The human body plan

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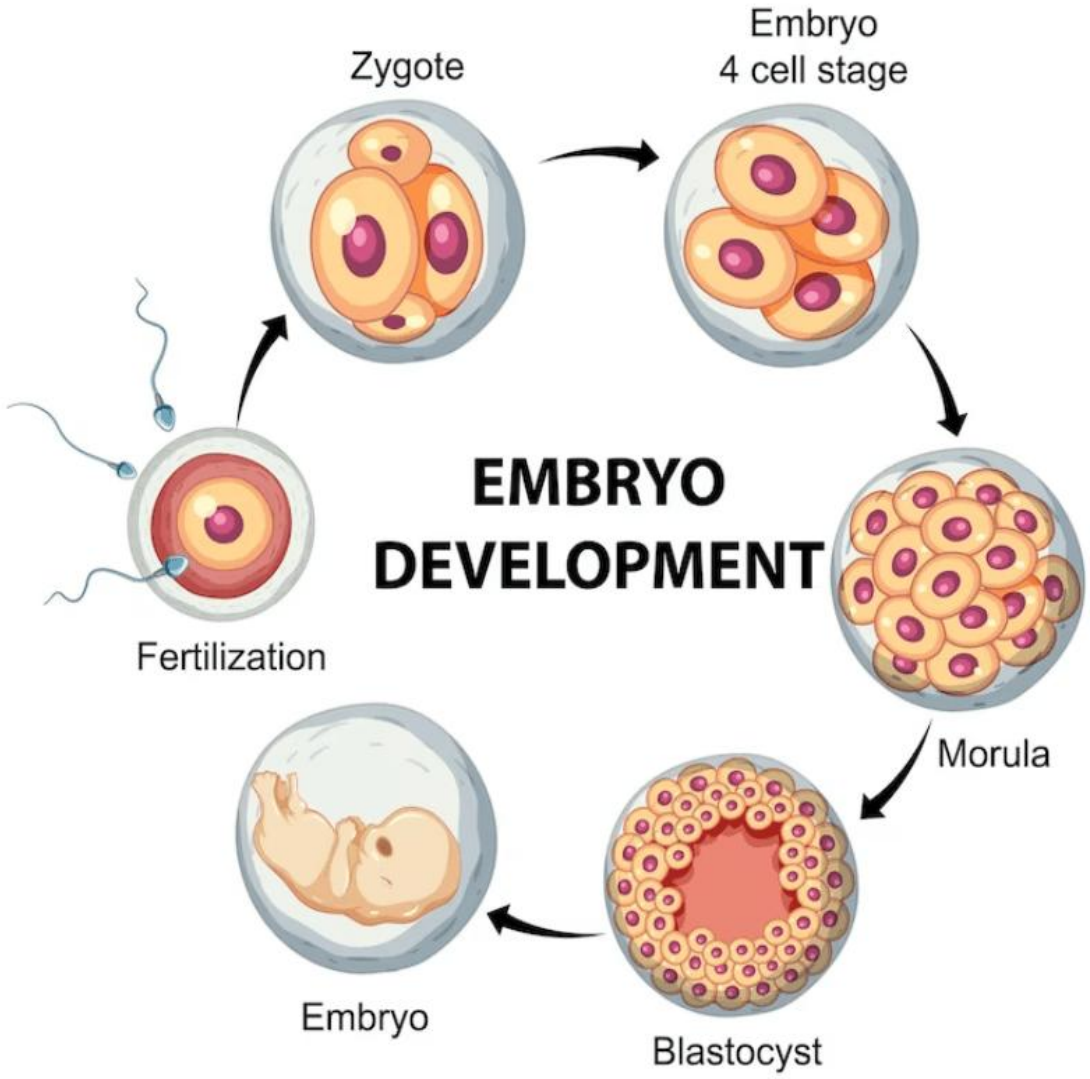
Objectives of the lesson:

- To describe four types of tissues that make up the human body.
- To explain how tissues, organs, and organ systems are organized.
- To summarize the functions of the primary organ systems in the human body.
- To identify the five human body cavities and the organs that each contains.

Embryogenesis

At six weeks old, the developing human embryo (right) weighs less than 1g. By **eight weeks**, all of the major organ systems will be recognizable.

From embryo -> differentiation of cells -> different type of cells -> different type of tissues -> different organs!!



What is a tissue?

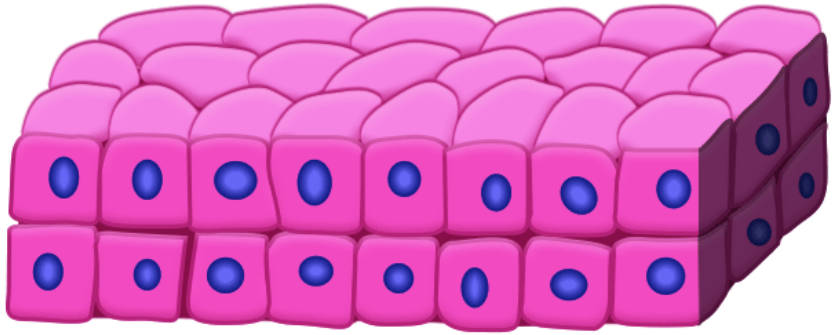
Tissues are collection of cells:

- that are similar in structure and,
- that work together to perform a particular function.

What kind of function?

- Secretion
- Protection
- Transportation
- Sense
- Signaling
- ……

A group of cells that work together to perform a function



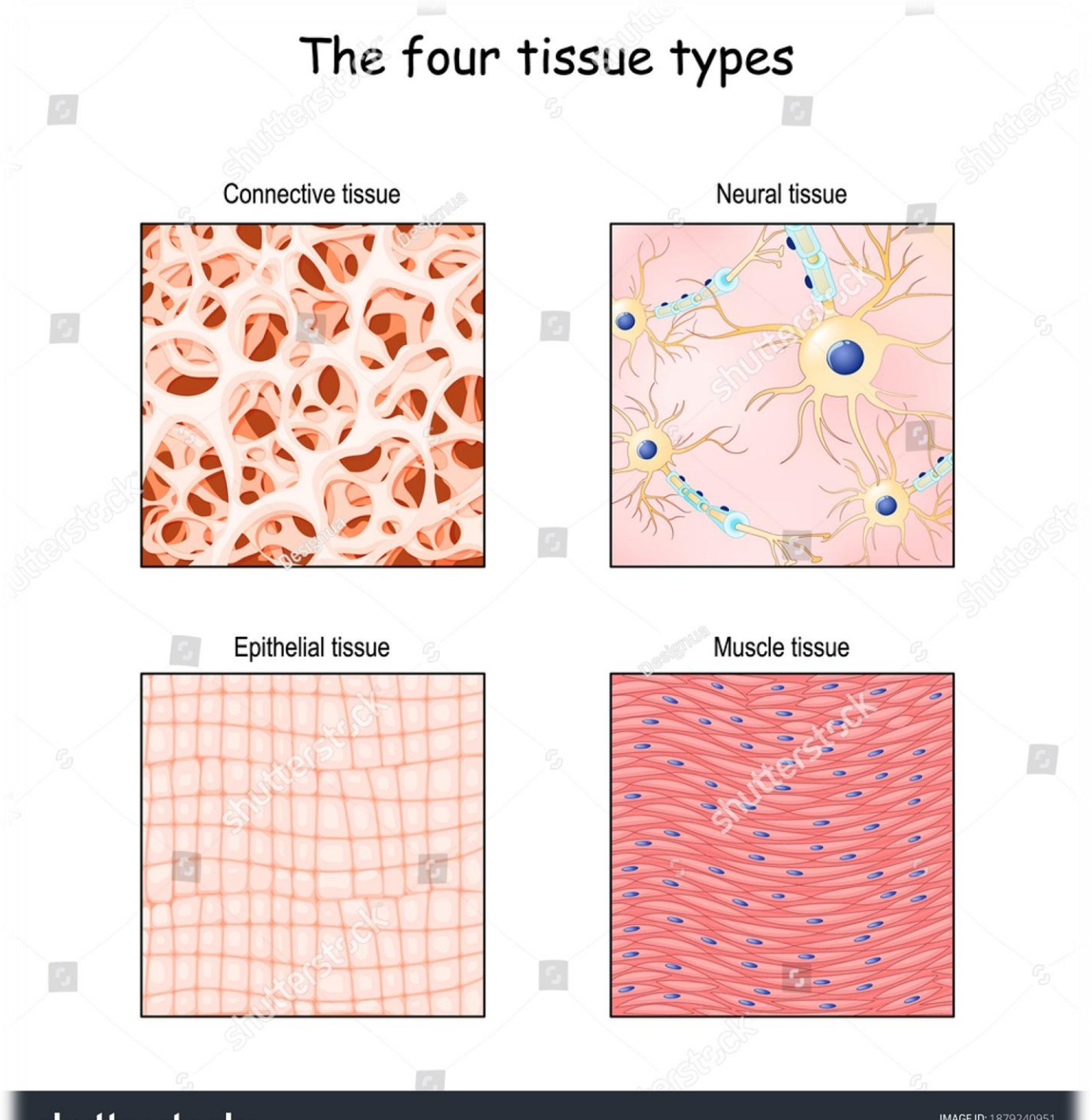
tissue

GamaSmartz

Body tissues

There are four main body tissues:

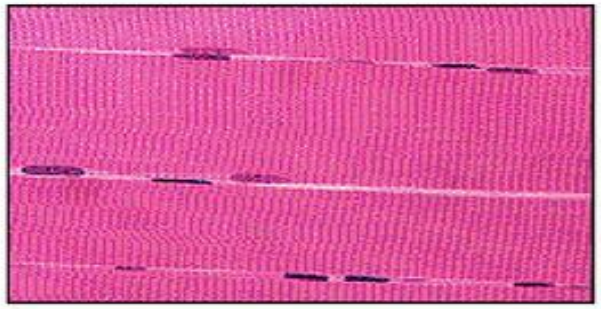
- Muscle tissue
- Nervous tissue
- Epithelial tissue
- Connective tissue



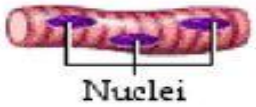
Muscle Tissue

Comparison of Skeletal, Cardiac, and Smooth Muscle Cells

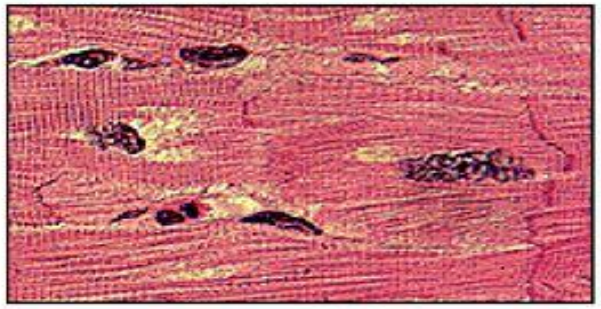
The contractile cells of the body can be classified into three major groups based on their shape, number and position of nuclei, presence of **striations**, and whether they are under **voluntary** or **involuntary** control.



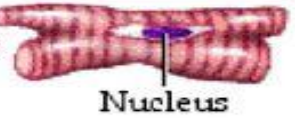
Skeletal Muscle
300 x



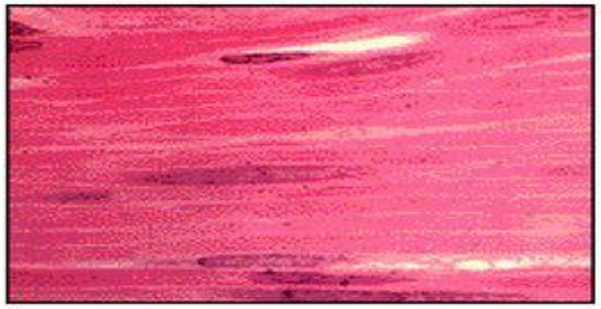
- Elongated cell
- Multiple peripheral nuclei
- Visible striations
- Voluntary



Cardiac Muscle
400 x



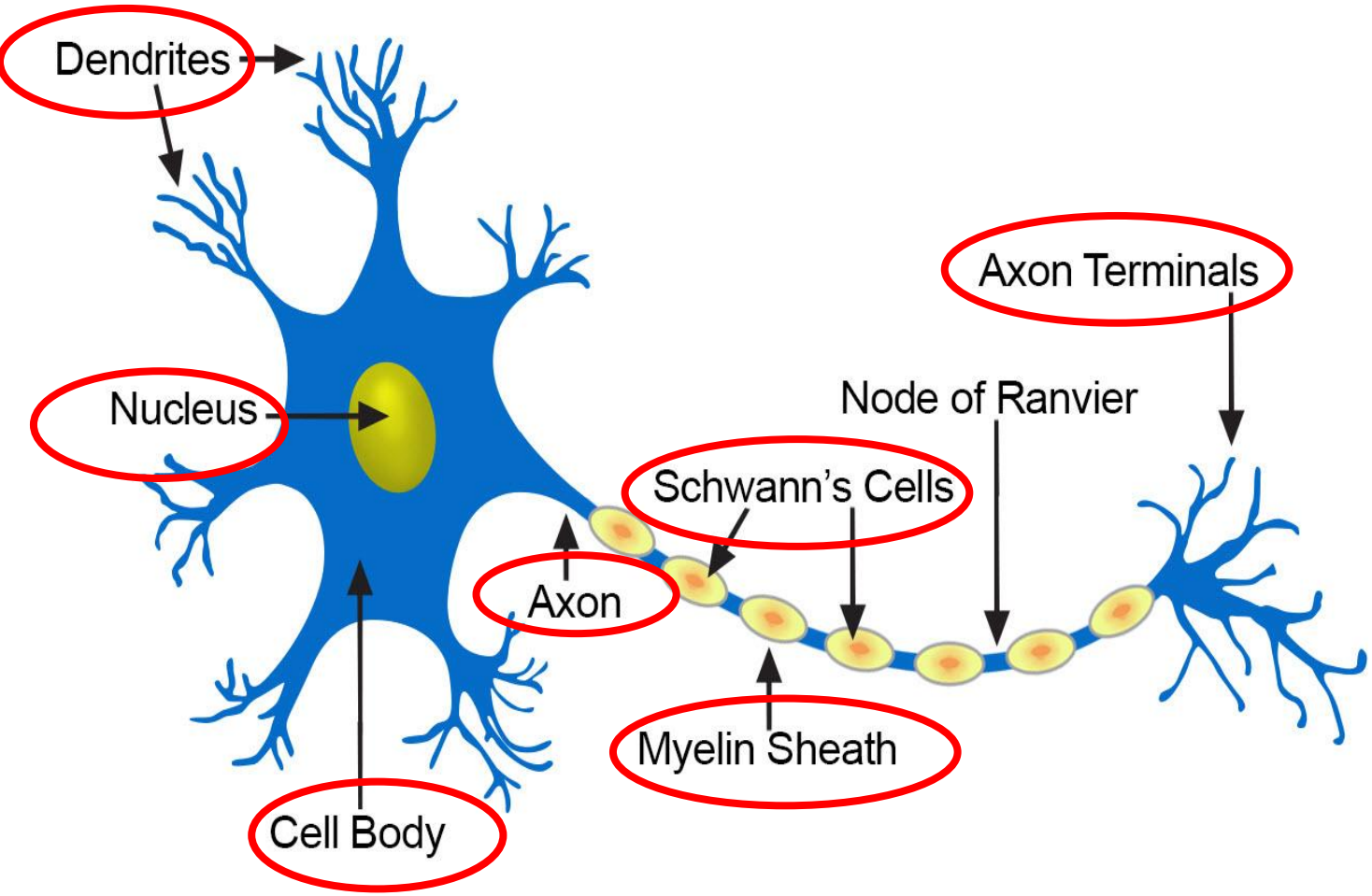
- Branching cell
- Single central nucleus
- Visible striations
- Involuntary

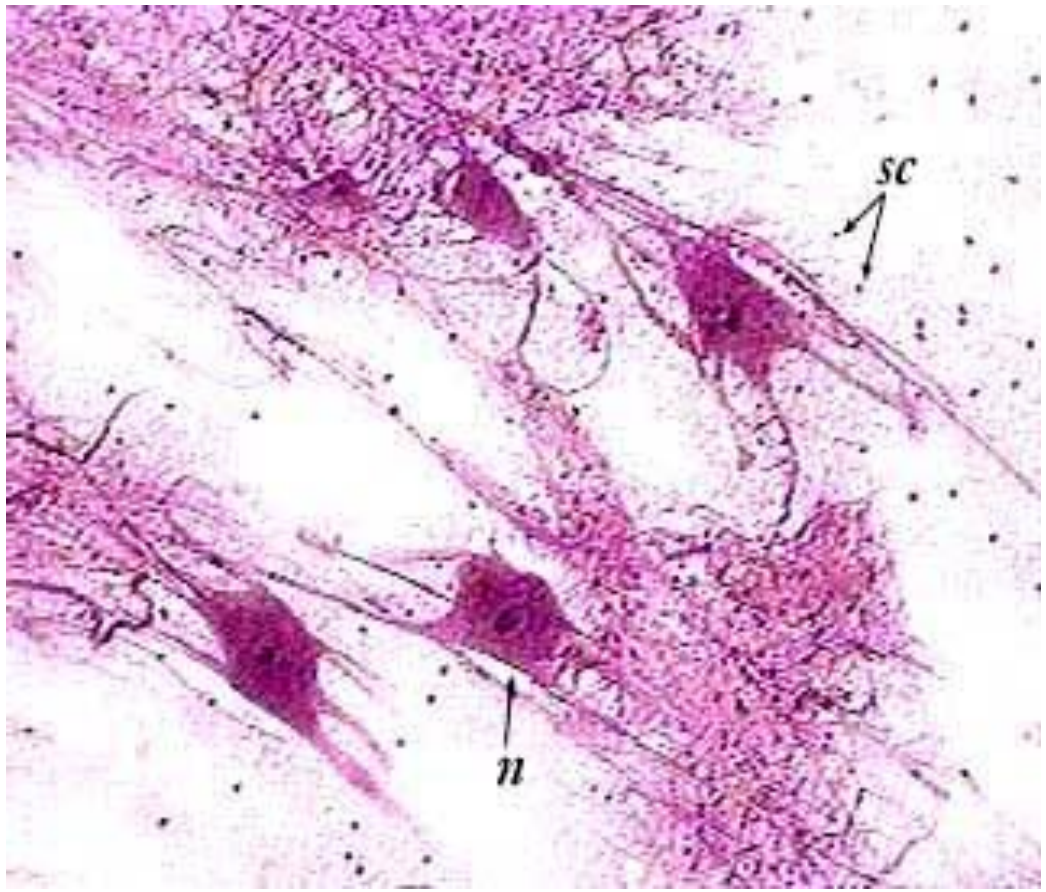


Smooth Muscle
1200 x

- Spindle-shaped cell
- Single central nucleus
- Lack visible striations
- Involuntary

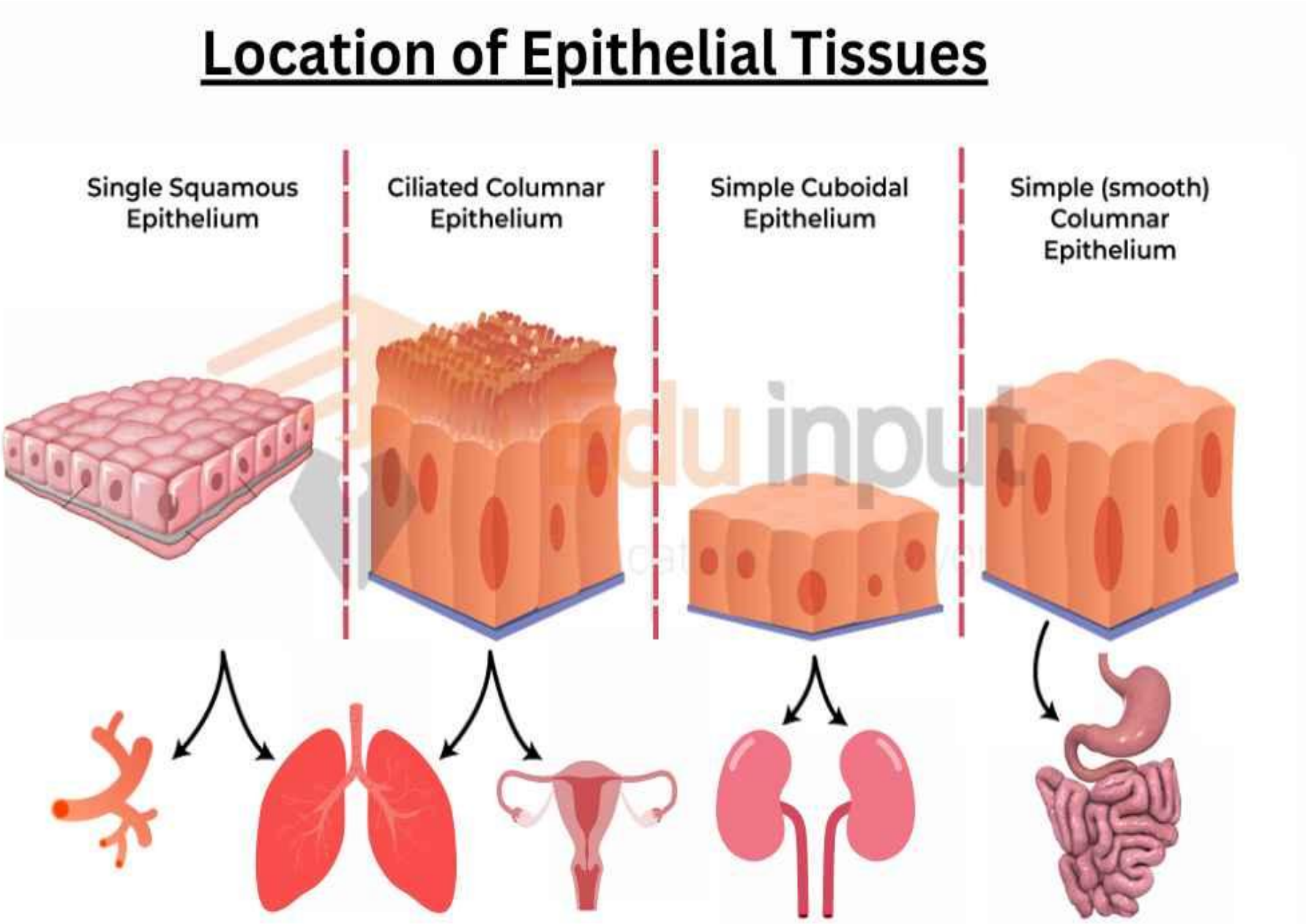
Structure of a Typical Neuron





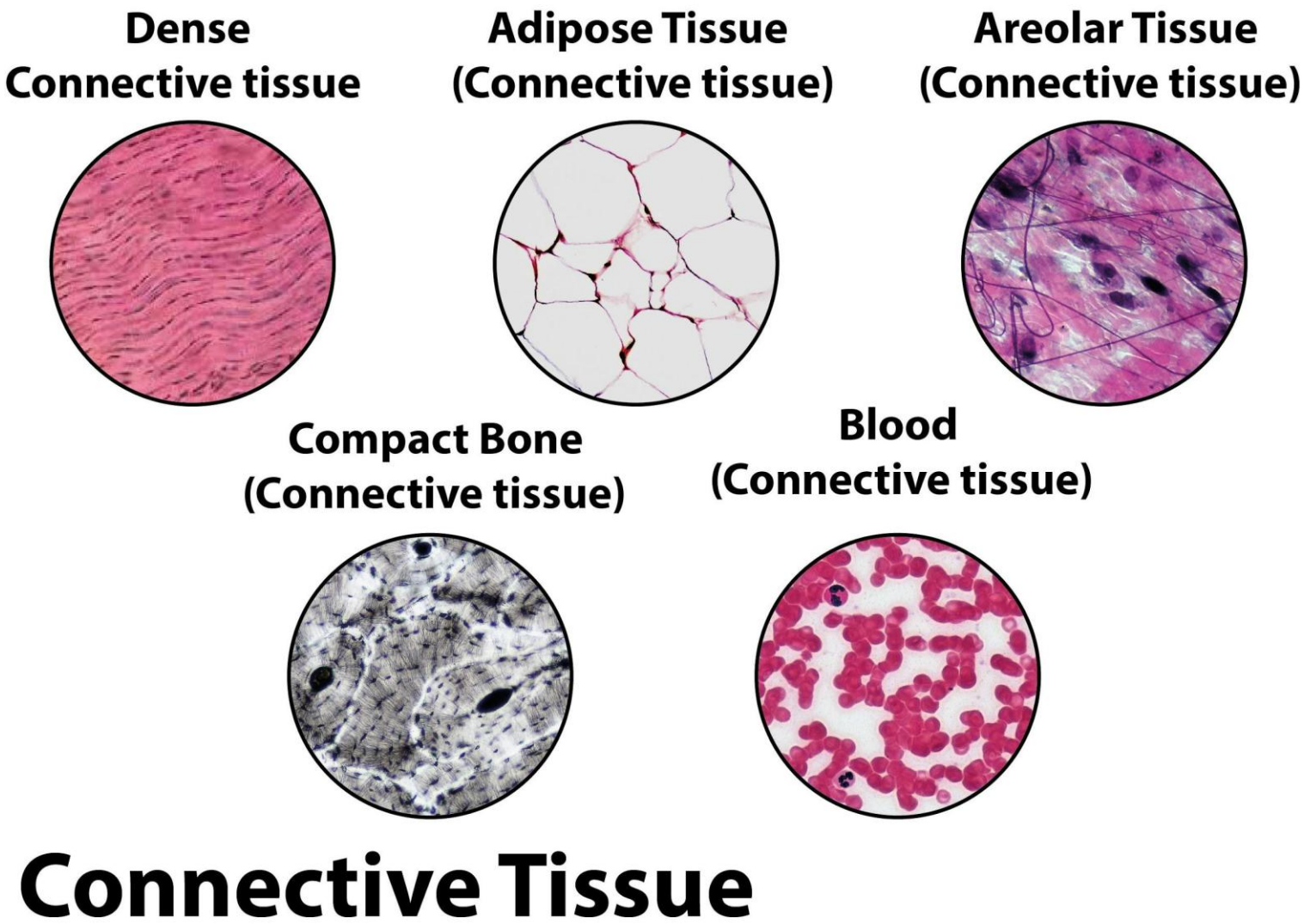
- Consist of layers
- Internal and external surfaces
- Cells are tightly bound together
- Variety of thickness, depending on the location

Ex:
when gas exchange – thin layer,
when protection – thick layer!



Connective tissue

- Binds, supports, and protects structures in the body.
- Inter-cellular substance called MATRIX.
- Matrix: **solid, semisolid, or liquid.**

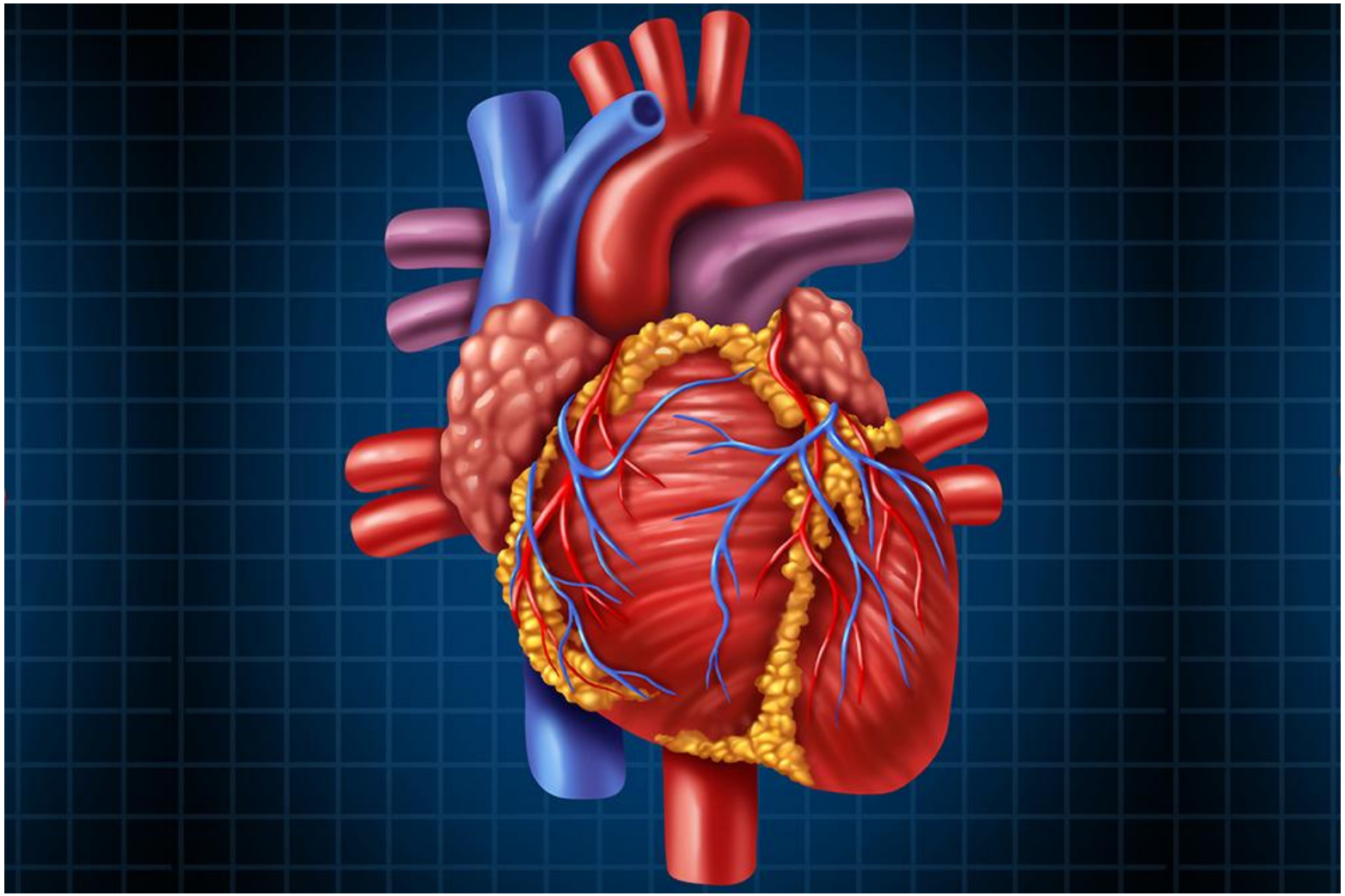


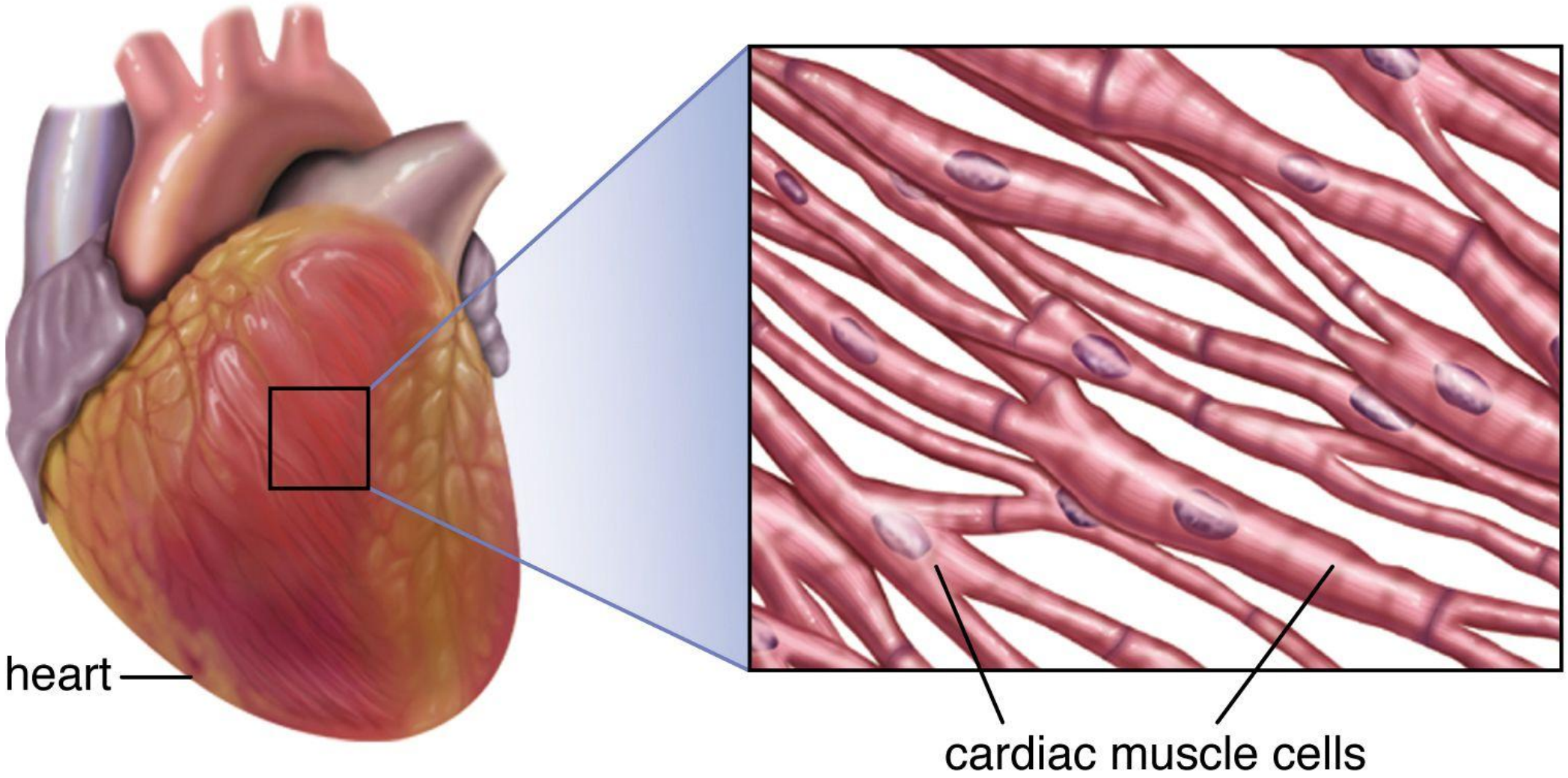
Organs

Organs are made up of different types of tissue working together to perform a function.

For example, heart is composed of different tissues:

- Cardiac cells (Muscle tissue)
- Pacemaker cells (Nervous tissue)
- Pericardium (Epithelial Tissue)
- Valves (Connective Tissue)





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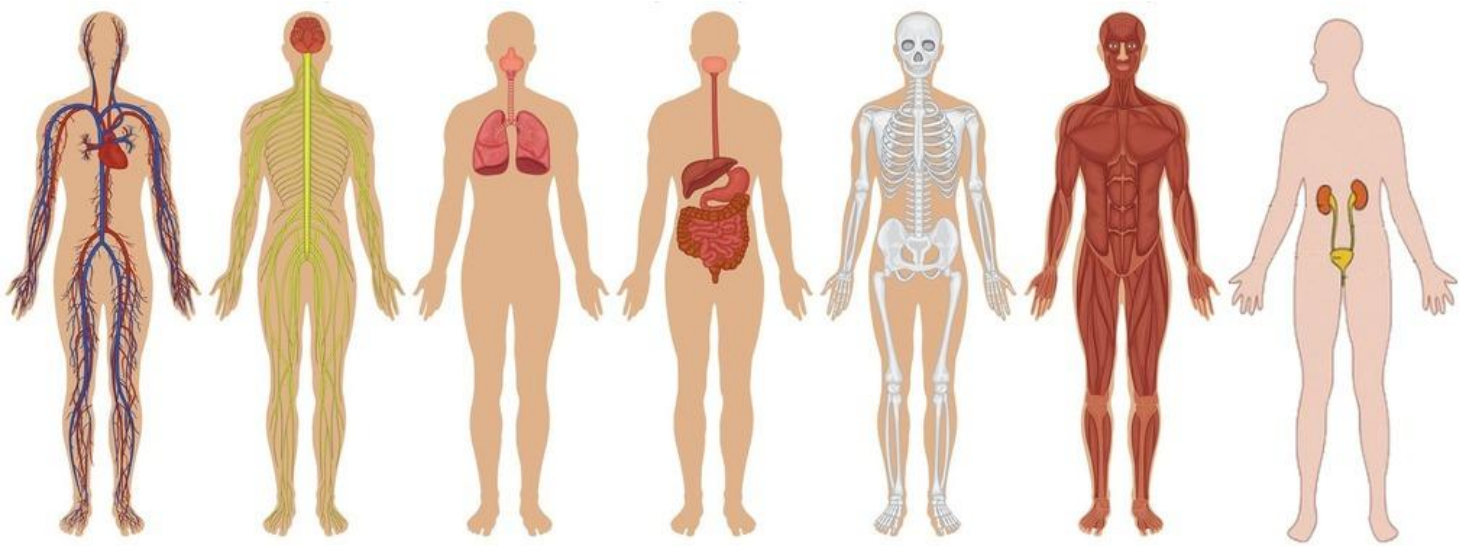
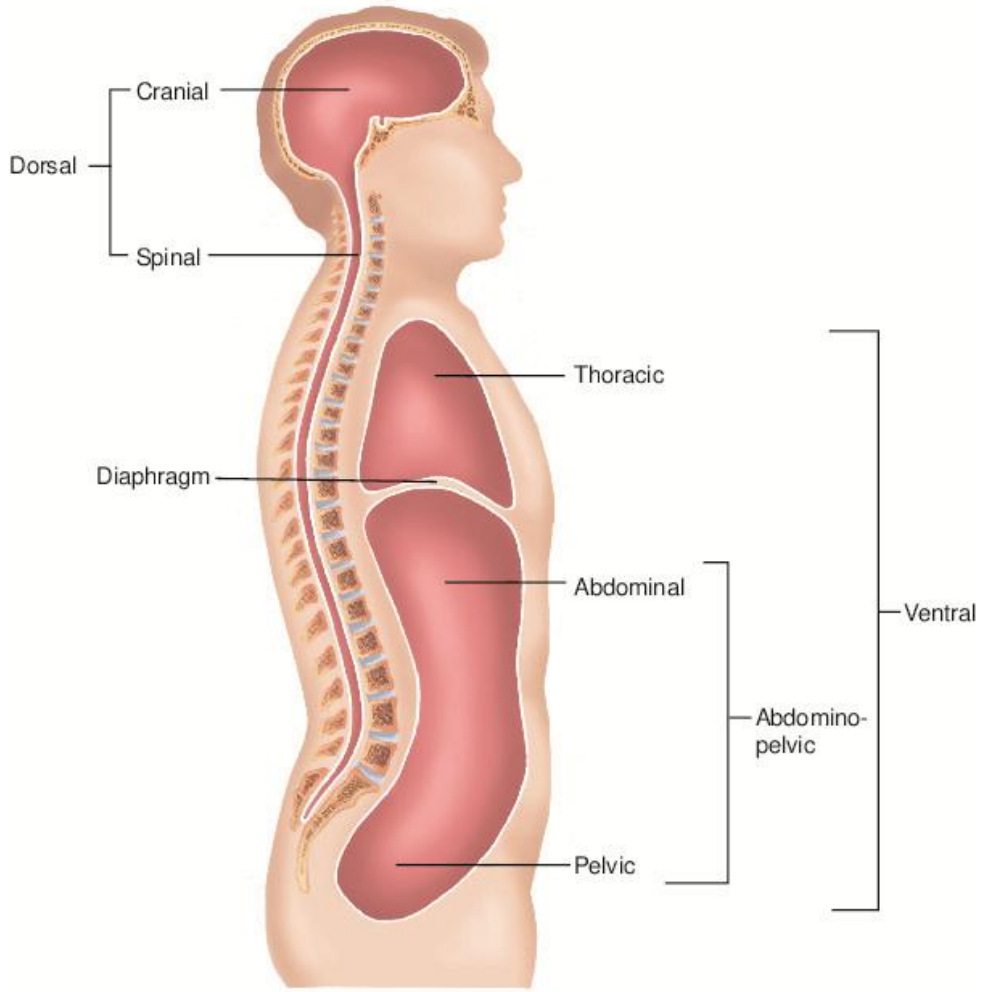
Organ Systems

- Circulatory System
- Skeletal System
- Muscular System
- Digestive System
- Respiratory System
- Immune System
- Nervous System
- Endocrine System
- ……




Cranial
Dorsal
Spinal
Thoracic
Diaphragm
Abdominal
Ventral
Abdomino-
pelvic
Pelvic