

microtubules

- Hollow rod-like structures made of the protein tubulin
- grow from the centrosome
- serve as structural support for the movement of organelles that are interacting with motor proteins
- assist in the separation of chromosomes during cell division
- cilia and flagella

Microfilaments

- Thin solid rods made of the protein actin
- Maintain cell shape
- Bear tension
- Assist in muscle contraction and cell motility
- Actin works with another protein called myosin to cause a contraction
- Division of animal cells
- Contractile ring of the cleavage furrow

Intermediate filaments

- Fibrous proteins made up of varying subunits
- Permanent structural elements of cells
- Not assembled and broken down at the rate of microtubules and microfilaments
- Maintain cell shape
- Anchor nucleus and organelles
- Form the nuclear lamina
- Lines the nuclear envelope

active transport & passive transport

active transport	passive transport
movement of molecules from lower concentration to higher concentration	the movement of molecules from higher concentration to lower concentration

need energy	need NO energy
endocytosis: the cell uses energy to take in macromolecules by forming new vesicles from the plasma membrane	plays a primary role in the import of materials and the export of wastes

phagocytosis-cell takes in large particles	diffusion-movement of molecules from high con to low con
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pinocytosis- cell takes in extracellular fluid containing dissolved substances	small nonpolar molecules pass freely (N ₂ ,O ₂ ,CO ₂)
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receptor- mediated endocytosis receptor proteins on the cell membrane	Facilitated diff- from high con to low con through transport proteins
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exocytosis requires energy to move large molecules out of the cell (signal proteins, hormones, waste)

Water balance (Tonicity)

Isotonic	Hypertonic	Hypotonic
balanced	Lack of water	Too much water

Water potential

A physical property that predicts the direction water will flow

Includes the effects of solute concentration and physical pressure

Plasma membranes and membrane permeability

- Plasma membrane
- Phospholipid
- Phosphate group
- Glycerol
- Hydrophilic head
- Hydrophobic tails
- Phospholipids are amphipathic

selective permeability

the ability of membranes to regulate the substances that enter and exist

- Hydrophilic heads oriented toward aqueous environment
- Hydrophobic tails are facing inwards away from aqueous environment



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Published 6th November, 2022.
 Last updated 6th November, 2022.
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- Fluid mosaic model

membrane is held together by weak hydrophobic interactions and can therefore move and shift

- Cholesterol

- Temperature affects fluidity

- Helps maintain fluidity at high and low temps

- Unsaturated hydrocarbon tails help maintain fluidity at low temps

- High temp: reduces movement

- Low temp: reduces tight packing of phospholipids

- Mosaic: comprised of many macromolecules

- Membrane proteins

- Integral proteins

- Peripheral proteins

☞ Proteins that are embedded into the lipid bilayer

- Proteins that are not embedded into the lipid bilayer

👁️ Also known as transmembrane proteins

☞ Loosely bonded to the surface

☞ Amphipathic

Membrane carbohydrates

Glycolipids

Glycoproteins

Carbohydrates bonded to lipids

Carbohydrates bonded to proteins

Most abundant

two cells

Plant

Animal

Golgi vesicles (trafficking, processing, and sorting of newly synthesized membrane, proteins and lipids)

Golgi vesicles

ribosome (read mRNA and translates)

ribosome

smooth ER (synthesizes lipids, phospholipids as in plasma membranes, and steroids)

smooth ER

nucleolus (inside)

nucleolus (inside)

nucleus

nucleus

Rough ER (endoplasmic reticulum)

Rough ER (endoplasmic reticulum)

large central vacuole

X

amyloplast (Starch grain)

X

cell wall

X

cell membrane

cell membrane

two cells (cont)

golgi apparatus (transporting, modifying, and packaging proteins and lipids to vesicles)

golgi apparatus

chloroplast (produce energy through photosynthesi)

X

vacuole membrane

X

mitochondrion (generates ATP)

mitochondrion

cytoplasm (medium for chemical reaction)

cytoplasm

X

lysosomes

plastid (stores pigment)

X

