NOTES: Skeletal System & Bones Part 1

Overview of Skeletal System:

Skeletal System

- Bones
- Joints
- Cartilage
- Tendons (bone to muscle)
- Ligaments (bone to bone)

Function of the Skeletal System

- Support
- Protection
- Movement
- Red blood cell production
- Storage of minerals and fats

Types of Bone Tissue

- Compact bone: Hard outer layer of bone
- Spongy bone: Less dense, small needle-like pieces of bone
  - Many Haversian systems
- Marrow: Soft tissue inside bone that produces blood cells

Classification of Bone

- Bones are classified according to shape

1. Long Bones
   - Typically ____________
   - Have a shaft with heads at both ends
   - Contain mostly ____________
   - Examples: Femur, humerus

2. Short bones
   - Generally ____________
   - Contain mostly ____________
   - Examples: Carpals, tarsals

3. Flat bones
   - Usually curved
   - Thin layers of compact bone around a layer of spongy bone
   - Examples: Skull, ribs, sternum

4. Irregular bones
   - Do not fit into other bone classification categories
   - Example: Vertebrae and hip
**Gross Anatomy of Long Bone**
- **Diaphysis - Shaft**
  - Composed of ___________________
  - Location of ___________________ (fat)
- **Epiphysis - Ends of the bone**
  - Composed mostly of ____________
  - Location of _________________ (blood formation)
- **Periosteum**
  - ________________ of the diaphysis
  - Fibrous connective tissue membrane
- **Arteries**
  - _______ bone cells with ______________
- **Articular cartilage**
  - Covers the external surface of the epiphyses
  - Made of hyaline cartilage
  - ___________________ at joint surfaces
- **Medullary cavity**
  - Cavity of the shaft
  - Contains ________________ (mostly ______) in adults
  - Contains ________________ (for blood cell formation) in infants

**Microscopic Anatomy of the Bone**
- ________________ (Haversian System)
  - A unit of bone
- ________________ (Haversian) __________
  - Opening in the center of an osteon
  - _____________________________
  - Cavities containing bone cells (osteocytes)
  - Arranged in concentric rings
- **Lamellae**
  - Rings around the central canal
  - Sites of lacunae

**Canaliculi**
- ________________
  - Radiate from the central canal to lacunae
  - Form a __________________________

**Ossification: Bone Growth**
- _________ allow for growth of long bone during childhood
  - New cartilage is continuously formed
  - Older cartilage becomes ossified (changed to bone)
    - Cartilage is broken down
    - ________________
  - Bones are remodeled and lengthened until growth stops
    - Bones change shape somewhat
• Bones grow in width

**Types of Bone Cells**

- Mature bone cells
- Bone-_________ cells for __________________
- Bone-_________ cells
- Break down bone matrix for remodeling and release of calcium
- Bone remodeling is a process done by both osteoblasts and osteoclasts

**Bone Fractures**

- Types of bone fractures
  - ________ (simple) fracture – break that does not penetrate the skin
  - ________ (compound) fracture – broken bone penetrates through the skin
- Bone fractures are treated by reduction and immobilization
  - Realignment of the bone

**Common Types of Fractures**

<table>
<thead>
<tr>
<th>Fracture Type</th>
<th>Illustration</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comminuted</td>
<td><img src="image1" alt="Comminuted Fracture" /></td>
<td>Bone breaks into many fragments.</td>
<td>Particularly common in the aged, whose bones are more brittle.</td>
</tr>
<tr>
<td>Compression</td>
<td><img src="image2" alt="Compression Fracture" /></td>
<td>Bone is crushed. (i.e., osteoporotic bones).</td>
<td>Common in porous bones</td>
</tr>
<tr>
<td>Depressed</td>
<td><img src="image3" alt="Depressed Fracture" /></td>
<td>Broken bone portion is pressed inward.</td>
<td>Typical of skull fracture.</td>
</tr>
<tr>
<td>Impacted</td>
<td><img src="image4" alt="Impacted Fracture" /></td>
<td>Broken bone ends are forced into each other.</td>
<td>Commonly occurs when one attempts to break a fall with outstretched arms</td>
</tr>
<tr>
<td>Spiral</td>
<td><img src="image5" alt="Spiral Fracture" /></td>
<td>Ragged break occurs when excessive twisting forces are applied to a bone.</td>
<td>Common sports fracture.</td>
</tr>
<tr>
<td>Greenstick</td>
<td><img src="image6" alt="Greenstick Fracture" /></td>
<td>Bone breaks incompletely, much in the way a green adults.</td>
<td>Common in children, whose bones are more flexible than those of adults</td>
</tr>
</tbody>
</table>

**Repair of Bone Fractures**

- ___________ (blood-filled swelling) is formed
- Break is ___________ (immobilized) by __________________ to form a callus
- Fibrocartilage callus is replaced by a __________________
- Bony callus is ___________ to form a permanent patch

**Learning Goals:**
1. Describe the functions of the skeletal system.
2. Differentiate between the 4 types of bones. Give an example of each.
3. Explain how ossification works
4. Compare the 3 types of bone cells.
5. Summarize how bone fractures are repaired.