
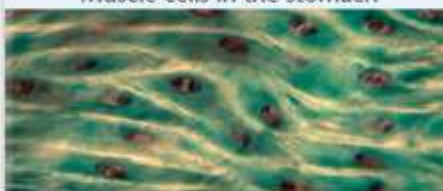
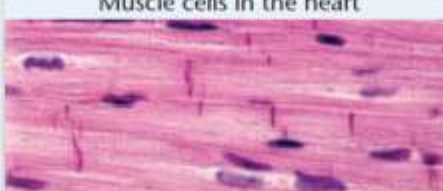
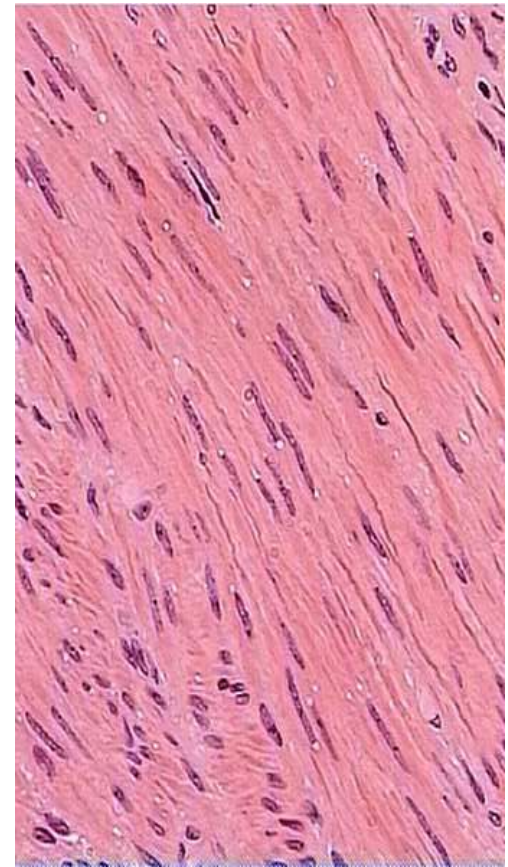


# Muscle Cells

Table 1.3 Tissues in the Human Body

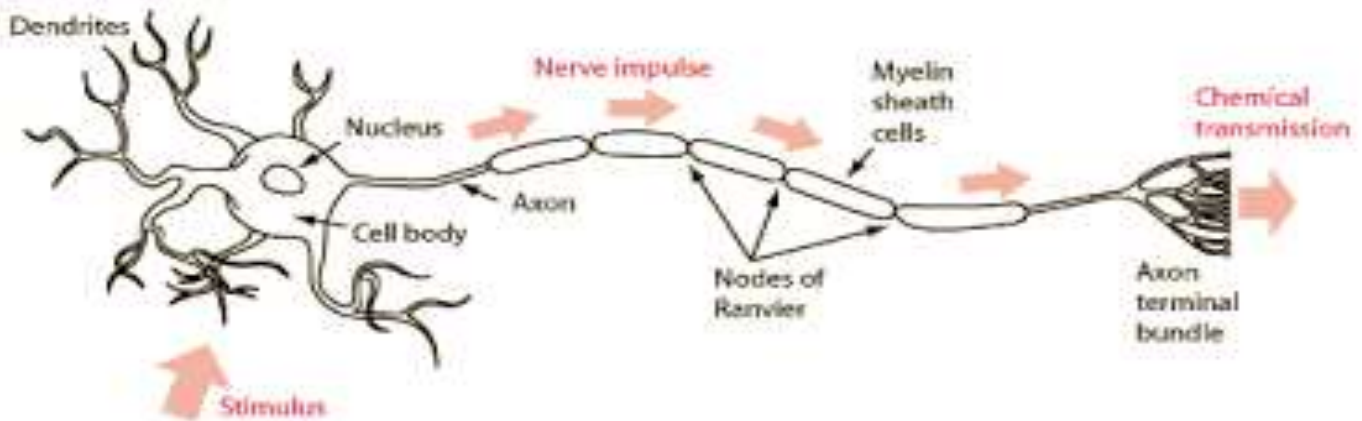
Tissue	Function	Example
Muscle	<ul style="list-style-type: none"> <li>Enables body parts to move, exert force, or change shape</li> </ul>	Muscle cells in an arm 
		Muscle cells in the stomach 
		Muscle cells in the heart 



Specialized Cells	How Structure Influences Function
Muscle cells	<ul style="list-style-type: none"> <li>Long and thin structure allows the cells to change size drastically when they contract.</li> <li>Some have a branching pattern that increases muscle strength.</li> <li>High concentration of mitochondria supply the energy required to change shape.</li> </ul>

Muscle tissue, one of the four major tissue types, plays the vital role of providing movement and heat generation to the organs of the body. Within muscle tissue are three distinct groups of tissues: **skeletal muscle**, **cardiac muscle**, and **smooth muscle**. Each of these tissue groups is made of specialized cells that give the tissue its unique properties.

# Nerve Cells



Nerve cells (called *neurons*)

- Long, threadlike branches enable the cells to receive and transmit signals from other cells throughout the body.

Nerve cells are the primary cells in the nervous system. They are responsible for relaying electrical messages to cells and tissues in other organ systems. These are specialized cells designed to stimulate other cells in the body in order to communicate. Neurons are **excitable**, which means they function by using electrical stimulation. Through this electrical message, known as an **action potential**, neurons are able to initiate action in the cells they target.

Neurons have long, spindly extensions called axons that carry electrical and chemical messages. These messages convey information to your brain—"The ground is burning hot!"—and responses back from the brain—"Pick up your foot!"

To transmit these messages, charged particles (primarily sodium ions), jet across a nerve cell membrane, creating an electrical impulse that speeds down the axon. When the electrical impulse reaches the end of the axon, it triggers the neuron to release a chemical messenger (called a **neurotransmitter**) that passes the signal to a neighboring nerve cell. This continues until the message reaches its destination, usually in the brain, spinal cord, or muscle.

Most neurons can convey messages very fast because they are electrically insulated with a fatty covering called **myelin**. Myelin is formed by Schwann cells—one of the many types of **glial cells** that supply support and nutrition to nerve cells. Nerves coated with myelin transmit messages at a speed of about 250 miles per hour, plenty of time for the message to get to your brain to warn you to lift your foot before it burns.

## Red blood cells

cytoplasm containing haemoglobin



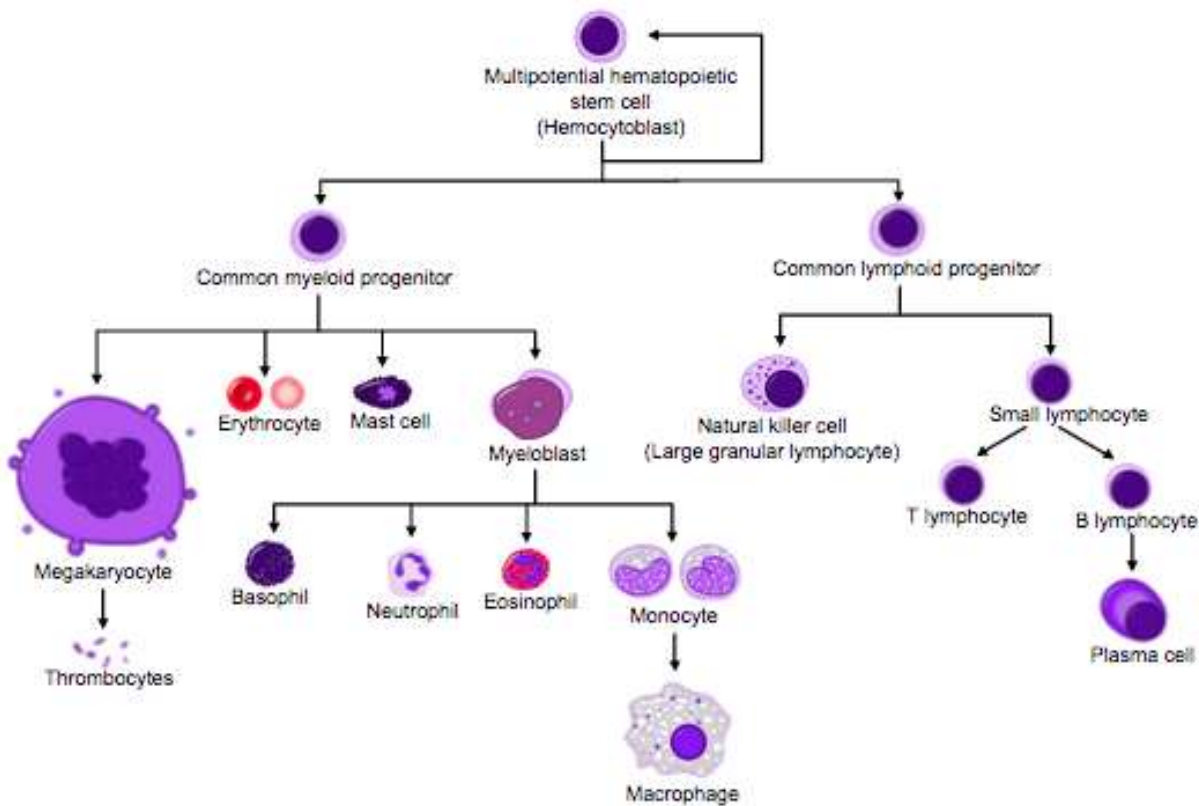
biconcave discs with no nucleus, carry oxygen

# Red Blood Cells

## Red blood cells

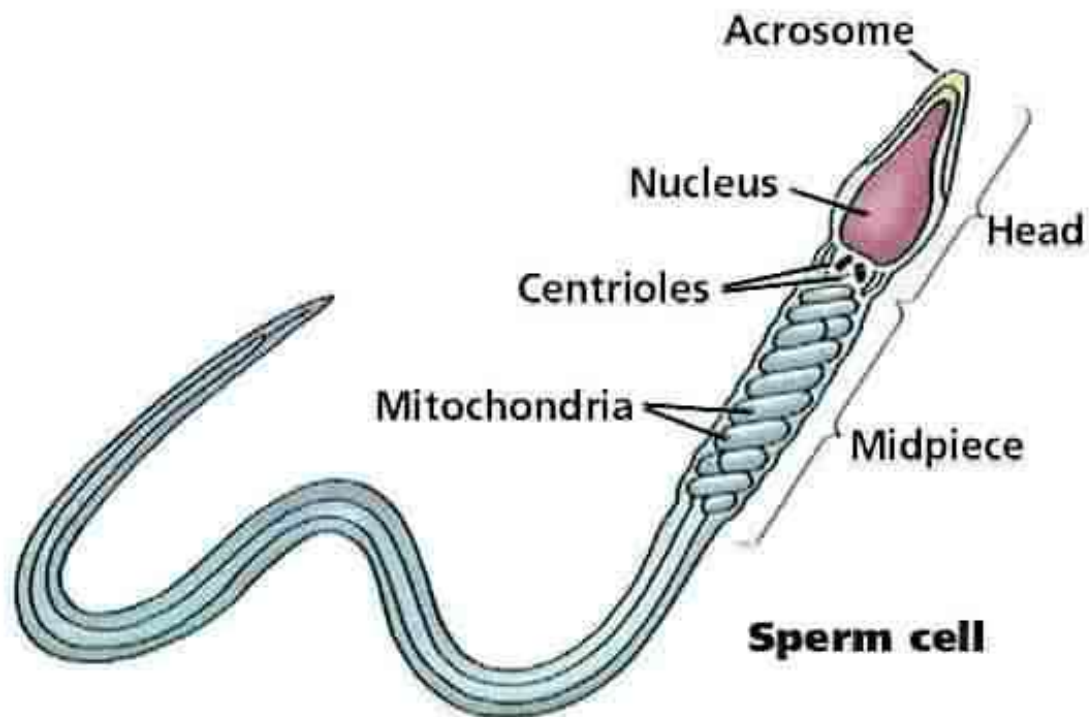
- Doughnut-like shape with a depression in the centre provides a large surface area to carry oxygen.

- All **blood cells** begin as **unspecialized Stem Cells** in the **bone marrow**, which then differentiate through **various paths** to become specialized cells, such as **Erythrocytes** and **Neutrophils**.



- **Erythrocytes**, commonly known as **Red Blood Cells**, carry **oxygen** from the lungs to respiring tissues. They are specialized in several ways for their function. They contain **large amounts of Haemoglobin**, that holds oxygen, and many of the **organelles** (including the **nucleus**) present in normal cells are **not present** in Erythrocytes, to make space for more Haemoglobin. Their shape is **biconcave**, which **maximizes surface area**, and so the speed of movement of Oxygen into and out of the cell.

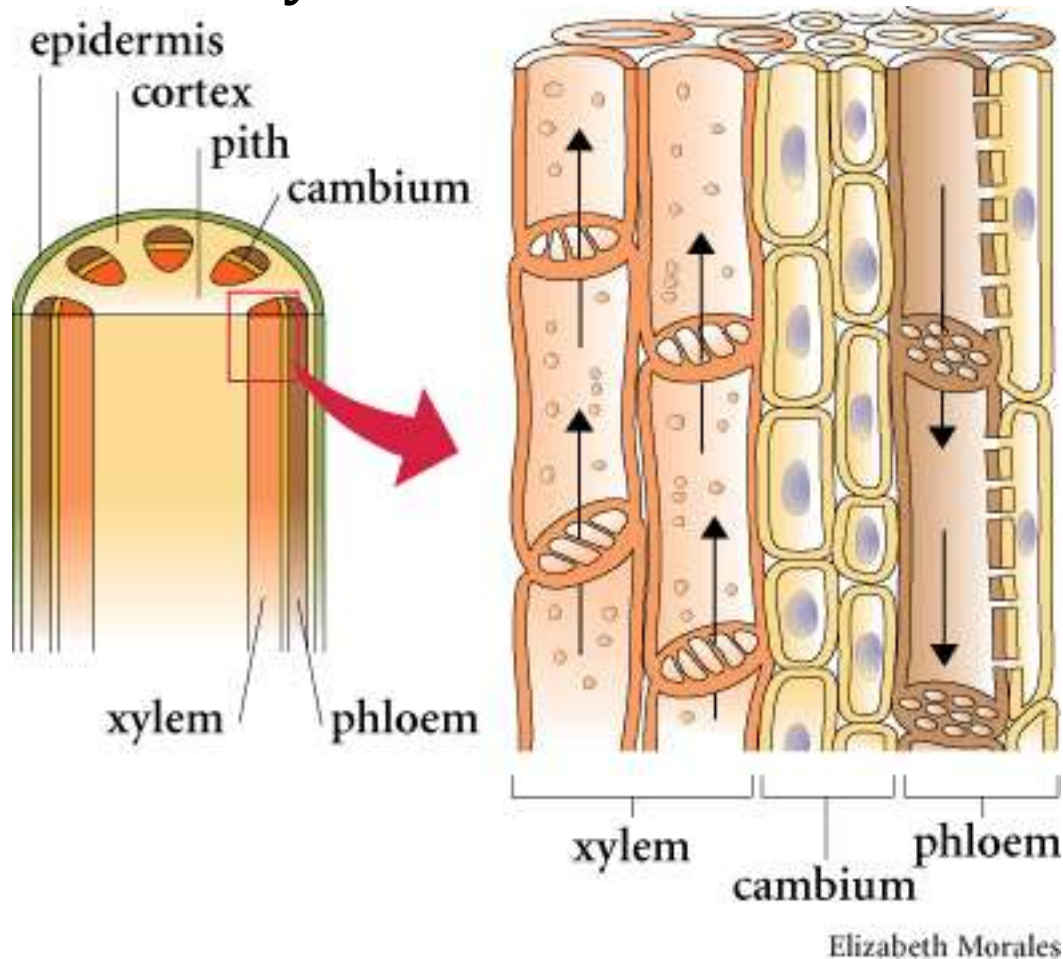
# Sperm Cells



- **Spermatozoan** are **motile Sperm Cells**. They are the **male sex cells** involved in **sexual reproduction**. They travel toward the female's **Egg** and attempt to fertilize it to produce a **Zygote**.
- Sperm Cells are specialized in a number of ways. They have an **Undulipodium** (tail) which moves by energy generated by **many mitochondria** and **propels** the cell. The head of the cell contains an **Acrosome**, which is a **specialized lysosome** that releases enzymes so that the Sperm Cell can **penetrate** the **Ovum Coat** of the Egg. Sperm Cells are also very **small and thin**, which aids their movement.



# Xylem and Phloem



- **Xylem** and **Phloem** are the **transport tissues** of plants. Xylem transports **water** and **minerals up** the plant, and Phloem carry **sugars up and down** the plant.
- Both are found in **Vascular Bundles**. These consist of Xylem and Phloem Tissue, separated by **Meristematic Tissue** (undifferentiated cells) called the **Cambium**. The cells in the Cambium **differentiate** to produce **new Xylem and Phloem Cells**.
- **Xylem Tissue** consists of **Xylem Vessels** and **Parenchyma Cells**. Xylem Vessels are made of **dead cells** that have become **elongated** and **reinforced** and **waterproofed** with deposits of **Lignin**. The dead cells also do not have any **ends**, so that successive cells form **tubes** with **wide Lumen**. Xylem **transports water up** the plant can help to **support** it.
- **Phloem Tissue** is made up of **Sieve Tubes** and **Companion Cells**. Sieve tubes line up and their ends form **Sieve Plates** through which **substances** can move. Companion Cells lie **next** to Sieve Tube Cells and allow them to **stay alive**.

