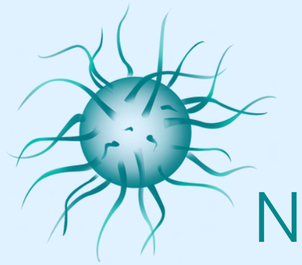
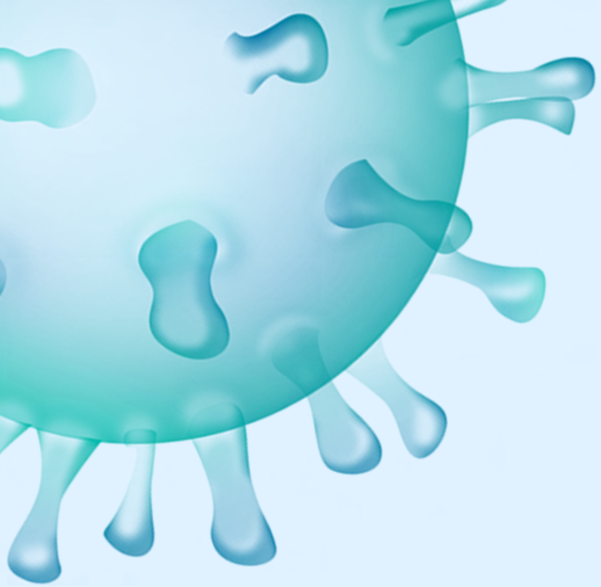
UNIT 2

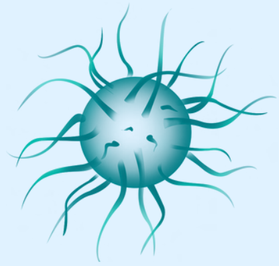
CELL STRUCTURE & FUNCTION

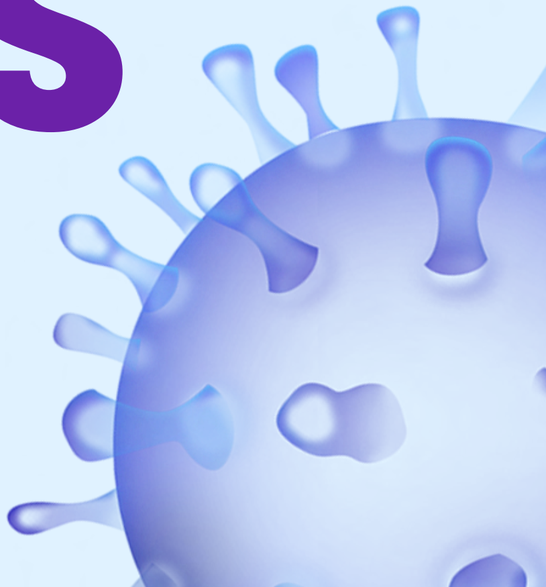


Nucleus Notes



THE CELL ORGANELLES





Nucleus

- **Structure**: Double membrane nuclear envelope with pores which allow materials like mRNA to leave the nucleus
- **Functions**:
  - Stores genetic information
  - Synthesizes RNA
  - Assembles ribosomes

Ribosomes

- **Structure**: Composed of mRNA and protein; consists small and large subunits
- **Types**:
  - Bound to ER (endoplasmic reticulum)
  - Cytoplasmic (free in cytoplasm)
- **Function**: Site of protein synthesis

Rough Endoplasmic Reticulum

- **Structure**: Membrane studded with ribosomes; attached to nuclear envelope
- **Functions**:
  - Synthesis of membrane bound proteins and secreted proteins
  - Cell compartmentalization
  - Mechanical support and intracellular transport

Smooth Endoplasmic Reticulum

- **Structure**: Folded, tubelike structure (cisternae)
- **Functions**:
  - Detoxification
  - Calcium storage
  - Lipid synthesis

Golgi Complex

- **Structure**: Flattened membrane bound sacs (cisternae)
- **Functions**:
  - Folding and chemical modification of proteins
  - Packaging proteins into vesicles ready for transport

Mitochondria

- **Structure**: Double membrane (inner membrane folded into cristae for more surface area, making it more efficient in the exchanging of materials)
- **Functions**:
  - Site of oxidative phosphorylation
  - Site of the Kreb’s cycle

Chloroplast

- **Structure**: Double outer membrane, contains stacked thylakoid (stacks are called grana) and fluid (called stroma)
- **Functions**:
  - Site of photosynthesis
  - Light reactions occur in the thylakoid
  - Calvin-Benson cycle occurs in the stroma

Lysosome

- **Structure**: Membrane enclosed sacs containing hydrolytic enzymes (to break down the bacteria that they engulf)
- Functions:
  - Intracellular digestion
  - Recycling of cell materials
  - Programmed cell death (apoptosis)

Vacuole

- **Structure**: Membrane-bound sacs
- Functions:
  - Storage and release of macromolecules and cell waste
  - **Central vacuole**: water retention and turgor pressure
  - **Contractile vacuole**: osmoregulation in protists
  - **Food vacuole**: formed by phagocytosis, fuses with lysosome

Plasma Membrane

- **Structure**:
  - Phospholipid bilayer
  - Cholestrol (acts as a buffer to keep bilayer fluid during temperature changes)
  - Channel proteins
  - Glycolipids and glycoproteins

MEMBRANE TRANSPORT

Simple Diffusion

- Passive transport
- No energy required
- Moves down concentration gradient
- Small, nonpolar molecules can pass through

MEMBRANE TRANSPORT

Facilitated Diffusion

- Passive transport
- No energy required
- Carrier/channel protein required
- Moves down concentration gradient
- Small, polar molecules can pass through

MEMBRANE TRANSPORT

Active Transport

- Energy required
- Moves against concentration gradient
- Requires transport protein (usually carrier)

BULK TRANSPORT

Endocytosis

- Phagocytosis: Cellular eating
  - ingestion of large particles
- Pinocystosis: Cellular drinking
  - internalization of extracellular fluids
- Receptor-mediated endocystosis
  - Ligands bind to receptor to allow materials in
  - Uses cell communication

BULK TRANSPORT

Exocytosis

- Export of materials
- Pathway:
  - Rough ER
    ↓
  - Golgi complex
    ↓
  - Plasma membrane

OSMOSIS & TONICITY

Hypertonic Solution

- High solute concentration
- Low free water concentration
- Cell loses water to the hypertonic solutions

Hypotonic Solution

- Low solute concentration
- High free water concentration
- Cell gains water from hypotonic solutions

Isotonic Solution

- Equal solute concentration (as compared to other solution)
- Equal free water concentration