

Skeleton

Skeleton includes bones and cartilage.

Synonyms : Osteon (greek) , Os (latin)

Bone is connective tissue (1/3), impregnated with calcium salts(2/3). The inorganic calcium salts make it hard and rigid, which can afford resistance to compressive forces of weight – bearing and impact forces of jumping. The organic connective tissue (collagen fibers) makes tough and resilient, which can afford resistance to tensile forces.

It has greater regenerative power than any other tissue of the body, except blood.

It can mould itself according to changes in stress and strain it bears.

It shows disuse atrophy and overuse hypertrophy

Function

1. Bone give shape and support to body and resist all form of stress.
2. They provide surface for the attachment of muscles, tendon, ligaments.
3. They serve as lever for muscular actions
4. The skull, vertebral column and thoracic cage protect brain, spinal cord, and thoracic viscera respectively.
5. Bone marrow manufacture blood cell.
6. Bone store 97% of the body calcium and phosphorus.
7. Bone marrow contains reticulo – endothelial cell which are phagocytic in nature and take part in immune response of body
8. The larger paranasal sinuses affect the timer of of the voice.

Division of skeletal system

Axial Skeleton

Skull – 1. Cranium : 8

2. Face : 14

Hyoid : 1

Auditory ossicles : 3 in each

Vertebral column : 26

Thorax – 1. Sternum : 1

2.ribs : 12 in each side

Appendicular skeleton

Pectoral girdles- 1.clavicle: 2

2.scapula: 2

Upper extremities

1. Humerus: 2

2. ulna : 2

3. radius: 2

4. carpals: 16

5. metacarpals: 10

6. Phalanges:28

Pelvic girdle- hip bone 2

Lower extremities

Classification according to shape

1. **Long bones** – Each long bone has an elongated shaft and two expanded ends which are smooth and articular.

Example – Typical long bone

miniature long bone - metacarpal

modified long bone – clavicle, vertebra

2. **Short bones** – shapes is usually cuboid, scaphoid, trapezoid eg. Carpal and tarsal bones
3. **Flat bones** – resembles shallow plates and form boundaries of certain cavities. Eg. Ribs, sternum scapula
4. **Irregular bone** – eg. Hip bone and bone in base of skull
5. **Pneumatic bone**- certain irregular bones contain large air spaces lined by epithelium. Eg. Maxilla , ethmoid , sphenoid.
6. **Sesamoid bone** – these are bony nodules found embedded in in tendons and joint capsules. eg patella, pisiform etc.

Developmental classification –

1. Membrane bones formed through mesenchymal ossification or intra-membranous ossification eg. Bone of vault of skull and facial bones
2. Cartilaginous bones ossify through intra- cartilaginous or endochondral ossification eg. Bones of limbs, vertebral column and thoracic cage.
3. Membrano – cartilaginous bones ossify partly in membrane and partly in cartilage. Eg clavicle, mandible , occipital etc

Structural Classification Macroscopically

1. **Compact bone or cortical bone** – its is dense in texture like ivory and has a sturdy calcified matrix with very few spaces . This layer not only forms protective shell around spongy bone tissue but also gives our bone rigidity , strength and resistance. Contributes 80% of human body weight. This is adaptation to bending and twisting forces.
2. **Cancellous bone or trabecular bone** – it is open in texture and is made up of meshwork of trabeculae between which marrow containing spaces. Cancellous bone is an adaptation to compressive forces. Eg end of long bone, pelvic bones , ribs skull

Microscopically

1. **Lamellar bone** – Most mature human bone, whether compact or cancellous are composed of thin plates of bony tissue called lamellae. These are arranged in piles in a cancellous bone, but in concentric cylinders in compact bone.
2. **Fibrous bone** – found in young foetal bones but are common in reptiles and amphibia

Cement - teeth

Parts of a young bone

A typical bone ossifies in three part , two ends fro secondary centers and intervening shaft from a primary center. Before ossification is complete the following parts of the bone can be defined.

Epiphysis : the end of bone which ossify from secondary center are called epiphyses.

a. pressure epiphysis – it is articular and takes part in transmission of weight

b. traction epiphysis – Is non- articular and does not take part in transmission of weight but provides attachment to tendons. Eg. Trochanter of femur and tubercles of humerus

- c. Atavistic epiphysis – Phylogenetically an independent bone which become fused to another bone. Eg. Coracoid process of scapula and Os Trigonum
- d. Aberrant Epiphysis – not always present

Diaphysis – it is elongated shaft of long bone which ossifies from primary center

Metaphysis – the epiphysial end of diaphysis are called metaphysis. Each metaphysis is the zone of active growth. After the epiphysial fusion, vascular communication are established between metaphysial and epiphysial arteries in child. In adult metaphysis contains no more end arteries.

Epiphysial plate of cartilage – it separates epiphysis from metaphysis. Proliferation of cell in this cartilagious plate is responsible for length wise growth of long bone.

Books :

B D Chaurasia's General Anatomy

Gray's Anatomy