SKELETAL SYSTEM

Functions

- Protection
- Support
- Movement
- Mineral reservoir
- Hematopoeisis – blood cell formation

Chemical Makeup

- Matrix of Osteocytes
- 65% hydroxyapatite – calcium phosphate salts
- 35% collagen fibers and water
  - More collagen when younger – jump off things,etc
- Bone is strong as steel when compressed
- Bone is half as strong when shearing or bending forces are applied
- Bone is storehouse for 99% of calcium
- 80% of phosphorous and 65% sodium and magnesium

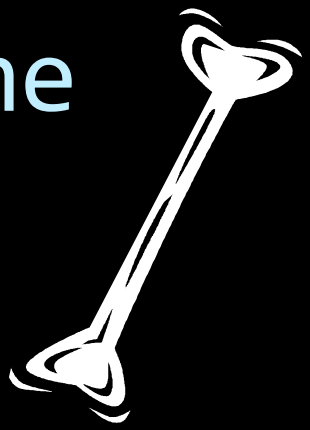
Contents

- 206 bones total
- Axial
  - 80 bones
  - skull, rib cage, vertebrae,
  - Sternum, hyoid
- Appendicular
  - 126
  - Arms and legs

4 types of bones

- Long
  - Bones of the leg – femur, tibia, fibula
  - Bones of the arm – humerus, radius, ulna
- Short
  - Ankle and wrist
  - Sesamoid -bones wrapped in tendons
- Irregular
  - Pelvis
  - Vertebrae
- Flat
  - Skull bones, sternum, ribs, scapula, clavicle

Structure of long bone



- Epiphysis
  - Ends of bone
  - Contain epyphyseal discs or growth plates
- Diaphysis
  - Shaft of the bone
- Periosteum
  - Connective tissue membrane covering the outside of the bone
- Endosteum
  - Lines the inside of the medullary cavity

2 types of bone

spongy

- Less dense
- Found in the ends of long bones
- Red marrow usually found here
  - Produces blood cells

compact

- Dense/hard
- Found in the shaft of the long bones
- Haversion Canals = tubelike system that serve as openings for blood vessels and nerves
- Yellow marrow
  - Fatty marrow

Bone Cells

- Osteoblasts
  - Make new bone cells
- Osteocytes
  - Mature bone cells
- Osteoclasts
  - Take away bone cells – mineral resorbtion

Skeletal Cartilages

- Elastic
- Fibrous
- Hyaline
  - Most common
  - Forms the end of the ribs
  - Tips of the nose
  - Over the ends of long bones

Bone Formation

- Osteogenesis
  - Bone formation occurs at 8 weeks
  - Intramembranous ossification
    - Forms the flat bones of the skull and clavicle
  - Endochondral ossification
    - Forms all other bones
- Ossification
  - Bone secretion and hardening

Bone Growth

- Influenced by hormones
- Thryoid Hormone and Growth Hormone
- Longitudinal Growth
  - Lengthwise growth
  - Occurs during formative years
  - Growth hormone
- Appositional Growth
  - Growth in thickness
  - Caused by stress and use of the bone

Bone Markings

- Projections
  - Head
  - Process
  - Tuberosity
  - Spine
  - crest
- Depressions
  - Foramen
  - Sinus
  - fossa

Skull Bones

- Frontal
- Parietal
- Occipital
  - Foramen magnum
- Temporal
  - Mastoid process
- Sphenoid
  - Sella turcica
- Ethmoid

Skull bones

- Maxilla
- Mandible
- Vomer
- Zygomatic
- Nasal
- Palatine
- Inferior nasal concha
- lacrimal

Aging and Skeletal Changes

- Loss of calcium and protein – weaker bones
- Loss of collagen in bones, tendons, and ligaments = increased stiffness
- Muscle atrophy
- Intervertebral discs lose water = back pain and shrinking height
- Costal Cartilage becomes calcified = harder to breathe, easier to fatigue, and decreased chest diameter

Bone Repair

Fractures

- Closed fracture – within bone = worst kind
- Open fracture – bone sticking out

Reduction

- Closed reduction – yank the bone back in place
- Open reduction – surgery

Classification of Fractures

- Completeness of break
- Whether the bone penetrates skin
  - Open - compound
  - Closed- simple
- Orientation of the break
  - Lineated, transverse, or comminuted (broke into many pieces)
- Position of bone ends
  - Non – displaced – bone ends retain their position
  - Displaced – ends are out of normal alignment

Fracture examples:

- Compound
- Comminuted
- Compression
- Spiral
- Greenstick
- depressed

Homeostatic Imbalances

- Osteomalacia
  - Occurs in adults when the bone is inadequately mineralized
- Rickets
  - Occurs in children when not enough calcium or vitamin D
- Osteoporosis
  - Rate of bone resorption exceeds rate of bone formation

Osteoporosis risk factors

- Petite body frame
- Insufficient exercise
- Diet poor in calcium and vitamin D
- Abnormal vitamin D receptors
- Smoking
- Loss of estrogen production – usually for women who hit menopause

Types of diarthoses joints

- Know these from the chart in book

Joint Diseases

- Arthritis – wear of the joint surface
- Osteoarthritis
  - Old age
  - Morning stiffness, bone spurs, snap, crackle, pop
- Gouty arthritis
  - Build up of uric acid which causes crystals to form in the joints and cause erosion (BIG TOE)
- Rheumatoid arthritis
  - Autoimmune disease – attacks synovial membrane - pannus