microtubules

- Hollow rod-like structures made of the protein tublin
- 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	he movement of molecules from higher concen-tration 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-mo-vement of molecules from high con to low con
pinocytosis- cell takes in extracellular fluid containing dissolved subsances	small nonpolar molecules pass freely (N2,O2,CO2)
receptor- mediated endocytosis receptor proteins on the cell membrane	Facilitated diff-from high con to low con through transport proteins

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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- 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 macromole-cules

- Membrane proteins

- Integral proteins	- Peripheral proteins
Proteins that are embedded into the lipid bilayer	- Proteins that are not embedded into the lipid biolayer
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, profcessing, and sorting of newly synthesized membrane, proteins and lipids)	Golgi vesicles
ribosome (read mRNA and transplates)	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 (endop-lasmic 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)	mitoch-ondrion
cytoplasm (medium for chemical reaction)	cytoplasm
X	lysosomes
plastid (stores pigment)	X

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