

# Lettergram.Net - Tissue Classification

## What is our main objective?

- Learning to distinguish our body's tissues and be able to properly identify them and accurately interpret their different functions.

## What is a Tissue?

- The study of tissues is called **histology** (I always like to think of flipping through a *history* text—the book being our body and all of the pages are its tissues—but that's just me!)
- A **tissue** is a cell grouping that is similar in structure and function.
- **Four primary types of tissue:**
  1. *Epithelium*
  2. *Connective*
  3. *Nervous*
  4. *Muscle*

***Not to worry, all have very distinct features!***

***I am hoping to create a guide that will identify each epithelial tissue individually—complete with a description of its appearance, its unique function, and its specific location in the body.***

## Epithelial Tissue

- Job is to cover surfaces:
  - **Epidermis (skin)**
  - **Cavity linings** and tubules
- Distinguishes our “insides” from our outsides.
- Glands are generally classed as a type of epithelia due to their development.

## Functions

- **Protection:** skin protects body from bacterial invasion and chemical damages.
- **Absorption:** especially along the stomach and small intestine.
- **Filtration:** urine filtration and diffusion in our kidney tubules.
- **Excretion:** sweating is an example.
- **Secretion:** hormones secreted by glands throughout our body.
- **Sensory reception:** through our skin barrier.

## Characteristics

- **Polarity**
  - *Apical Surface:* the free surface layer on top of the membrane.
  - *Basal Surface:* exactly how it sounds, it is the *base* of the membrane.
- **Cellularity**
  - Cells fit closer together to form membranes bound by special junctions.
- **Support**
  - Connective tissue cells help by assisting epithelial cells create a sticky **basement membrane**, allowing the cells to attach and be supported!
- **Avascularity**
  - **NO BLOOD SUPPLY OF THEIR OWN.** Think of epithelium as that needy younger brother and always depends on connective tissue for nutrients for *nutrient diffusion*. On the other hand, **glandular epithelia** is self-sufficient and is very much **vascular** (the older, more responsible brother!).
- **Regeneration**
  - When well nourished, epithelium can easily regenerate itself (this is important due to abrasion, or friction).

## Classifications

- **Arrangement (or number of layers)**
  - *Simple Epithelia*: one layer of cells, which is attached to the basement membrane.
  - *Stratified Epithelia*: two or more layers of cells.
- **Shape**
  - *Squamous*: flat and scale-like (think of what a fried egg looks like)
  - *Cuboidal*: simple, it has a cube shape
  - *Columnar*: column shaped, more rectangular-looking
- There are two other types of epithelia that can be categorized in their own category:
  - *Pseudostratified Epithelium*: this tissue is actually a **simple columnar epithelium**. However, because the cells all differentiate in height and the nuclei placements vary, it gives off an illusion of being stratified (**do not be fooled!**). More often than not, it is ciliated (think *pseudo = cilia*).
  - *Transitional Epithelium*: this is an unusual **stratified squamous epithelium**, this unique tissue allows the cells to slide over one another and thus has the remarkable ability to allow the organ to stretch (most commonly referred to organ is the bladder).

## Connective Tissue

- **The most abundant and widely distributed type of tissue in the body!**
- **Found in all parts of the body** as either discrete **structures** OR **body organs**.
- **Contains an extracellular matrix**, which distinguishes it apart from any other tissue.
  - The matrix takes credit for the strength associated with connective tissue.

## Functions

- **Protection:** *osseous tissue* (or bone tissue) serves to protect other body organs.
- **Support:** *osseous tissue* also supports various other tissues and organs.
- **Binding together body tissues:** our ligaments and tendons (made of *dense connective tissue*) binds bones to either skeletal muscle or other bones.

## Characteristics

- **Rich supply of blood vessels**
  - However, cartilages, tendons, and ligaments are an exception to this particular characteristic, as they receive poor vascularity.
- **Multicellular Composure**
  - There are many different types of cells that make up connective tissue.
- **Extracellular Matrix**
  - An abundance of nonliving, non-cellular matter resides between cells of connective tissue. I like to think of it as the yolk in an egg, personally. It's the extra safety jelly inside.

## Classification

- **Four main types of (adult) connective tissue:**
  - *Connective Tissue Proper*
  - *Cartilage*
  - *Blood*
  - *Bone*
- Interestingly enough, all of these tissues are derivatives of **mesenchyme**, which is just a nice fancy name for the tissue of an embryo.

## Nervous Tissue

- Composed of two major cell populations
  - **Neurons:** receive stimuli and send impulses to all parts of the body
  - **Neuroglia:** cells that protect, support and insulate neurons

## Neuronal Structure

- **Cell body**
- **Nucleus**
- **Cell Process (containing cytoplasm)**

## Muscle Tissue

- Specialized to contract and create body movement

## Functions (as stated above)

- **Contraction**
- **Body movement**

## Characteristics

- **Nuclei:** specifically either uninucleate or multinucleate.
- **Striations:** (or stripes) can be visibly seen through a microscope in cardiac and skeletal muscle; however, *smooth muscle contains no striations*. This is an easy tactic to use when it comes down to distinguishing one muscle tissue from another.

## Classifications

- *Skeletal*
- *Cardiac*
- *Smooth*