

# Tissue

## Definition

**Tissue:** a functional 3-D organization of aggregations of morphologically and functionally similar cells, together with their products and derivatives.

In turn, different types of tissues come together to form organs and organ systems. The **parenchyma** is the functional tissue of an organ, while the **stroma** is the tissue that surrounds and supports the organ.

## Basic Types

### Epithelial

- Continuous, avascular aggregations of polyhedral cells
- Minimal ECM and intercellular space
- Line surface or body cavities
- Derived from all three germ layers

### Muscle

- Elongated contractile cells
- Moderate ECM
- Strong contractions
- Mostly derived from mesoderm (but mm. sphincter and dilator pupillae from ectoderm)

### Nerve

- Elongated cells with fine processes
- Minimal ECM
- Receive and transmit nerve impulses
- Mostly derived from ectoderm, but microglia from mesoderm

### Connective

- Fixed and wandering cells
- Abundant ECM
- Structural support and protection of organs
- Derived from mesenchyme
- Vascularization depends on type

## Histogenesis

Though all cells start from the zygote, they differentiate into over 200 different types. Histogenesis happens via

1. **Proliferation:** cells increase in number
2. **Differentiation:** stem cells acquire new properties and functions (gene activation/inactivation)
3. **Migration:** differentiated cells colonize other parts of the organism
4. **Apoptosis:** programmed cell death used to shape structures
5. **Tissue patterning:** cells receive regulator signals influencing their organization to determine final localization, orientation and morphology. Environment defines stem cell niche.

## References

Mescher, A. and Junqueira, L., 2018. *Junqueira's basic histology*. New York: McGraw-Hill, pp. 71.