Anatomy of The Long Bone

Bones consists of non-living materials as well as living cells:

**A) Non-Living Materials**

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
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</thead>
<tbody>
<tr>
<td>Calcium carbonate (CaCO$_3$)</td>
<td>adds stiffness &amp; resists compression</td>
</tr>
<tr>
<td>Calcium phosphate (Ca$_3$PO$_4$)</td>
<td>adds stiffness &amp; resists compression</td>
</tr>
<tr>
<td>Collagen</td>
<td>adds flexibility &amp; resists tension</td>
</tr>
</tbody>
</table>

**B) 3 Types of Living Cells**

1. **Osteoblasts:**
   a. Bone forming/reconstructing cells
   b. Deposits osteoid (un-calcified bone matrix) into the bone matrix to build up cortical bone

2. **Osteocytes:**
   a. Mature bone cells

3. **Osteoclasts:**
   a. Cells that break down and reabsorb bone
   b. Secrete acids and enzymes to dissolve calcium and organic matrix of the bone.

**Homeostasis of Bone Cell Activity:**

- The activity of osteoblasts and osteoclasts are interconnected (i.e. the activity of one is influenced by the other)
- These cells must be in a state of **HOMEOSTASIS** in order to maintain proper bone formation and remodeling!!!
Anatomy of the Long Bone:

**Periosteum**
- A fibrous, cellular, vascular and highly sensitive life support sheath covering the length of the bone (not ends).
- Allows for ligaments and tendons to attach to the bone.

**Diaphysis**
- The shaft or central part of a long bone.

**Medullary Cavity**
- The cavity of the diaphysis that contains red and yellow marrow.

**Epiphysis**
- The ends of the long bone.
- Outer surface made up of cancellous bone.
- Articulates (i.e. makes contact) with adjacent bones.

**Articular Cartilage**
- Covers the end (Epiphysis) of the long bone.
- Smooth, slippery, porous, malleable, insensitive, and bloodless surface that makes contact with adjacent bones.

**Nutrient Artery**
- The principal artery and major supplier of oxygen and nutrients to the shaft of a bone.

2 Types of Bone

1. **Cancellous (Spongy) Bone**
   - Consists of interwoven beams (trabeculae) of bone
   - The spaces are filled with marrow.

2. **Compact (Cortical) Bone**
   - Dense bone that forms in the walls of the diaphysis.
   - Provides structural integrity

2 Types of Bone Marrow

1. **Red Marrow**
   - A gelatinous substance where blood cell formation occurs (red and white).

2. **Yellow Marrow**
   - Fatty connective tissue that no longer produces blood cells (with age red marrow becomes yellow).