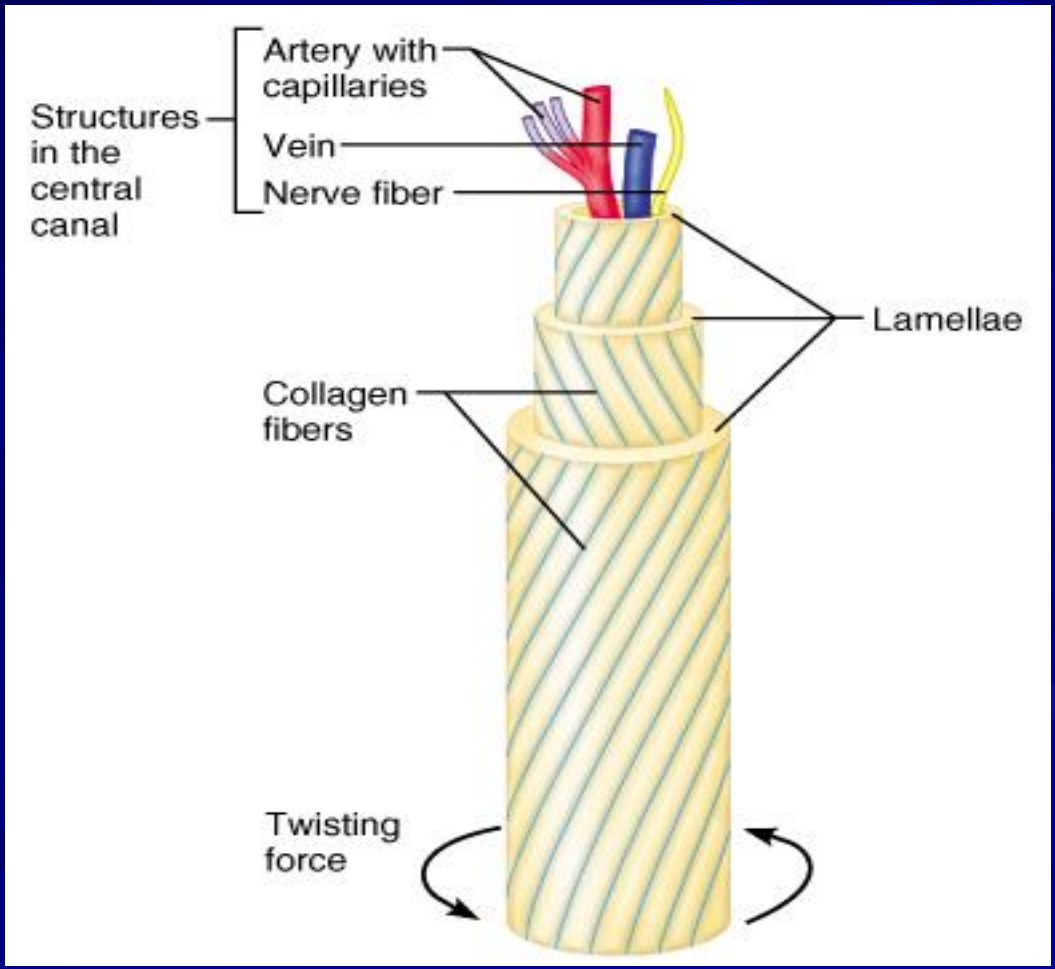
MICROSCOPIC STRUCTURE OF COMPACT BONE

AN OSTEON IS A GROUP OF HOLLOW TUBES OF BONE MATRIX, ONE PLACED OUTSIDE THE NEXT LIKE THE GROWTH RINGS OF A TREE TRUNK. EACH OF THE MATRIX TUBES IS A LAMELLA.

MICROSCOPIC STRUCTURE OF COMPACT BONE

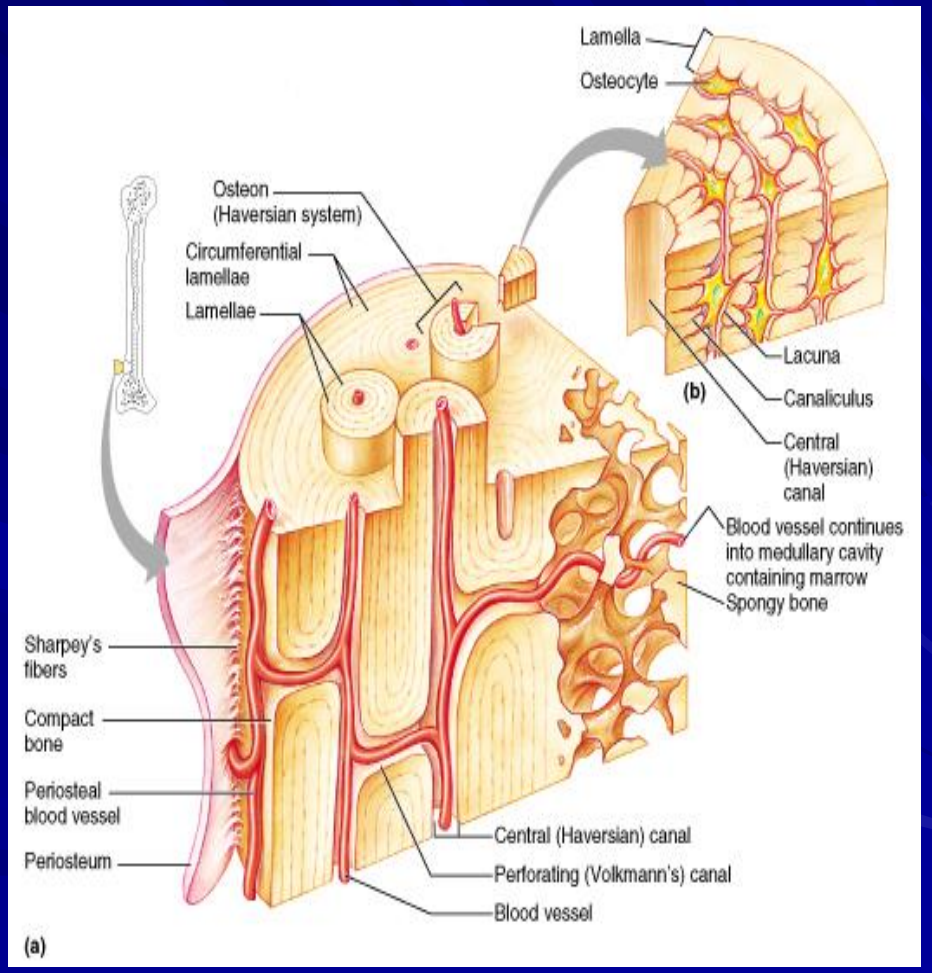
THE COLLAGEN FIBERS IN A PARTICULAR LAMELLA RUN IN A SINGLE DIRECTION.

MICROSCOPIC STRUCTURE OF COMPACT BONE



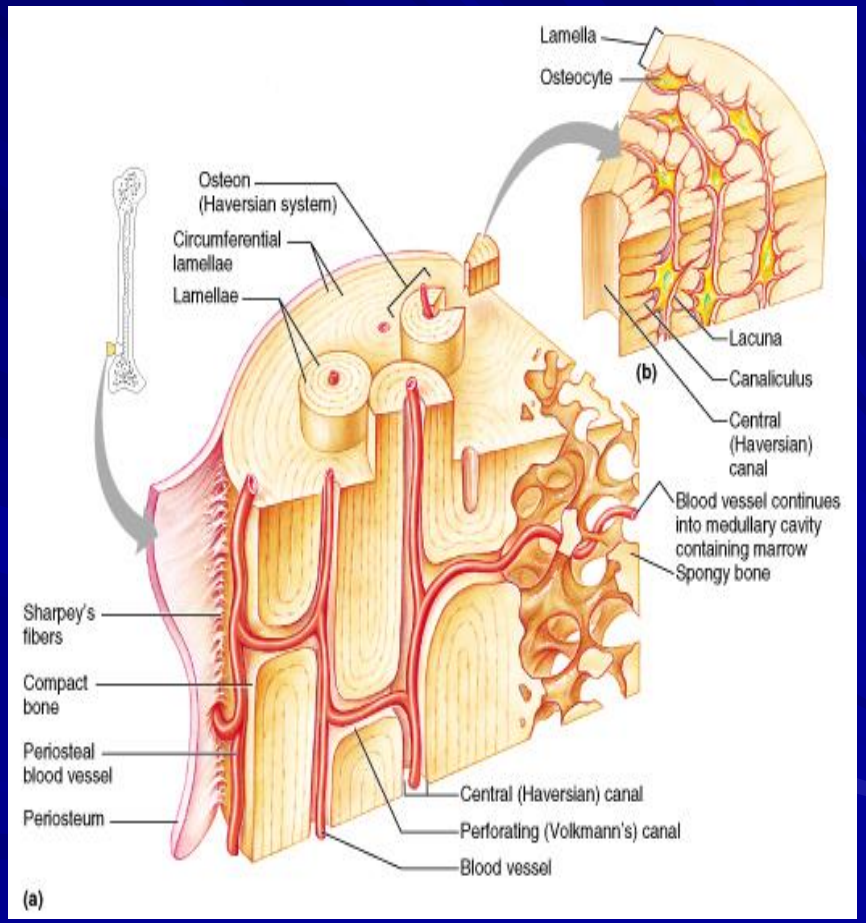
MICROSCOPIC STRUCTURE OF COMPACT BONE

- Running through the core of each osteon is the central,or Haversian canal.
- The canal contains small blood vessels and nerve fibers that serve the needs of the osteon's cells.

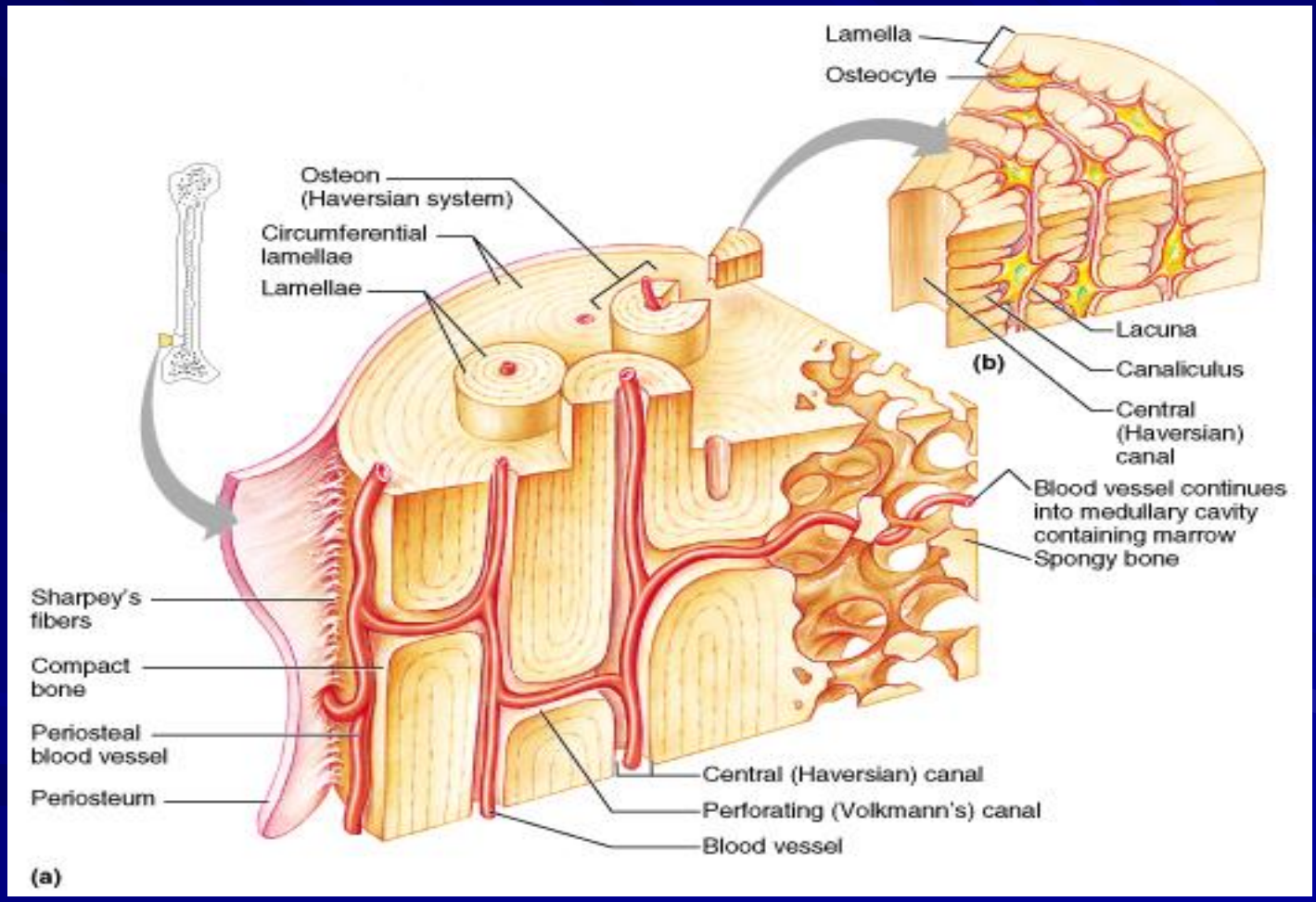


MICROSCOPIC STRUCTURE OF COMPACT BONE

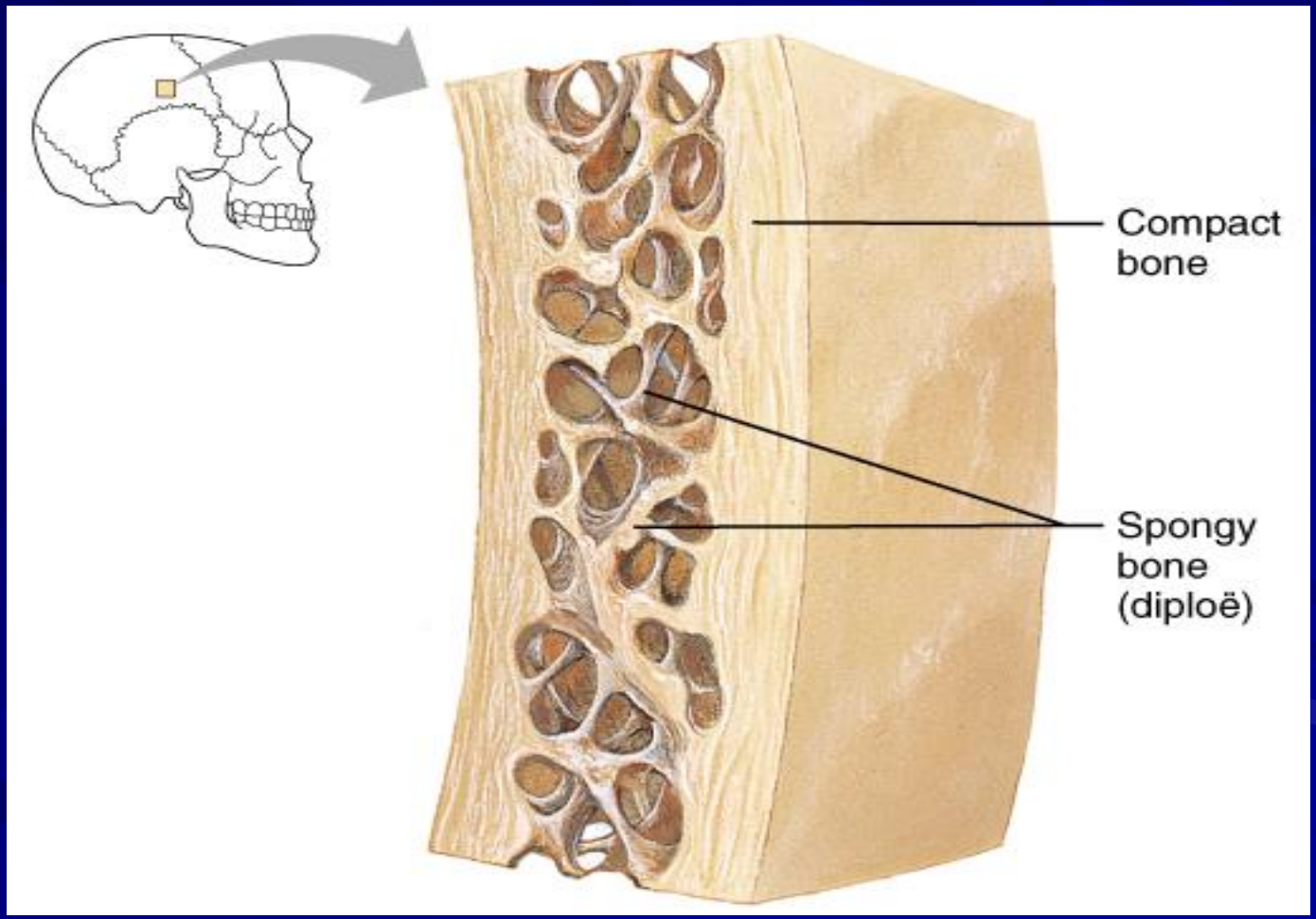
- Spider shaped osteocytes occupy small cavities called lacunae at the junctions of the lamellae.
- Hair like canals called canaliculi connect the lacunae to each other.
- The space between these structures is occupied by bony matrix.



MICROSCOPIC STRUCTURE OF COMPACT BONE



GROSS ANATOMY OF FLAT BONE



OSSIFICATION

OSSFICATION OR OSTEOGENESIS
IS THE PROCESS OF BONE FORMATION.
THERE ARE 2 MECHANISM
WHICH FORM BONE:

1. INTRAMEMBRANOUS
2. ENDOCHONDRAL

OSSIFICATION

INTRAMEMBRANOUS OSSIFICATION RESULTS IN THE FORMATION OF THE CRANIAL BONES AND THE CLAVICLES.

OSSIFICATION

ENDOCHONDRAL OSSIFICATION RESULTS IN THE FORMATION OF THE BONES BELOW THE SKULL, WITH THE EXCEPTION OF THE CLAVICLES.

OSSIFICATION

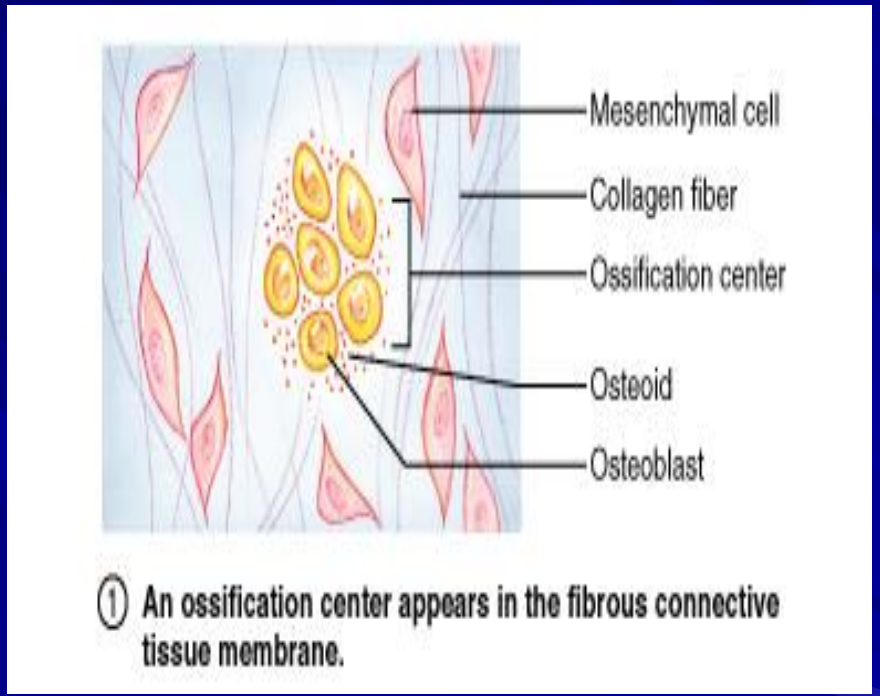
THREE TYPES OF CELLS ARE INVOLVED IN BOTH MECHANISM OF OSSIFICATION:

1. OSTEOBLASTS
2. OSTEOCLASTS
3. OSTEOCYTES

STEPS OF INTRAMEMBRANOUS OSSIFICATION

1. Selected mesenchymal cells cluster and form osteoblasts.

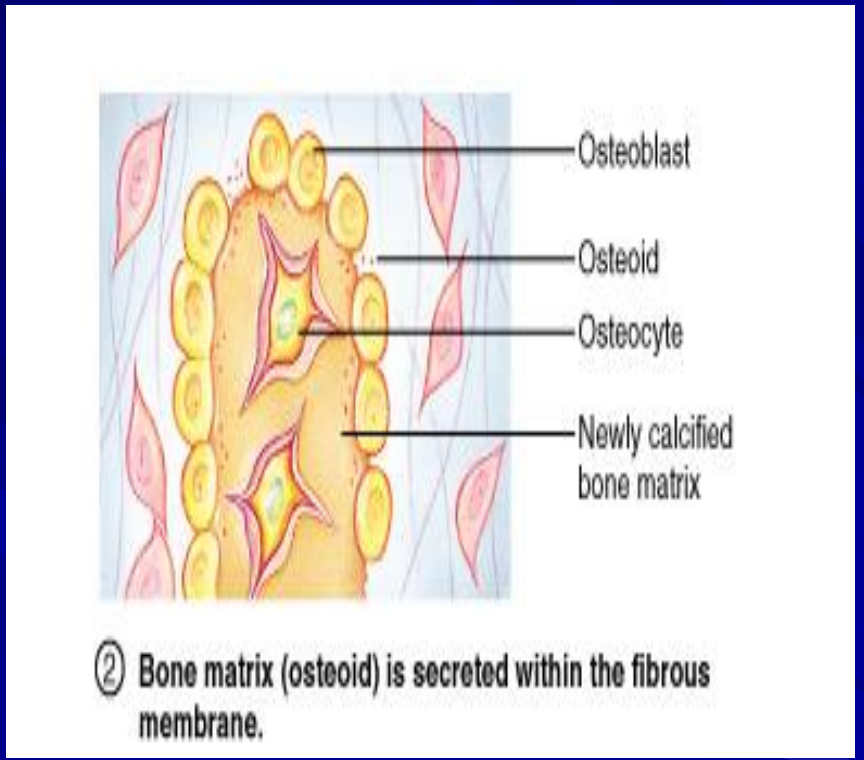
2. This forms an ossification center.



STEPS OF INTRAMEMBRANOUS OSSIFICATION

3. Osteoblasts begin to secrete osteoid, which mineralized.

4. The osteoblasts are trapped differentiate into osteocytes.

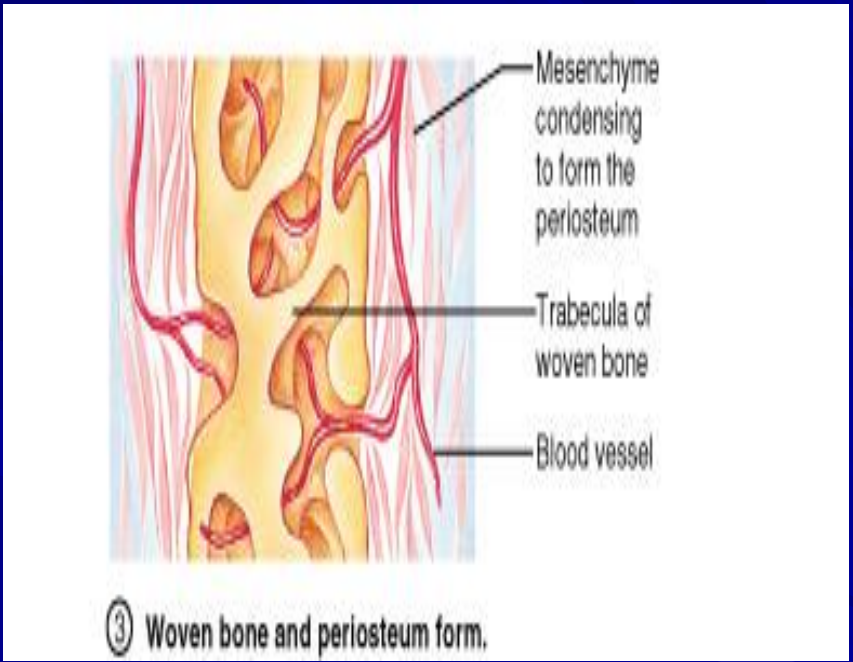


② Bone matrix (osteoid) is secreted within the fibrous membrane.

STEPS OF INTRAMEMBRANOUS OSSIFICATION

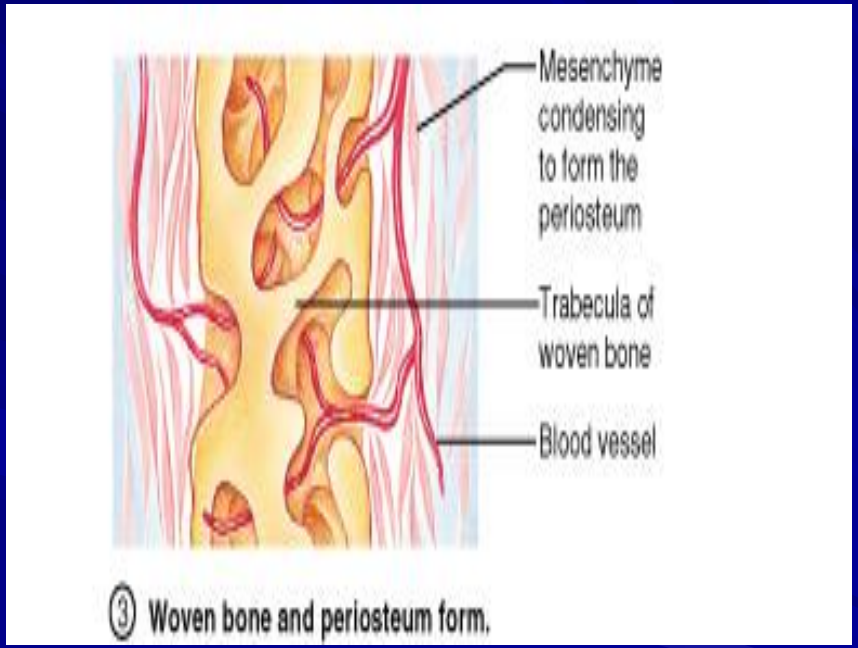
5. Accumulating osteoid is laid down between embryonic blood vessels.

6. This forms a network of trabulae.



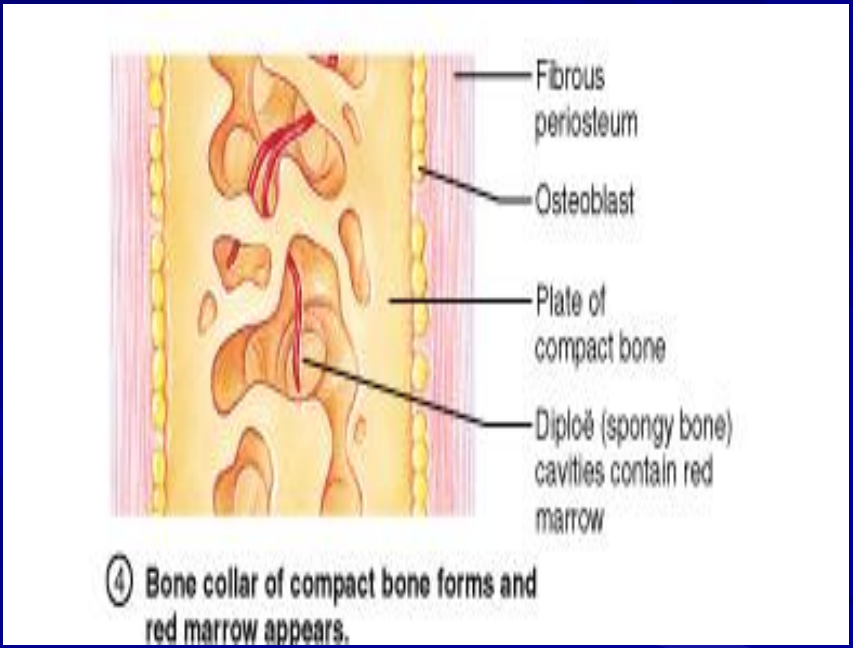
STEPS OF INTRAMEMBRANOUS OSSIFICATION

7. Vascularized mesenchyme condenses on the external face of the woven bone and becomes the periosteum.



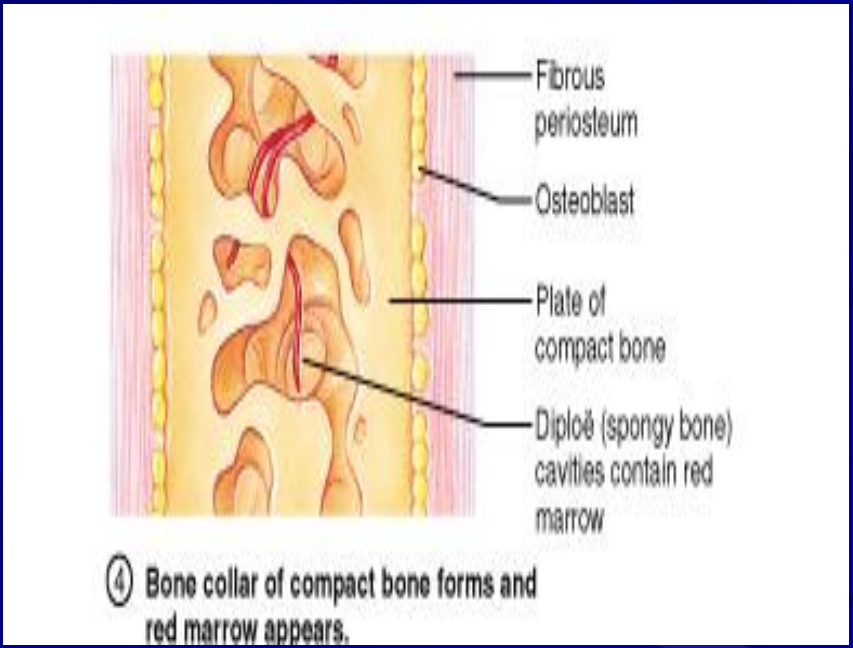
STEPS OF INTRAMEMBRANOUS OSSIFICATION

8. Trabeculae just deep to the periosteum thicken, forming a bone collar.
9. The bony collar is later replaced with mature compact bone.



STEPS OF INTRAMEMBRANOUS OSSIFICATION

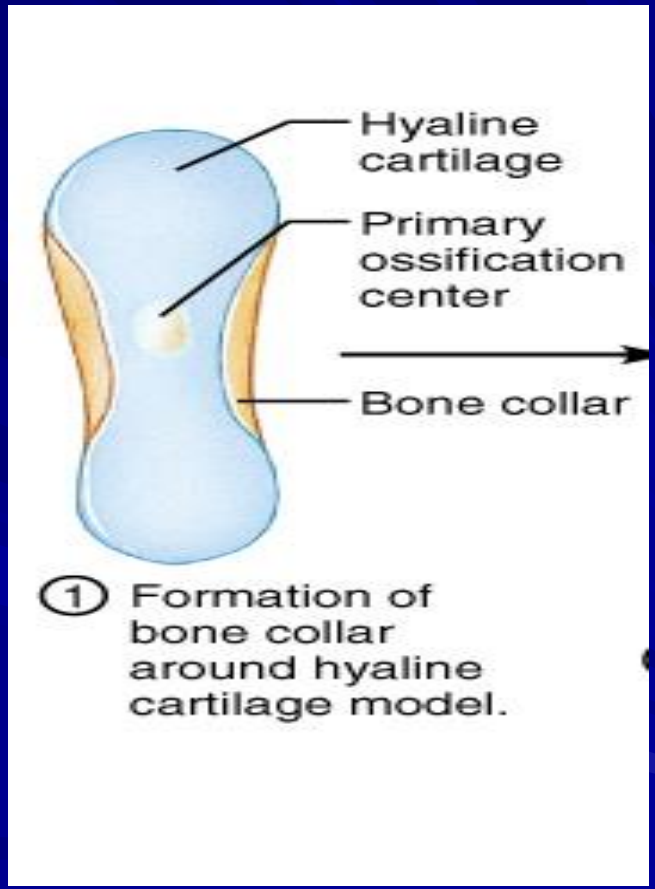
10. Spongy bone, consisting of distinct trabeculae, are present internally. Blood vessels differentiate into red bone marrow.



STEPS OF ENDOCHONDRAL OSSIFICATION

1. The perichondrium covering the hyaline cartilage "bone" is infiltrated with blood vessels.

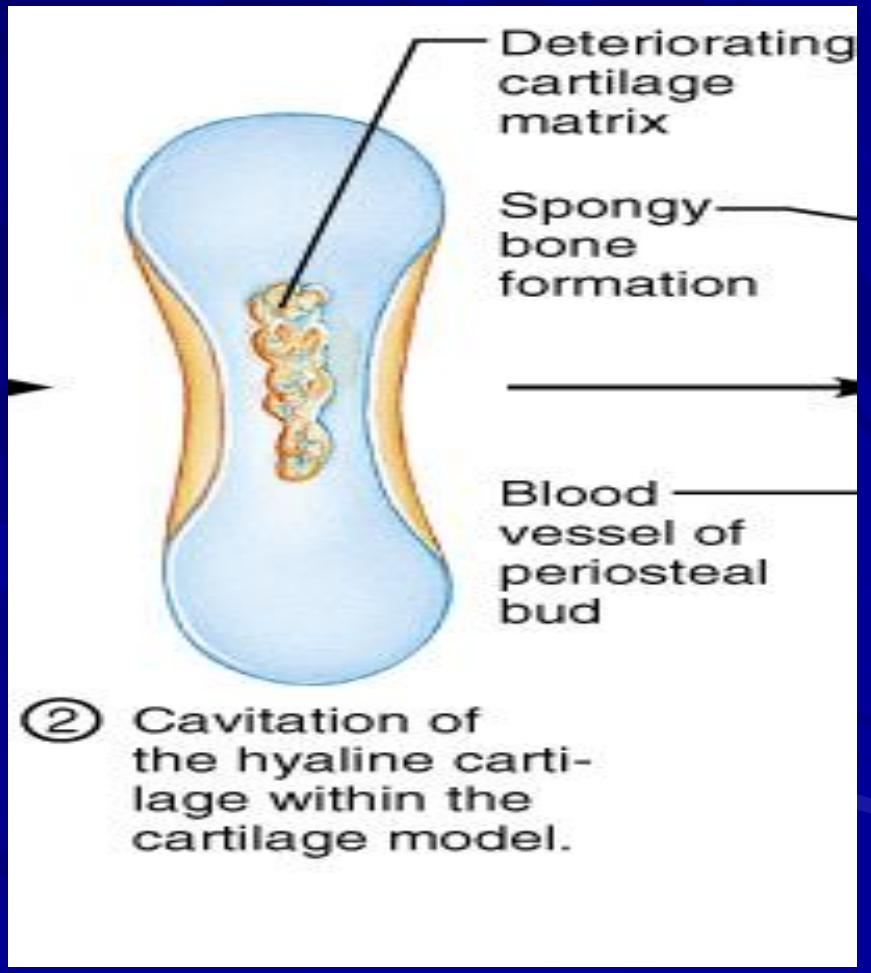
2. Osteoblasts secrete osteoid against the hyaline cartilage diaphysis, encasing it in a bony collar.



STEPS OF ENDOCHONDRAL OSSIFICATION

3. Chondrocytes within the diaphysis hypertrophy and signal the surrounding cartilage matrix to calcify.

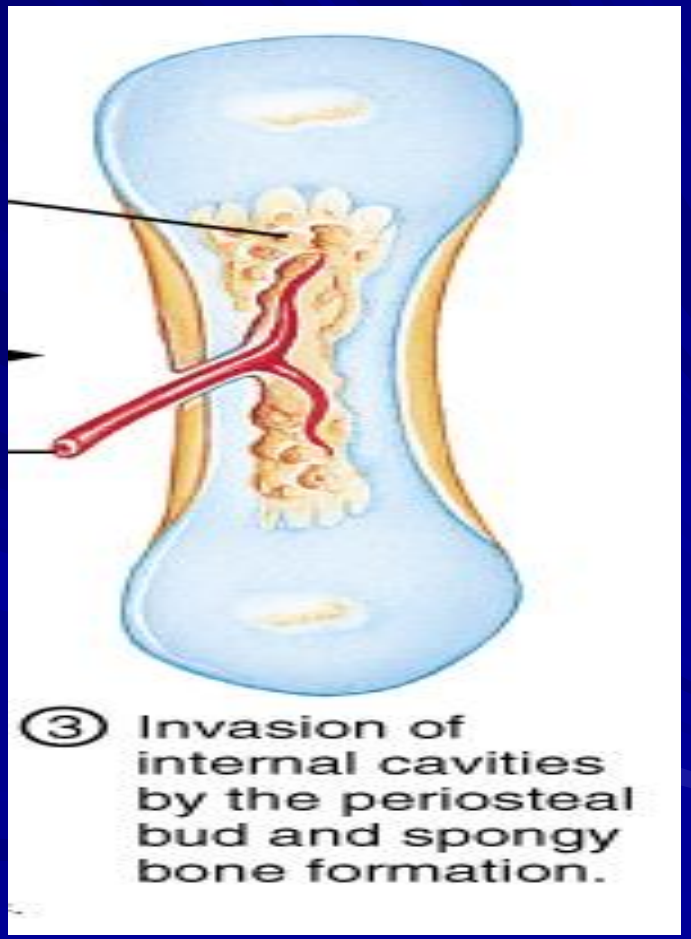
4. The chondrocytes, however, die and the matrix begins to deteriorate.



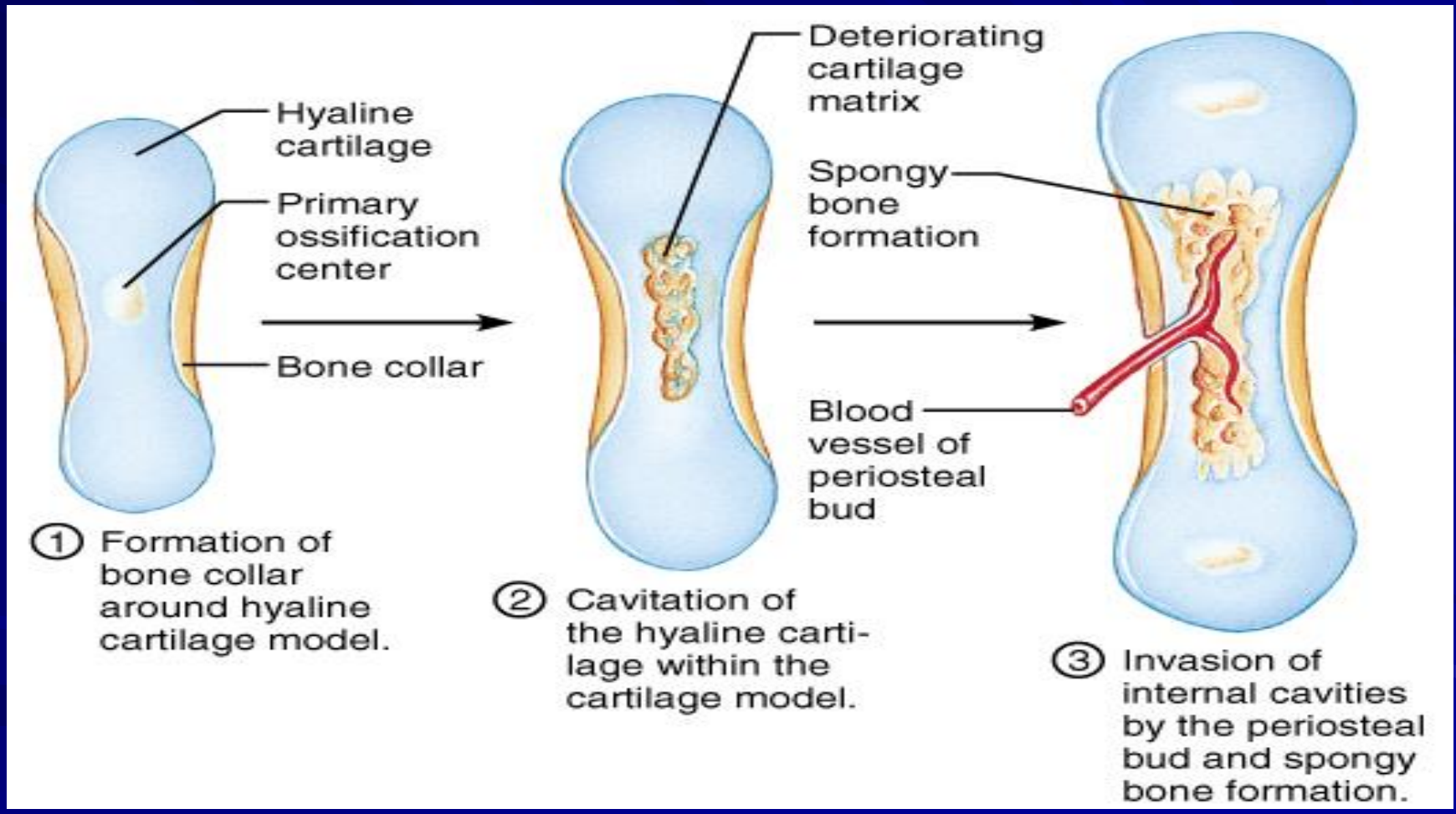
STEPS OF ENDOCHONDRAL OSSIFICATION

5. In month 3, the forming cavities are invaded by a collection of elements called the periosteal bud.

6. The entering osteoclasts partially erode the calcified cartilage matrix.

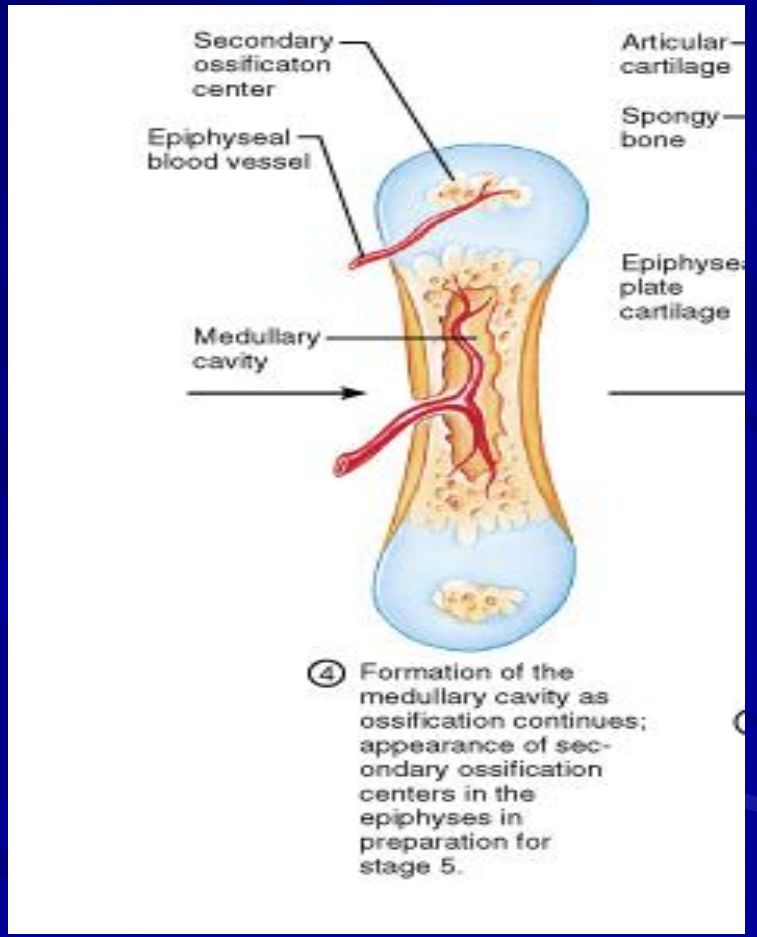


STEPS OF ENDOCHONDRAL OSSIFICATION



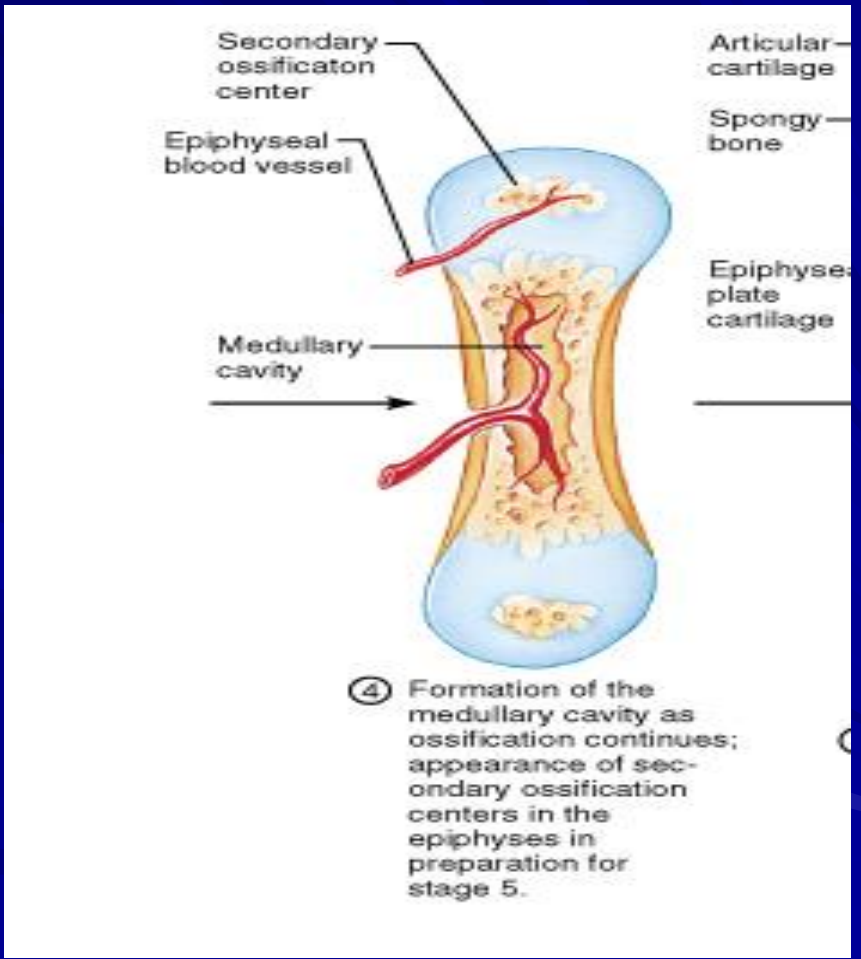
STEPS OF ENDOCHONDRAL OSSIFICATION

7. Osteoblasts secrete osteoid around the remaining fragments of hyaline cartilage forming trabeculae.



STEPS OF ENDOCHONDRAL OSSIFICATION

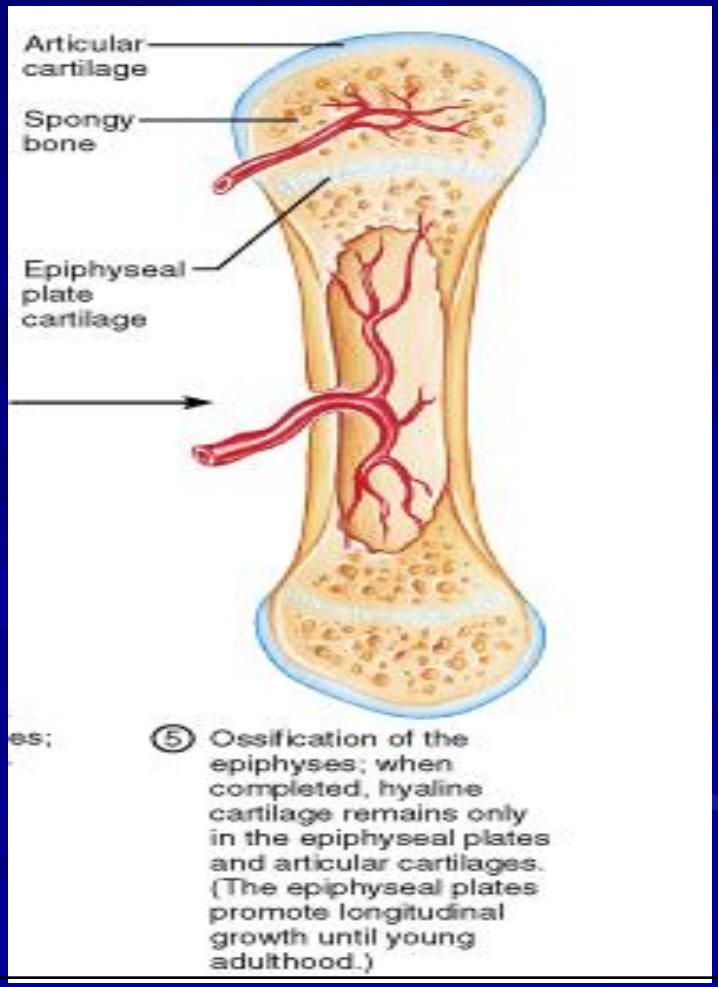
8. As the primary ossification center enlarges, osteoclasts break down the newly formed spongy bone and open up a medullary cavity in the center of the diaphysis.



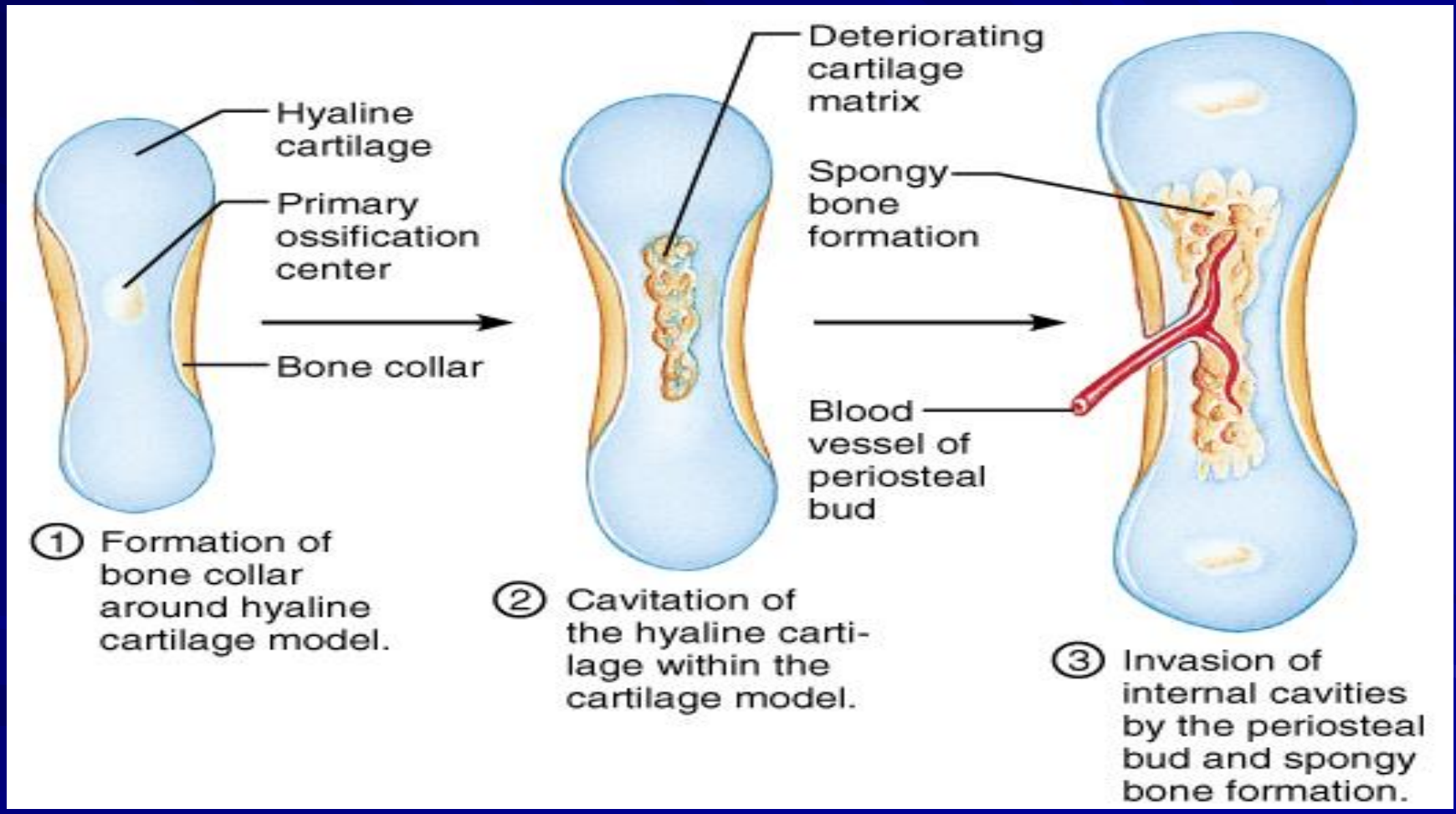
STEPS OF ENDOCHONDRAL OSSIFICATION

9. The epiphyses remain formed of cartilage until shortly before or after birth.

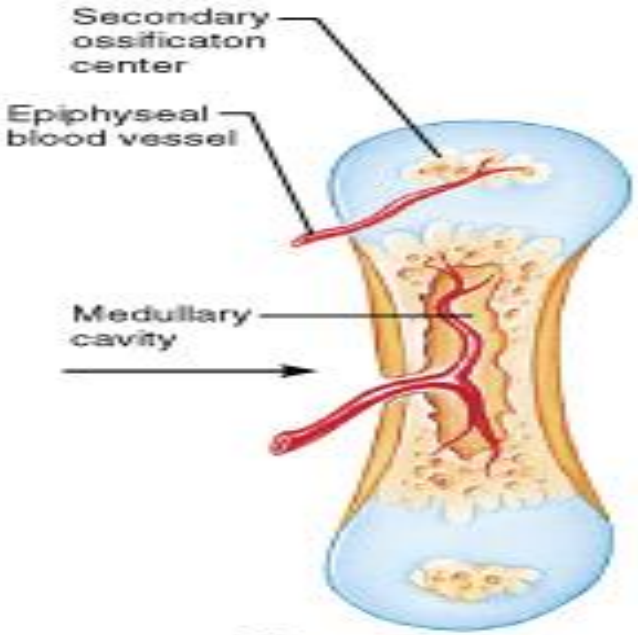
10. Secondary ossification centers form in the epiphyses. The events of ossification are like the events of the diaphysis, except, that spongy bone mains in the internal and no medullary cavity forms.



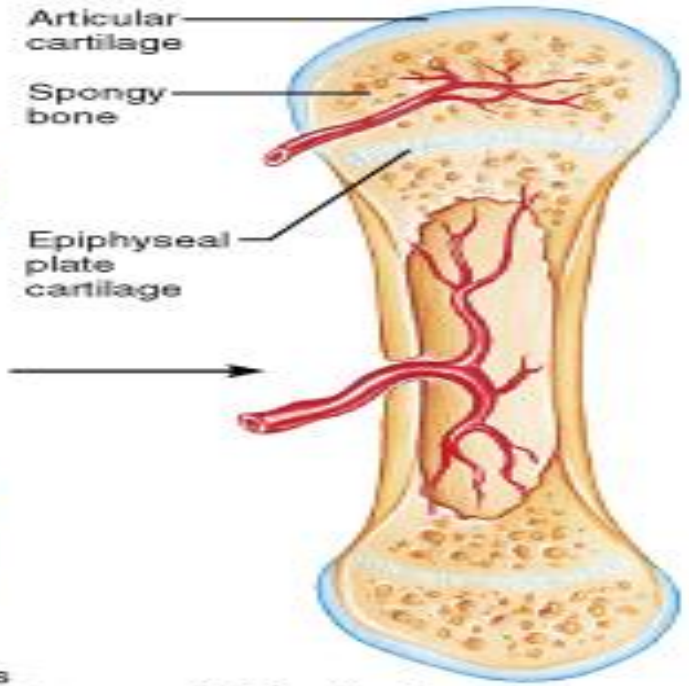
STEPS OF ENDOCHONDRAL OSSIFICATION



STEPS OF ENDOCHONDRAL OSSIFICATION



④ Formation of the medullary cavity as ossification continues; appearance of secondary ossification centers in the epiphyses in preparation for stage 5.



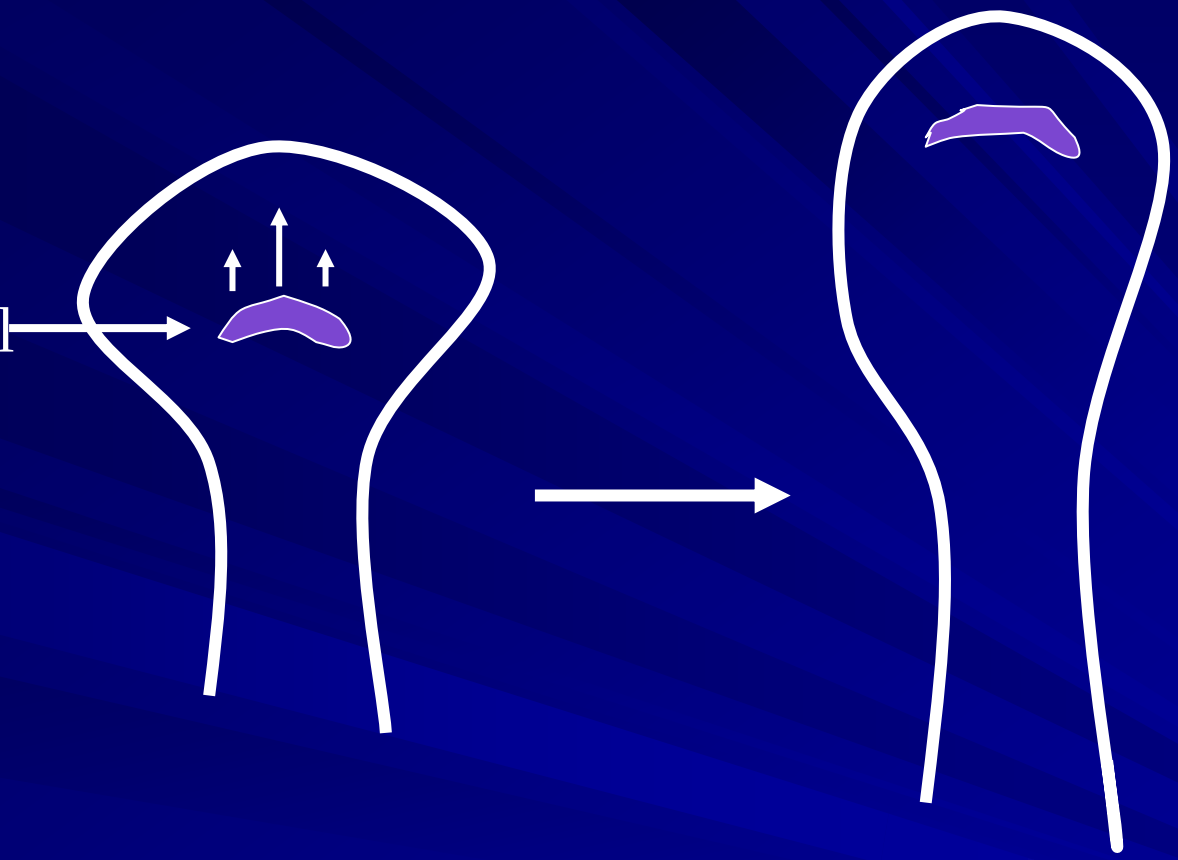
⑤ Ossification of the epiphyses; when completed, hyaline cartilage remains only in the epiphyseal plates and articular cartilages. (The epiphyseal plates promote longitudinal growth until young adulthood.)

BONE GROWTH

THERE ARE 2 TYPES OF BONE GROWTH:

1. LONGITUDINAL--LENGTH
2. APPOSITIONAL--DIAMETER

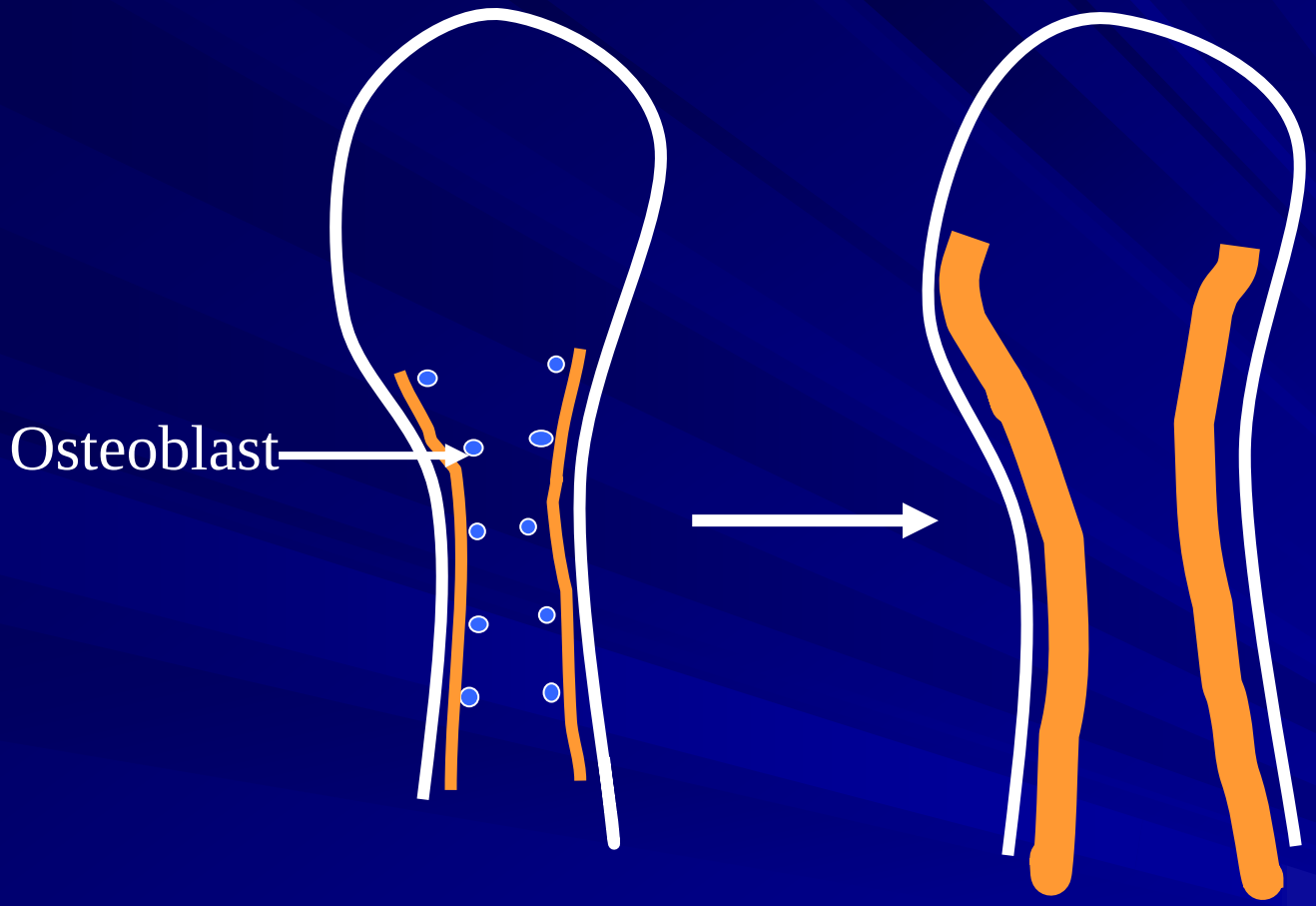
www.FirstRanker.com



LONGITUDINAL BONE GROWTH

www.FirstRanker.com

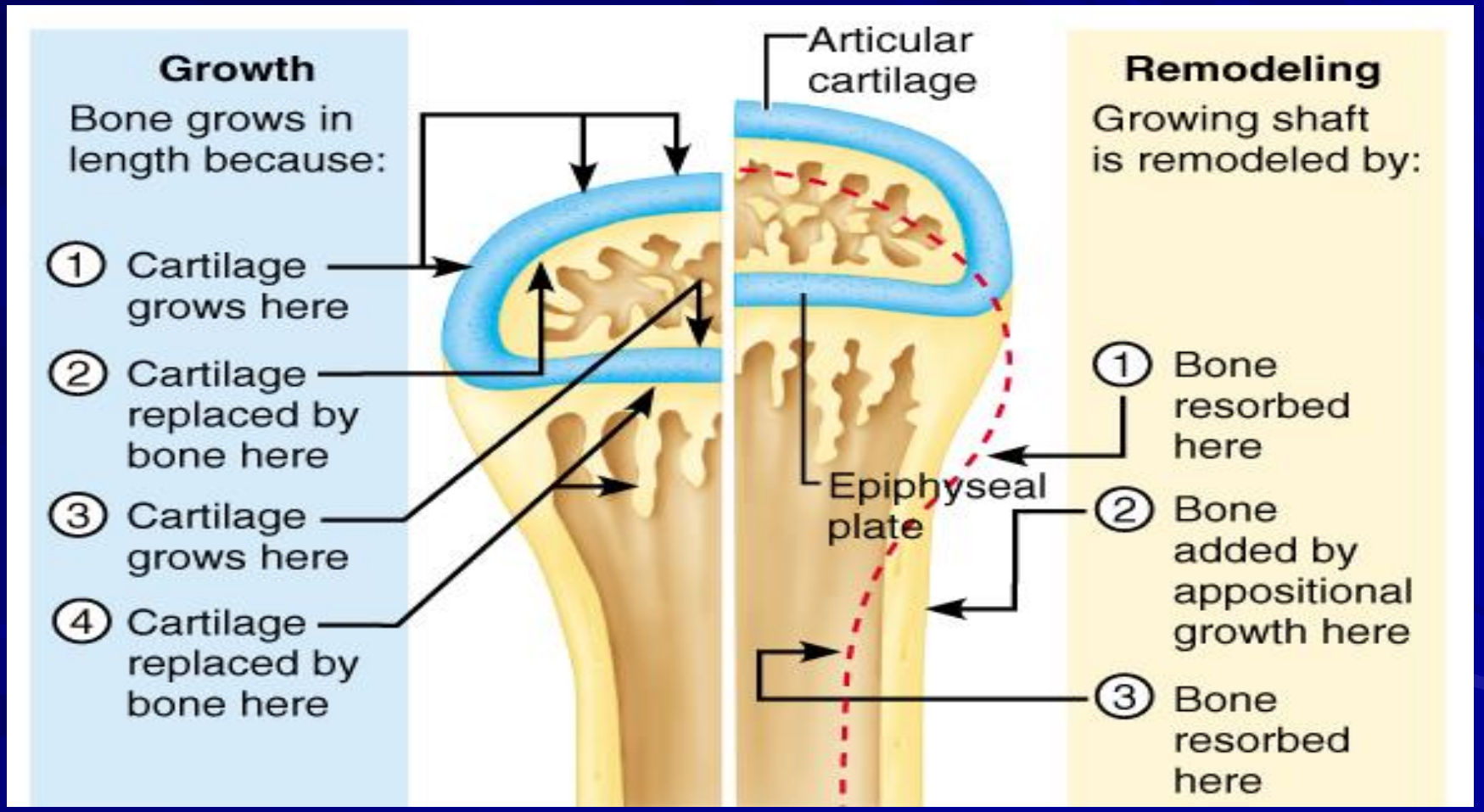
www.FirstRanker.com



APPOSITIONAL BONE GROWTH

www.FirstRanker.com

BONE GROWTH

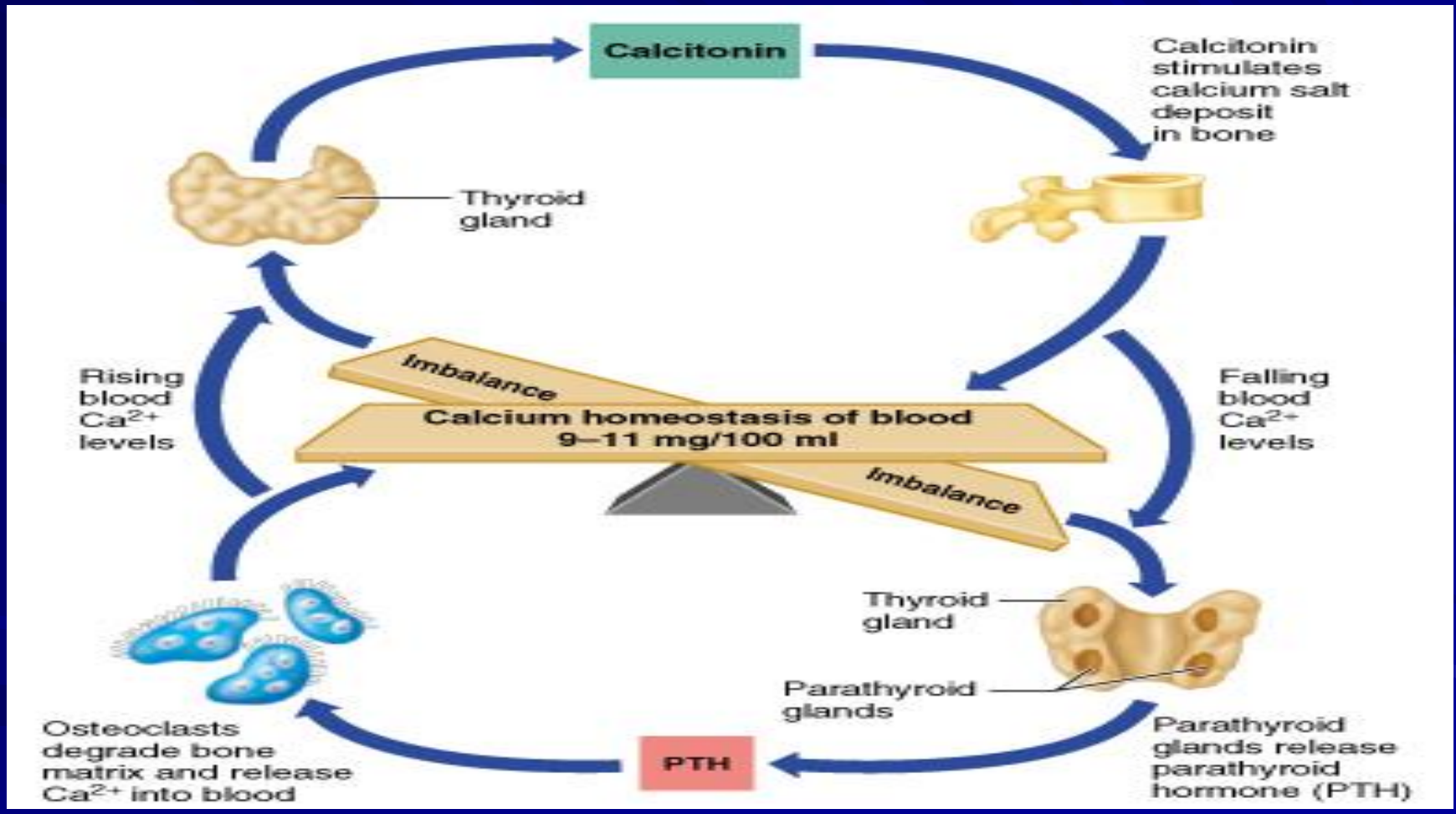


CALCIUM HOMEOSTASIS

FACTORS OF CALCIUM HOMEOSTASIS:

1. HORMONES
2. VITAMIN D—MILK
3. CALCIUM—MILK
4. VITAMIN A—CARROTS
5. PHOSPHORUS—MEAT

HORMONAL CONTROL OF CALCIUM HOMEOSTASIS



CALCIUM HOMEOSTASIS

OTHER FACTORS IN CALCIUM HOMEOSTASIS:

1. VITAMIN D—AIDS IN THE ABSORPTION OF BOTH CALCIUM AND PHOSPHORUS.

2. VITAMIN A—HELPS THE OSTEOBLASTS PRODUCE BONY MATRIX.

CALCIUM HOMEOSTASIS

3. TESTOSTERONE AND ESTROGEN—STIMULATES BONE DEPOSITION OF CALCIUM STARTING AT PUBERTY.

HOMEOSTATIC IMBALANCES OF THE SKELETAL SYSTEM

RICKETS

1. DISEASE OF CHILDREN DUE TO LACK OF VITAMIN D.
2. CALCIUM IS NOT DEPOSITED.
3. BOWING OF THE BONES.

HOMEOSTATIC IMBALANCES OF THE SKELETAL SYSTEM

OSTEOMALCIA

1. RICKETS IN ADULTS
2. DUE TO A LACK OF VITAMIN D
3. CALCIUM IS NOT DEPOSITED IN BONE.
4. MAIN SYMPTOM IS PAIN WHEN WEIGHT IS PUT ON THE AFFECTED BONE.

HOMEOSTATIC IMBALANCES OF THE SKELETAL SYSTEM

OSTEOPOROSIS

1. BONE REABSORPTION IS GREATER THAN BONE DEPOSITION.
2. CAUSES:
   - A. LACK OF ESTROGEN
   - B. LACK OF EXERCISE
   - C. INADEQUATE INTAKE
   - D. LACK OF VITAMIN D

HOMEOSTATIC IMBALANCES OF THE SKELETAL SYSTEM

OSTEOPOROSIS

3. SIGNS AND SYMPTOMS:

   A. SPONGY BONE OF THE SPINE IS MOST VULNERABLE.

   B. OCCURS MOST OFTEN IN POSTMENOPAUSAL WOMEN.

   C. BONES BECOME SO FRAGILE THAT SNEEZING OR STEPPING OFF A CURB CAN CAUSE FRACTURES.

4. TREATMENT

   A. CALCIUM AND VITAMIN D SUPPLEMENTS.

   B. HORMONE REPLACEMENT TREATMENT

   C. INCREAE WEIGHT BEARING EXERCISE.

HOMEOSTATIC IMBALANCES OF THE SKELETAL SYSTEM

(b)

(a)