Functions of the Bones

- Support
- Protection
- Movement
- Storage
- Blood cell formation

Classification of Bones by Type

1. Compact
   - dense
   - looks smooth and homogeneous
2. Spongy
   - small needlelike pieces of bone
   - lots of open space
Classification of Bones by Shape

1. Long bone
   - humerus of arm
2. Short bones
   - carpals of wrist
3. Flat bone
   - parietal bone of skull
4. Irregular bone
   - vertebra

Long Bone Anatomy

Compact Bone

- Haversian system (osteon)
- Haversian canal
- Lamellae
- Lacunae
- Osteocyte
- Canaliculi
Bone Formation, Growth, and Remodeling

Ossification - process of bone formation

Three types of bone cells

1. **Osteocytes** – mature bone cells
2. **Osteoblasts** - bone-forming cells
3. **Osteoclasts** - bone-destroying cells
Divisions of Adult Skeleton

Two divisions
1. Axial
2. Appendicular

Axial Skeleton
- Skull
- Vertebrae
- Ribs
- Sternum

The Skull
Two sets of bones
1. Cranium
2. Facial bones

Sutures – interlocking immovable joints
Cranial Bones

8 large flat bones
1 – frontal bone
2 – parietal bones
1 – occipital bone
2 – temporal bones
1 – sphenoid bone
1 – ethmoid bone
This X-ray picture shows a 5-centimeter nail stuck in an unidentified patient's skull Thursday, Dec. 2, 2004. According to the hospital, doctors found the nail after the man came to the hospital, complaining about a severe headache. They speculate that the nail stuck in the man's head four years ago in an accident but the man didn't know about it. The nail was removed in a surgery last Saturday. (AP Photo/Yonhap).

Facial Bones

14 Bones

- 2 maxillae bones
- 2 palatine bones
- 2 zygomatic bones
- 2 lacrimal bones
- 2 nasal bones
- 1 vomer
- 1 mandible
- 2 inferior nasal conchae

Facial Bones—Internal View

- Frontal bone
- Temporal bone
- Nasal bone
- Zygomatic bone
- Maxilla
- Mandible
The Infant Skull

- **Fontanels**
  1. Anterior (frontal)
  2. Sphenoid (anterolateral)
  3. Posterior (occipital)
  4. Mastoid (posterolateral)

- **Functions**

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Infant vs Adult

- **face : cranium**
- **skull : body length**
- **newborn skeleton**

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Regions of Vertebral Column

- 7 cervical vertebrae in neck region form cervical curvature.
- 12 thoracic vertebrae form thoracic curvature. Ribs attach here.
- 5 lumbar vertebrae in small of back form lumbar curvature.
- Sacrum: 5 fused vertebrae in adult form pelvic curvature.
Vertebral Column

Characteristics
- 26 irregular bones (originally 33)
- Surrounds and protects spinal cord
- top
- NOT rigid
- curves

Vertebrae
- Cervical (7)
  - Atlas
  - Axis
- Thoracic (12)
- Lumbar (5)
- Sacral (5 fused)
- Coccygeal (4 vestigial)
  - Coccyx

Thoracic Vertebra

- Body
- Superior articular process
- Vertebrae foramen
- Spinous process
- Facets for a rib
- Transverse process
Intervertebral discs

- **Function:**
  - cushion/shock absorber

- **Composition:**
  - fibrocartilage

Ribs

- “True” ribs (7 pairs)
- Costal cartilage
- “False” ribs (5 pairs)
- “Floating” ribs (2 pairs)
- Sternum (breastbone)
Rib Functions

1. Protection
2. Support

Appendicular Skeleton

- Shoulders
- Arms
- Hips
- Legs

Bones of the Upper Skeleton
Shoulder Girdle

Clavicle (collarbone)
- articulations
- function
- separation

Scapula (shoulder blade)
- genoid fossa
- dislocation

Lower Arm and Hand

head of radius
radius
ulna
carpals
metacarpals
phalanges
Eric Chavez

- Oakland Athletics' Eric Chavez reacts after being hit on the back of his right hand on a pitch by Chicago White Sox's Damaso Marte, Tuesday, June 1, 2004 in Oakland, California.
- Chavez is expected to be sidelined for six weeks with a broken fifth metacarpal in his right hand.

Kevin Brown

- September, 2004
- Punches clubhouse wall
- Pin in fifth metacarpal

Julian Tavares

- October, 2004
- Punches clubhouse wall with phone
- Fractured bone in ring finger and fifth metacarpal

Shoulder and Arm

- Clavicle - collarbone
- Scapula - shoulder blade
- Humerus - upper arm
- Radius - lateral lower arm (thumb side)
- Ulna - medial lower arm
- Carpals - wrist bones (8)
- Metacarpals - palm bones (knuckles)
- Phalanges - finger bones (14)
Bones of the Lower Skeleton

Pelvis

- Public symphysis
- Public arch
- Sacrum

Male vs Female Pelvis

- Male
  - Narrow, funnel-shaped
  - Coccyx curves forward
- Female
  - Wide, shallow, and basin-shaped
  - Coccyx more vertical
Hip and Leg

- Pelvis - hip bone
- Femur - upper leg
- Patella - kneecap
- Tibia - medial lower leg
- Fibula - lateral lower leg
- Tarsals - ankle bones (7)
- Metatarsals - bones of sole (5)
- Phalanges - toe bones (14)
Joints

Functions:
1. Hold bones together
2. Give skeleton mobility

Two classifications of joints:
1. functional
2. structural

Classification of Joints by Function

Three types:
1. Immovable (synarthroses)
2. Slightly movable (amphiarthroses)
3. Freely movable (diarthroses)

Classification of Joints by Structure

Three types:
1. Fibrous joints
   - sutures of skull
2. Cartilaginous joints
   - intervertebral joints
3. Synovial joints
   - elbows and knees
Types of Synovial Joints

- ball & socket
  - hip
- hinge
  - elbow
- pivot
  - atlas and axis
- gliding
  - foot

Inflammatory Disorders of Joints

- Arthritis
  - Osteoarthritis
  - degenerative
- Gouty arthritis
  - uric acid
- Rheumatoid arthritis
  - autoimmune
Osteoporosis

Normal Bone  Osteoporotic Bone

The End