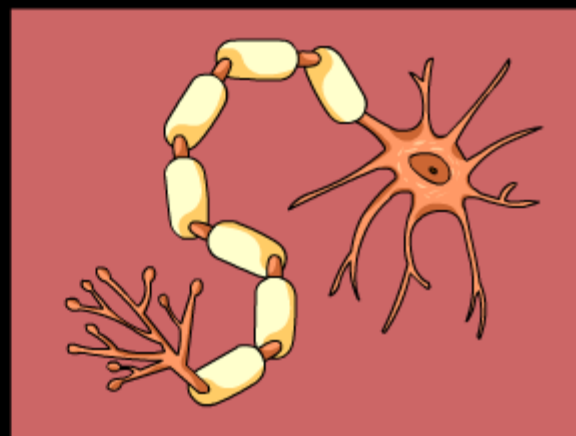
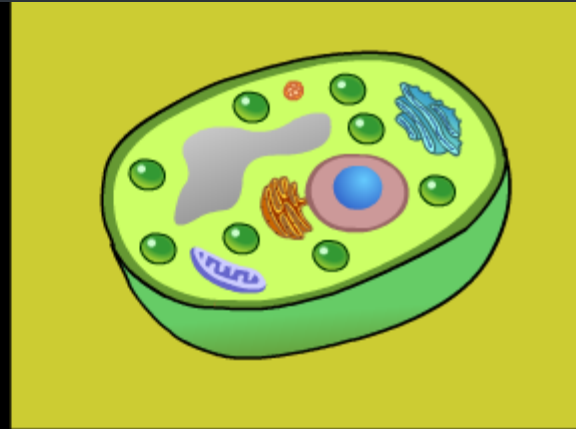
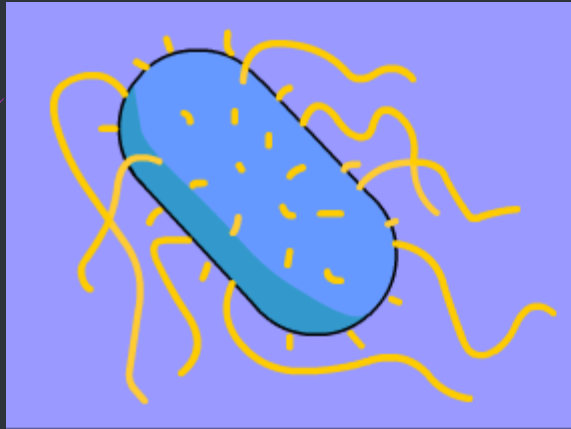


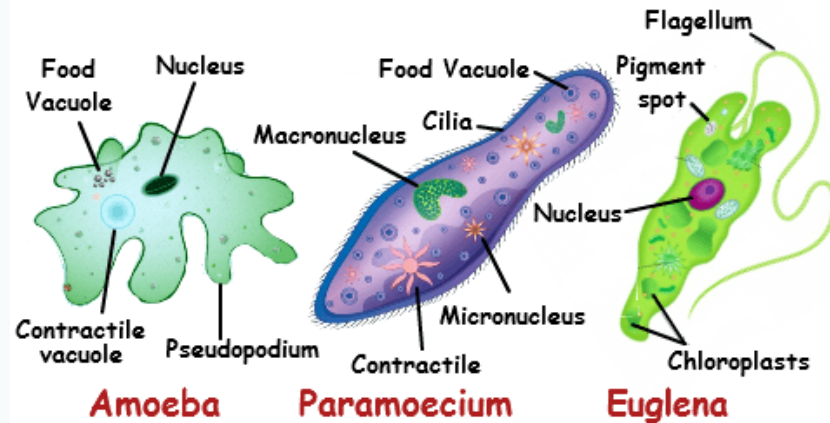
# Cell Specialization



# Diversity of Cellular Life

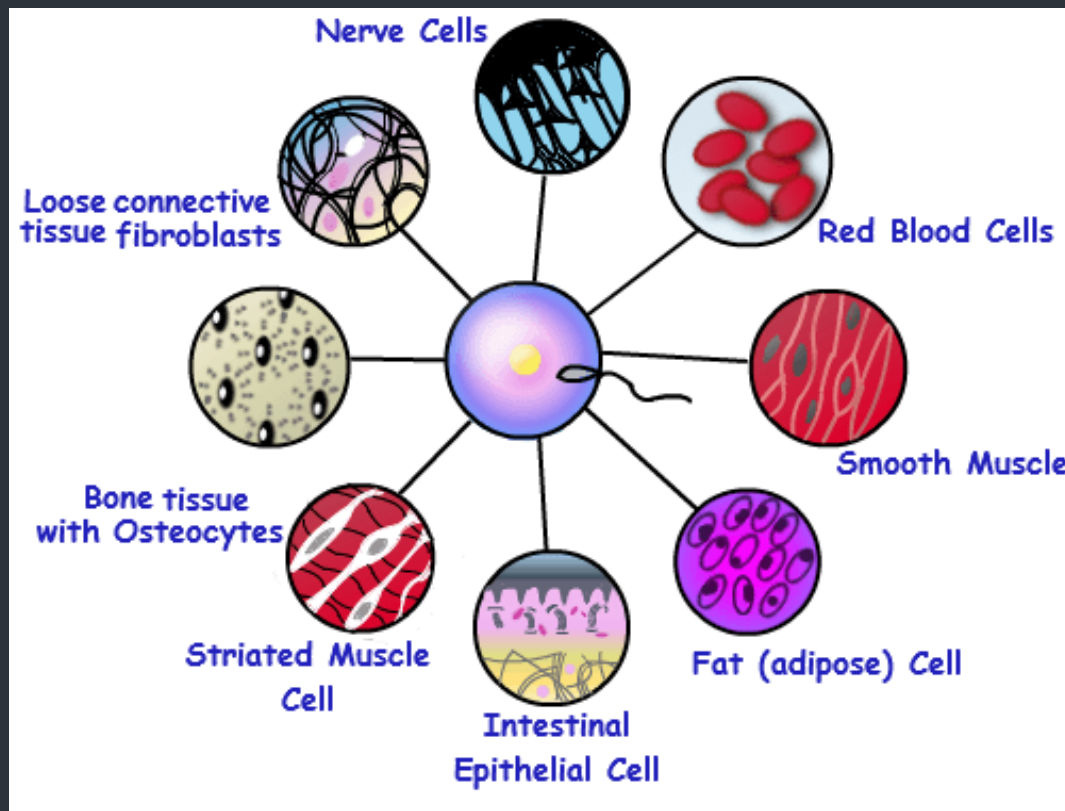
## Organisms are either

❖ Unicellular, ex. Amoeba, Paramecium, Bacteria



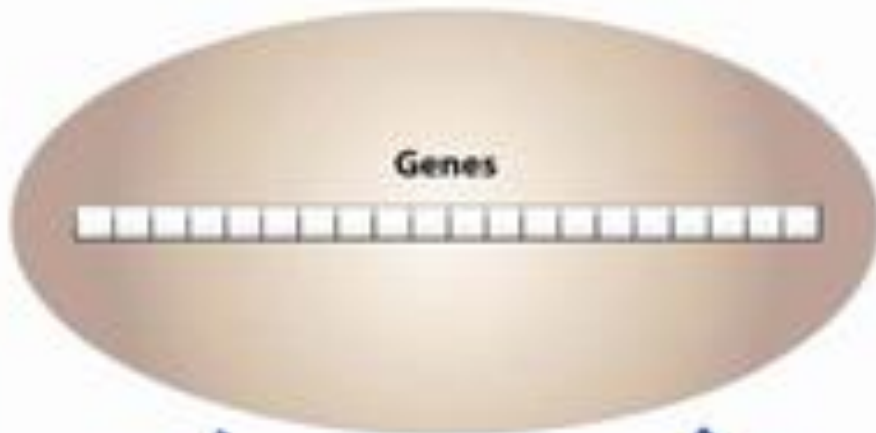
❖ Multi-cellular, ex. Humans




- **Multicellular organisms** contain a wide range of different cells.
- Every cell is **specialized** to perform its **function** as best as possible. There are many differences between different cells specialized for different functions.



- Each cell in the body, (*except for gametes (sex cells)*), contain **identical DNA**.
- Different **genes** function in each type of cell
  - some are **activated (expressed)** and others are **deactivated (not expressed)** due to internal and external environmental conditions
- Cells may have different **shapes**, different **contents** or different numbers of an **organelle**.

# Undifferentiated Cell



-  Gene with ability to be turned on or off
-  Gene expressed
-  Gene turned off



Differentiation



## Genes



Skin Cell

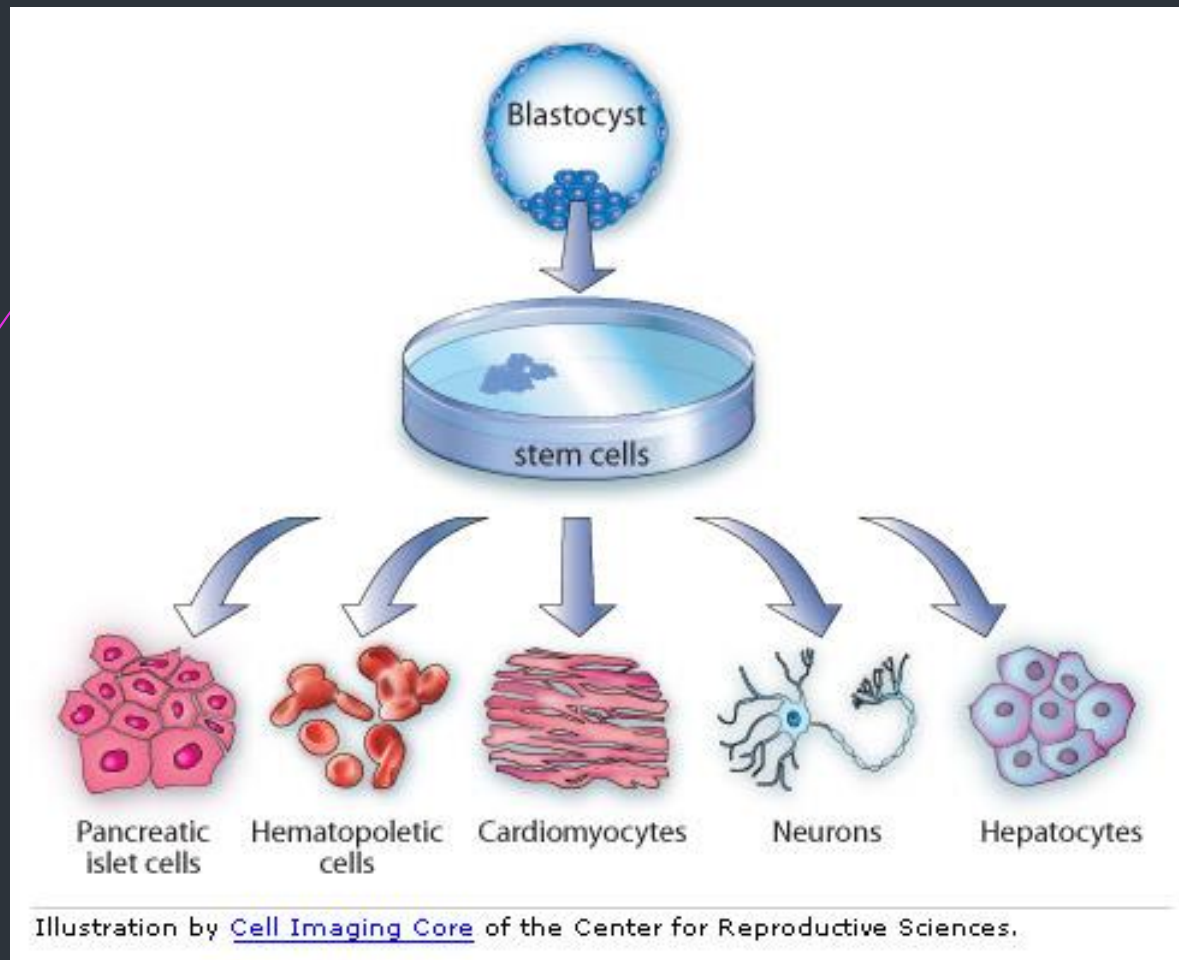
## Genes



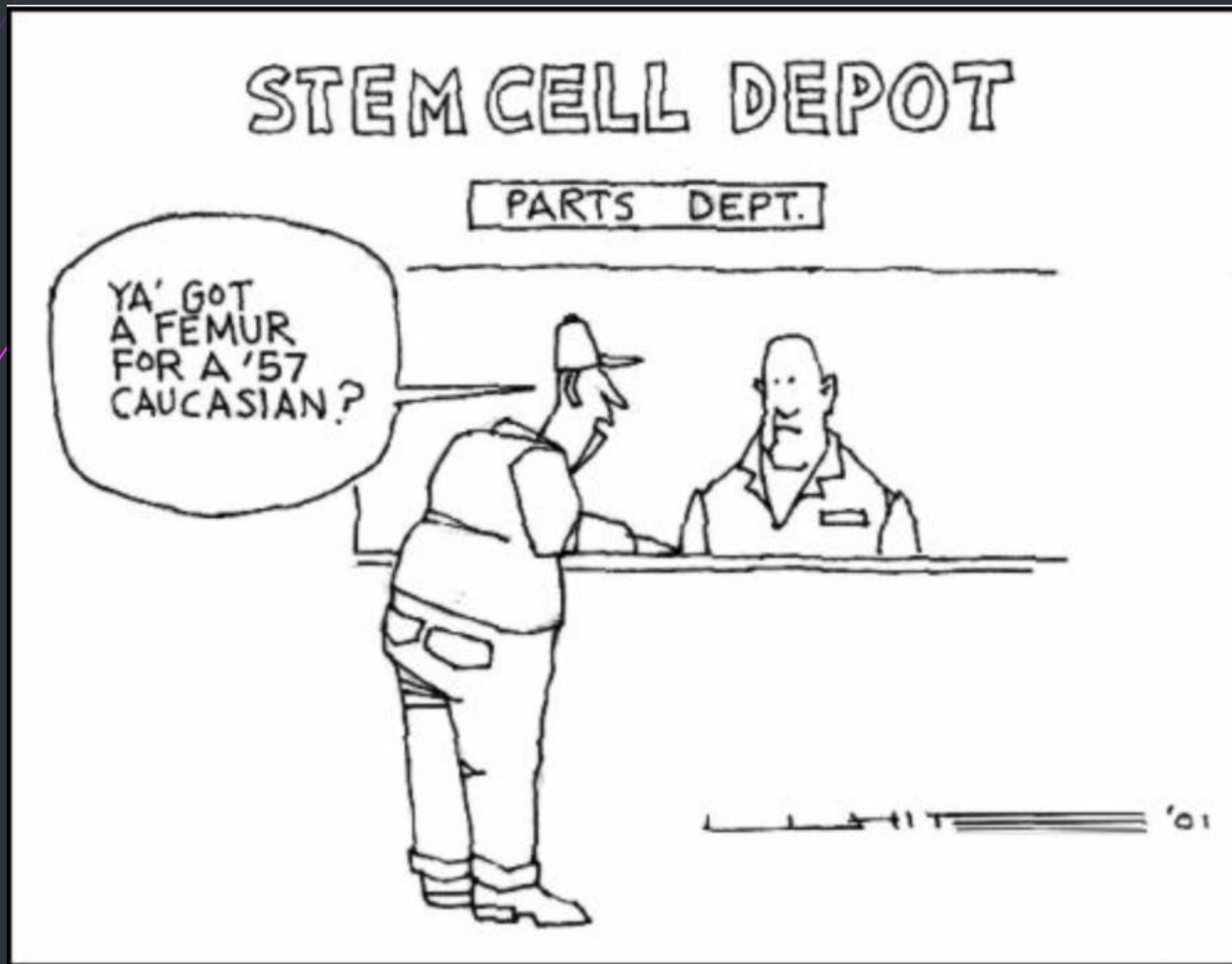
Nerve Cell



- In order for a cell to become **specialized**, a process called **differentiation** occurs, where **unspecialized cells** (called **Stem Cells**) produce cells with specialized structures.



- All **multicellular organisms** contain some form of Stem Cells. These are the cells that divide to replace **damaged** or **old tissue**, or new cells for **growth**.



# The cell as an organism

- ▶ The cells of multi-cellular organisms become specialized for particular tasks and communicate with one another to maintain homeostasis
  - ▶ **Homeostasis** relatively constant internal physical and chemical conditions that organisms maintain
  - ▶ **Dynamic equilibrium** refers to the optimal conditions for survival
- ▶ To maintain homeostasis, unicellular organisms grow, respond to the environment, transform energy, and reproduce



# The cell as an organism

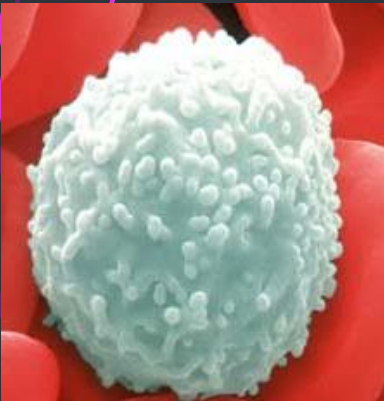
- ▶ Cells communicate by the means of chemical signals that are passed from one cell to another. These signals can speed up or slow down the activities of the cells that receive them and can even result in the cell to change what it is doing.
- ▶ To respond to the signals from another cell, a cell must have a receptor to which the signaling molecule can bind

# Specialized Cells Found in Animals



## Red Blood Cells

- carry **oxygen & carbon dioxide**
- **O<sub>2</sub>** and **CO<sub>2</sub>** **diffuse** into and out of lungs

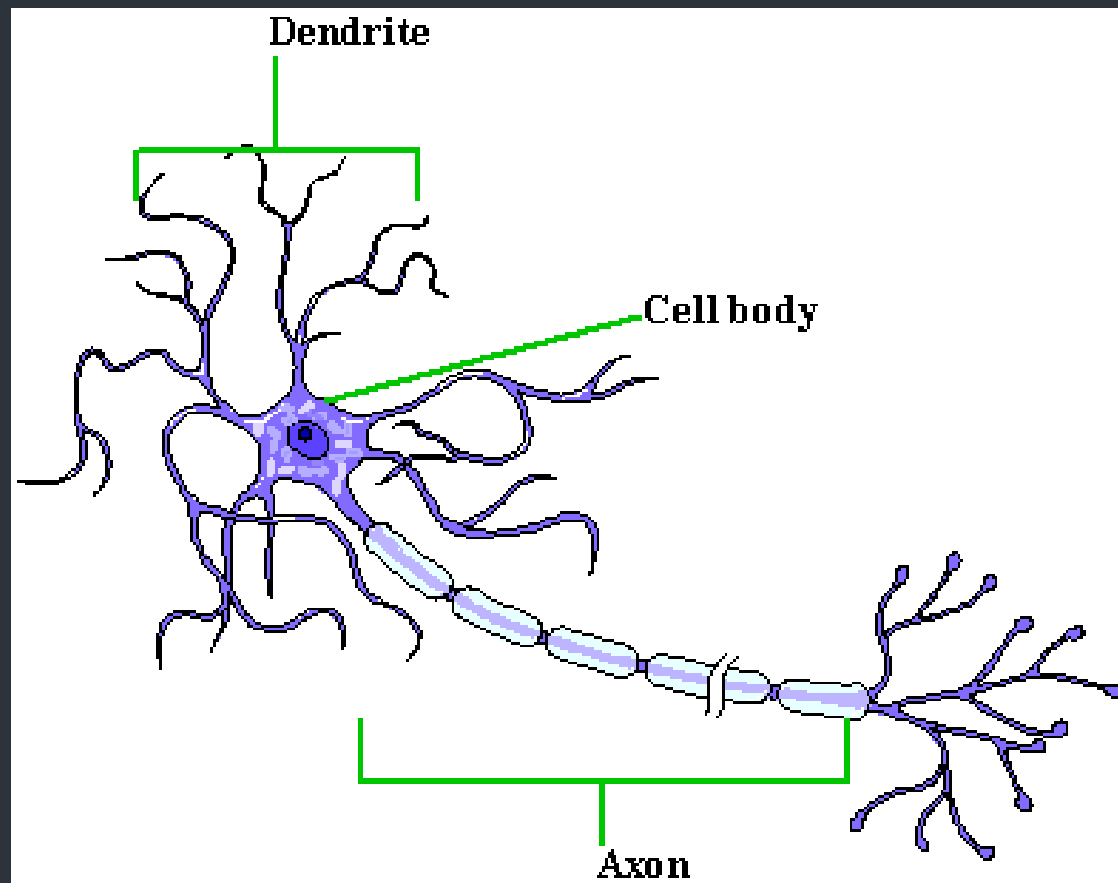


## White Blood Cells

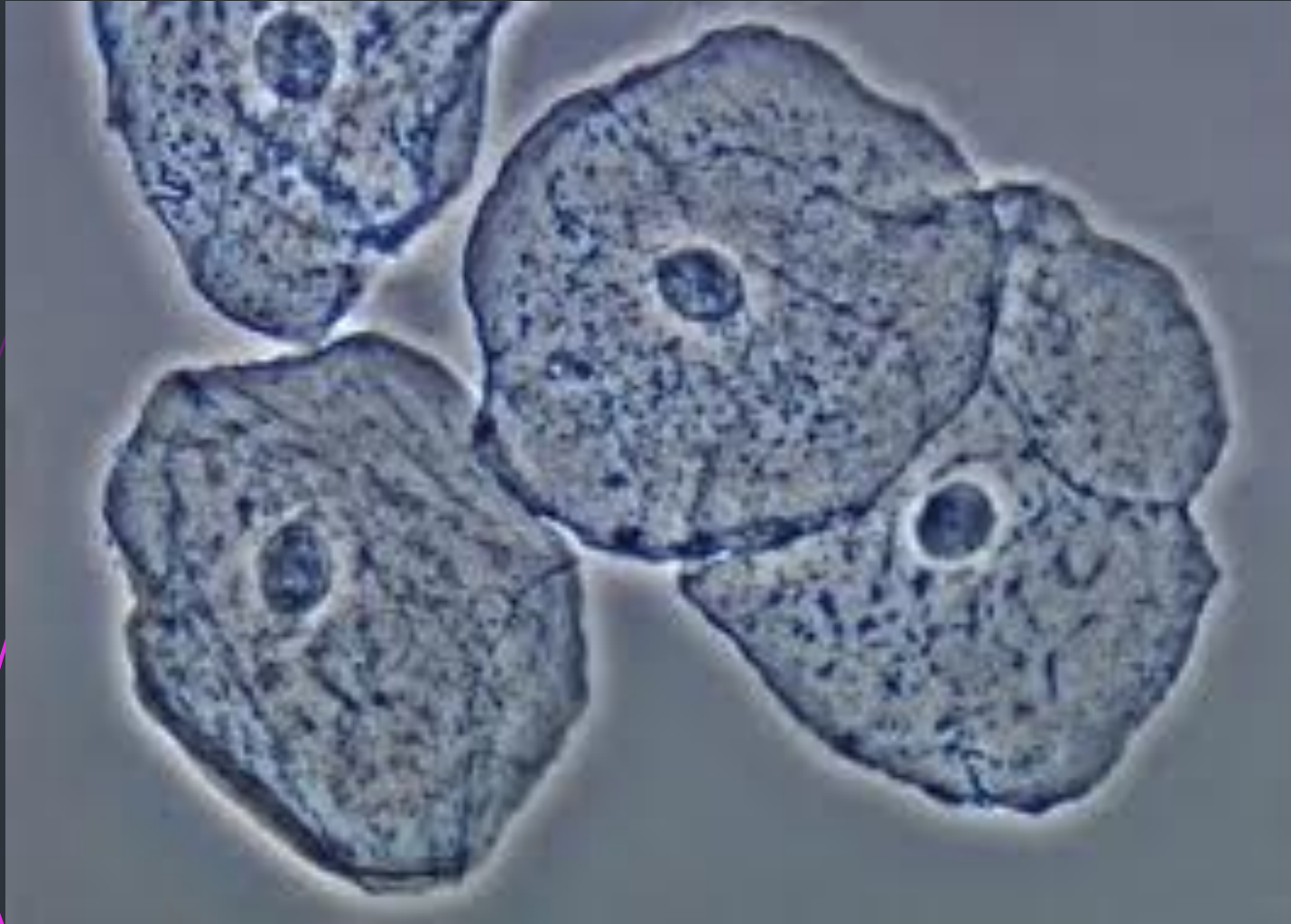
- help the body **fight diseases**

## Neuron – nerve cell

- make up the **nerves** and **brain**
- transmits **impulses**



# Epithelial cells – skin cells





# Types of Tissues

**Tissues** – A group of cells that perform a single function is called a tissue.

**There are 4 basic types of tissue:**

- 1. Epithelial tissue** – glands and tissues that cover interior and exterior body surfaces (ex: skin)
- 2. Connective tissue** – provides support for the body and connects its parts (ex: bone, cartilage)
- 3. Nervous tissue** – transmits nerve impulses (ex: nerve cells, brain cells)
- 4. Muscular tissue** – enables the body to move (ex: heart, bicep)

