Connective Tissue:

- Most abundant tissue type in the body
- Supports epithelial tissues connects it to other tissues
- Provides coverings that support & protect
- Containing more extracellular matrix than cells
- Extracellular matrix: consists of fibers and ground substance
  - 3 types of fibers: collagen fibers, elastin fibers, reticular fibers (produced by fibroblasts)
  - Ground substance: fluid, semifluid, gelatinous, or hard
Different Types of Mature CT:

**Loose CT:** extracellular fluid made by fibroblasts

**Dense CT:** extracellular fluid made by fibroblasts

**Cartilage:** extracellular fluid made by chondroblasts and maintained by chondrocytes

**Bone:** extracellular matrix made by osteoblasts and maintained by osteocytes

**Blood:** Plasma is the matrix where blood cells and platelets are, but it's not made by these cells
Connective Tissue Fibers:

- **Collagen (White):**
  - Strong collagenous fibers made of protein, collagen that adds strength for holding body parts together.

- **Elastic (Yellow) Fibers:**
  - Elastic fibers made of the protein elastin, are stretchy and add flexibility to certain types of connective tissue.

- **Reticular fibers:** thin collagenous fibers that form supportive networks in a variety of tissues.
Areolar (or Loose)

- **Identification:** Loose arrangement of thin (elastic and reticular) and thick (collagen) fibers that *criss-cross*
- **Where Located:** surrounding most organs, underneath epi
- **Functions:** wraps, cushions, holds defensive cells, holds fluids
  1. collagen fibers
  2. elastic fibers
  3. Fibroblasts (cells that produce fibers)
Adipose Tissue (loose)

• **Identification:** Little extracellular matrix
  – *greatly enlarged cells, nearly the entire volume of which is a fat vacuole* (adipocytes). *Few nuclei*

• **Where Located:** underneath skin, surrounds organs.

• **Functions:** energy storage, cushioning, insulation
Dense Regular

- **Identification:** Densely packed parallel fibers
- **Where Located:** ligaments and tendons
- **Function:** attaches bone to bone or muscle; resists tensile (pulling) forces in single direction
Dense Irregular

- **Identification:** The collagen fibers are in distinct bundles, separated by space
- **Where Located:** dermis of skin
- **Functions:** provides strength; can withstand pulling in many directions
Reticular Connective Tissue

- **Identification:** Dark-staining reticular fibers, *numerous nuclei brownish color* is also distinctive.
- **Where Located:** spleen (also bone marrow, lymph nodes).
- **Function:** forms scaffolding to support loose cells
Cartilage

- Connective tissue consisting of a **dense matrix of collagen fibers and elastic fibers** embedded in a rubbery ground substance.
- The matrix is produced by cells called **chondroblasts**, which become embedded in the matrix as **chondrocytes** (mature cell)
- Condrocytes found in spaces in matrix called **lacunae**
- No nerves or blood vessels
Hyaline Cartilage

- **Identification**: Lacunae often are paired. Matrix lacks fibrous appearance, instead an overall glassy appearance.

- **Where Located**: Ends of long bones, nose, trachea

- **Functions**: Structural support; cushions joints.
Elastic Cartilage

- **Identification:** Large lacunae, matrix contains extensive dark elastic fibers
- **Where Located:** ear lobe, epiglottis
- **Function:** flexibility, bendability.
Fibrocartilage

- **Identification:** Distinct, nearly parallel fibers, Usually *blue* in color.

- **Where Located:** intervertebral disks, pubic symphysis, menisci of knee joint.

- **Function:** resists compressive forces.
Compact Bone

- **Identification:** *Concentric rings* (like tree rings)
- **Where Located:** bones
- **Functions:** support, protection, act as levers, mineral storage.
Lacuna and Canaliculi (Lacuna resembles a centipede and the Canaliculi are its legs)
Spongy bone

- **Identification:**
  Spicule (bone) between areas of bone marrow (osteocytes in lacunae)

- **Where located:**
  Ends of long bones

- **Function:** support but very lightweight

\[ t = \text{trabeculae} \]
\[ m = \text{marrow} \]
Blood

• Function: Transports nutrients & chemical messengers to all body tissues and transports waste from tissues to excretory organs

• Composed of RBC, WBC, platelets, plasma

• Plasma is the extracellular matrix and its fibers are produced and observed only during blood clotting
Red Blood Cells (erythrocytes)

- Carry oxygen to all tissues
- Lack a nucleus
- Formed in red bone marrow
White Blood Cells (leukocytes)

- Fight infection
- Six different types
- Made in red bone marrow
- Much larger than RBC’s
Platelets (thrombocytes)

- Function in blood clotting
- Not complete cells, they are fragments of cells found in bone marrow