

Cells are the smallest living units of the body

- Organelles = Structures inside the cell that carry out functions that keep the cell alive and operating
- Major cell organelles:
 - √ Plasma membrane (cell membrane)
 - √ Cytoplasm
 - √ Nucleus
 - √ Vesicles
 - √ Mitochondria

Fig 3.13

Plasma membrane (cell membrane)

The outermost part of the cell

- Its main function is to act as a barrier that blocks most solutes from entering or exiting the cell
- The cell membrane is mostly composed of a phospholipid bilayer (two layers of phospholipid molecules) and a small amount of cholesterol molecules

√ The phospholipids and cholesterol molecules are hydrophobic. They repel hydrophilic solutes, stopping them from crossing the cell membrane

√ Hydrophobic solutes can pass through the membrane

- Membrane proteins = Proteins that are part of the cell membrane

√ Channel proteins/Carrier proteins = Proteins that form tunnels through the membrane to selectively allow certain solutes to cross the cell membrane

√ Receptors = Proteins that detect molecules outside the cell

[Figs 3.2, 3.3, and 3.4](#)

Cytoplasm

The watery liquid that fills the cell

- Gap junction = A channel through the cell membrane that connects the cytoplasm of one cell to its neighboring cell

Figs 3.13 and 4.5

Nucleus

The organelle that contains the chromosomes (the cell's DNA) and the membrane that surrounds the chromosomes

- The DNA is the genes (the recipes for making all the cell's proteins)

Figs 3.13 and 3.19

Vesicles/vacuoles

Round organelles for transport and storage of materials in the cell

Fig 3.13

Mitochondria

Organelles that are the cell's powerhouses (the ATP factory)

- Cellular aerobic respiration = The ATP-making process that takes place in the mitochondria

Figs 3.13 and 3.16

Mitosis (Cell division)

The process by which cells reproduce themselves for growth, maintenance, and repair of the body

- One cell divides into two cells
- Nuclear division (the chromosomes moving apart to opposite ends of the cell) always happens before cytokinesis (dividing of the membrane and cytoplasm)
 - √ In cells that are not dividing, the nucleus appears as a large dark round organelle inside the cell
 - √ In cells that are dividing, the nucleus appears as dark thread-like chromosomes that move slowly apart to opposite ends of the cell
- Some cells divide infrequently or not at all. Other cells divide constantly but in a controlled manner
 - √ Cancer = Uncontrolled cell division.

Fig 3.32

Tissues

A group of cells of the same type located together

- The four major tissue types:

- √ Epithelial

- √ Muscle

- √ Nervous

- √ Connective

Fig 4.2

Epithelial tissue

Sheets of tightly-packed cells that (1) form protective linings and (2) provide surfaces for absorption and secretion of materials

- Examples: The inner lining of all hollow organs in the body

Fig 4.2

Muscle tissue

Tissue that causes movement by contracting (shortening) its cells

- There are three types of muscle tissue:

- √ Skeletal muscle tissue = Attached to bones; for movement of body parts

- √ Smooth muscle tissue = In the walls of hollow organs, to propel substances through the organ

- √ Cardiac muscle tissue = In the heart, to make the blood circulate throughout the body

- Skeletal muscle is the only muscle tissue type that is voluntary (Voluntary = you consciously control when it contracts and relaxes). Smooth muscle and cardiac muscle tissue are involuntary

[Figs 4.2 and 4.18; Table 4.2](#)

Nervous tissue

Tissue that contains neurons (nerve cells) for detecting stimuli and transmitting signals rapidly between body parts

[Figs 4.19](#)

Connective tissue

Tissues that surround, support, or protect other tissues and organs

- There are six major types of connective tissue
 - √ The six types are: loose connective tissue, dense connective tissue, bone, cartilage, adipose, and blood
- The cells of connective tissues do not usually touch each other
 - √ The cells are separated from each other by a material called the extracellular matrix

Fig 4.12; Table 4.1

Loose (areolar) connective tissue

A soft flexible connective tissue

- Loose connective tissue surrounds and protects many organs in the body

Dense connective tissue

A strong leathery connective tissue

- The extracellular matrix is almost entirely collagen (a strong leather-like protein). The collagen gives the dense connective tissue its strength.

Fig 4.15

Bone

A rock-like connective tissue that forms bones (which surround, protect and anchor other organs)

- The extracellular matrix contains calcium phosphate, a rock-like substance

Figs 4.2 and 6.8

Cartilage

A rubbery connective tissue

- Example: The tips of the bones are covered with a protective layer of cartilage

Fig 4.16

Adipose tissue

A connective tissue that specializes in storing triglyceride (fat) molecules for energy storage and insulation

Fig 4.13

Blood

A liquid connective tissue that transports nutrients, oxygen, wastes, and other materials throughout the body

Fig 4.17

Organ

A body part made of several tissues working together

Fig 1.3

Organ system

A group of organs that work together

Fig 1.3