## Organelles

| | |
|---|---|
| Nucleolus | where rRNA & ribosomes are synthesized |
| Ribosomes | protein factories |
| Peroxisomes | use converts $H_2O_2$ to water+$O_2$ |
| Endome-mbrane System | regulates protein traffic+m-etabolic functions |
| Nucleus | holds chromatin, surrounded by nuclear envelope |
| Endoplasmic Reticulum | Rough: makes proteins<br>Smooth: synthesizes lipids, stores Ca++, detoxifies drugs/poisons |
| Golgi Apparatus | processes, packages, & secretes substances |
| Lysosomes | intracellular digestion |
| Mitochondria | powerhouse of the cell :) (respiration) |
| Vacuoles | storage & pumping out water |
| Chloroplast | absorbs light & synthesize sugar |
| Cytosk-eleton | maintains cell shape, flow, positioning |
| Centrioles Centro-somes MTOCs | organize spindle fibers (cell division) |
| Cell Wall | protects, maintains shape, regulates water intake |

## Prokaryotic vs. Eukaryotic Cells

| Prokaryotes | Eukaryotes |
|---|---|

## Prokaryotic vs. Eukaryotic Cells (cont)

| | |
|---|---|
| -no internal membranes/organelles | -membrane-bound organelles |
| -circular DNA | -DNA forms chromosomes |
| -small ribosomes | -larger ribosomes |
| -anaerobic or aerobic metabolism | -aerobic metabolism |
| -no cytoskeleton | -cytoskeleton present |
| -mainly unicellular | -mainly multicellular |
| -very small | -larger cells |

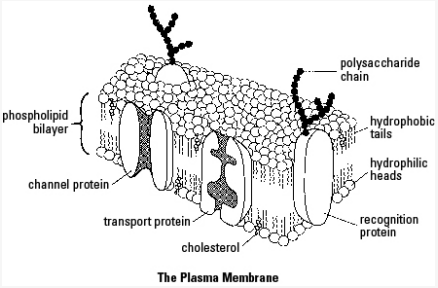
## Water Potential (Ψ= Ψp+ Ψs)

| | |
|---|---|
| water potential | potential energy of water to move elsewhere |
| solute potential | tendency of water to move across a permeable membrane into solution (Ψs=-iCRT) |

## Types of Cell Communication

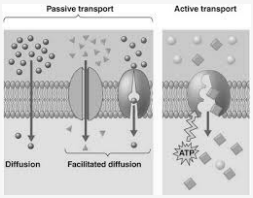
| | |
|---|---|
| Quorum Sensing | monitors bacteria population density & controls gene expression |
| Autocrine Signals | produced & used by same cell |
| Juxtacrine Signals | physically touching cells (gap junctions, plasmodesmata) |
| Paracrine Signals | adjacent (not touching) cells (synapses, growth factors) |
| Endocrine Signals | for all tissues, long distance (hormones) |

## Plasma Membrane Structure

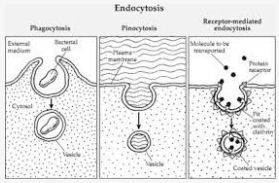


The Plasma Membrane

## Plasma Membrane Transport




## Endocytosis & Exocytosis




## Signal Transduction Pathways- Reception

| | |
|---|---|
| Reception | ligand binds to cell membrane or intracellular receptors & activates 2nd messenger |
| Ion channel | allows influx of ions to carry a message |
| GPCR | ligand binds, changes cytopl-asmic structure, activates G protein, bonds to GTP, catalyzes cAMP production |
| Protein kinase (RTKs) | ligand binds, aggregates+acti-vates tyrosine kinase regions, activates relay proteins |
| Intrac-ellular | hydrophobic messengers diffuse into the cell and control genes |

## Signal Transduction & Response

| | |
|---|---|
| Signal transd-uction pathway | multistep process in which extracellular signal molecules produce a cascade effect |
| Second messenger | intermediate molecule (like cAMP) that distributes+amp-lifies signal throughout the cell |
| Response | regulation of protein synthesis by turning genes on/off |

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Published 24th April, 2017.
Last updated 24th April, 2017.


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## Apoptosis

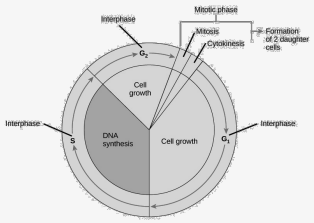
may be engulfed when no longer needed

cells with genetic damage are replaced

defense against infection

signals trigger caspases to carry out apoptosis

## The Cell Cycle

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Published 24th April, 2017.
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