Intercellular connections

1- **Simple contact** - membranes of two cells are on distance of 10-12 nm in such manner that glycocalyx one cell adjoins with glycocalyx of another cell, The basic function is metabolism and information Interchange between cells.

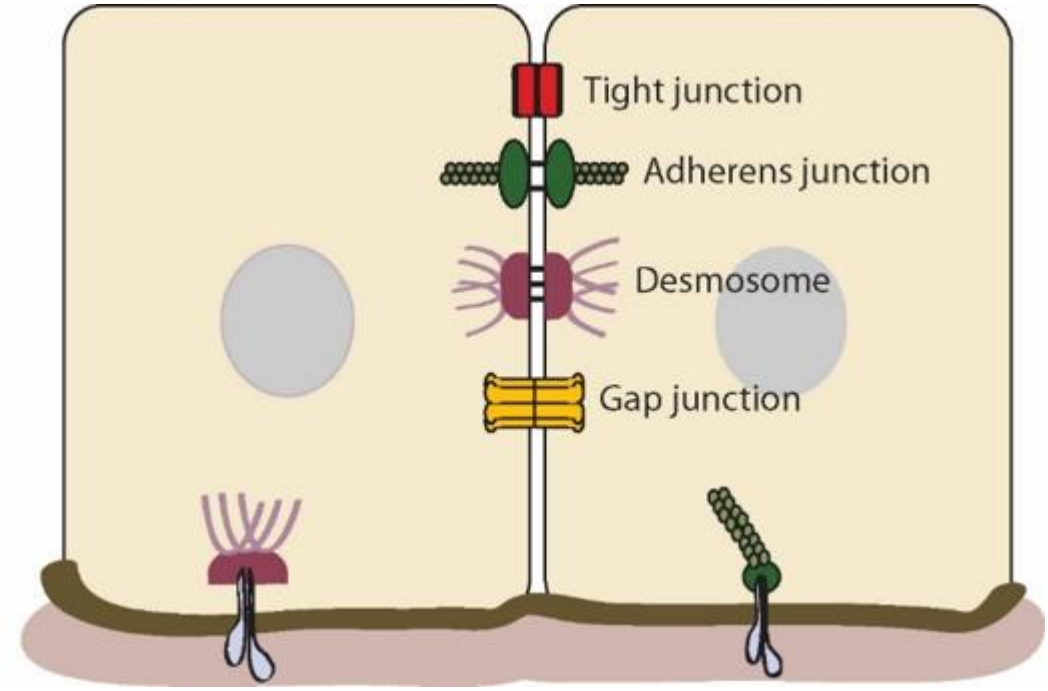
2- **Zonulae oceludentes**-also called tight junctions; Zonula occludes are located between Adjacent plane mecmbranes most typically, car the apiees of epithelial cells. They form o “belt- like" junction that encircles the entire circumference of the cell. These junctions act as barriers that prevent the movement of molecules imto the Intercellular spaces.

3- **Zonular aodherentes** are band-like adhesion, This device surrounds the eell and joins ft to its neighbors.

4- **Desmosomes (Maculae adherents)** This is the most common type of tight junction between adjoining cells,
A desmovome is a small circumscribed area of attachment- attachment plaques. At the side of a desmosome the plasma membrane (of each cell) by thickened because of the presence of dente laver of protein on Inner surface.
Desmosomes are serving to attach the basal cell membrane to the basal lamina.

5- **Gap junctions**, also called communicating junctions, are regions of intercellular communication. They are widespread in epithelial tissues, in cardiac muscle smooth muscle cells and neurons. Gap junctions are built by six closely packed transmembrane proteins connexins that assemble to from structures called connexons. The two connexons fuse, forming the functional intercellular communication channel.

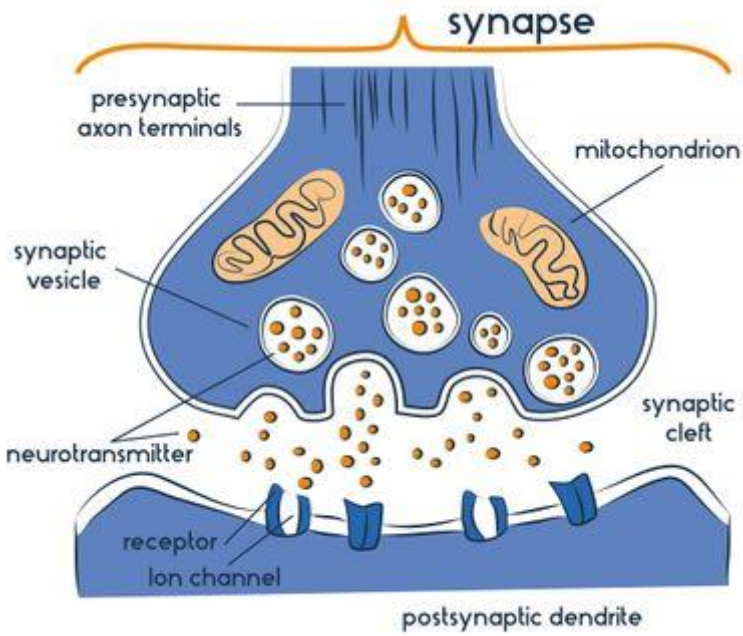
6- The hydrophilic cho permits the passage of lens, seal molecules and hormones.



Intercellular connections

7- **Plasma membrane enfoldings** of the basal plasma membrane increase the surface area available for transport. The basal surface of some epithelia, especially those involved in ion transport, possesses multiple enfoldings of the basal plasma membrane These enfoldings partition the basal cytoplasm and many mitochondria into the finger-like enfoldings.

8- **Synapse** - type of contact between two nervous cells or between a nervous cell and a muscle. Through synapses pass nervous impulses,



Cytoplasm structures can be divided into 3 groups:

1- **Organelles** are membrane-bound, enzyme- containing, permanent subcellular compartments.

2- **Cytoplasmic inclusions** are structures, membrane- bound or not, that are generally more transient than organelles and less actively involved in cell metabolism.

3- **Cytoplasmic matrix** the cytoskeleton is composed of proteinaceous elements that form a supporting network within the cytoplasm; some of these elements (microtubules) also form discrete cytoplasmic structures such as centrioles.

Organelles

Organelles constantly present in cell are described as membranous and nonmembrane us.

A - The membranous organelles include:

- endoplasmic reticulum (rER and sER)\
- mitochondria

- Golgi apparatus
- Isomers
- peroxisomes

B- The nonmembranous organelles include:

- microtubules
- filaments (different varieties)
- centrioles
- ribosomes

Membranous organelles are the most part of organdies of a cell.

1- Mitochondria

The largest of the cytoplasmic organelles, mitochondria are the energy providers of the cell. The sine to bacteria (usually 2-6 mm in lengtht and (.2 mm in diameter but quite variable) and have varios shapes: spheric, ovoid, filamentous, Each mitochondrion is bounded by 2 unit membranes.

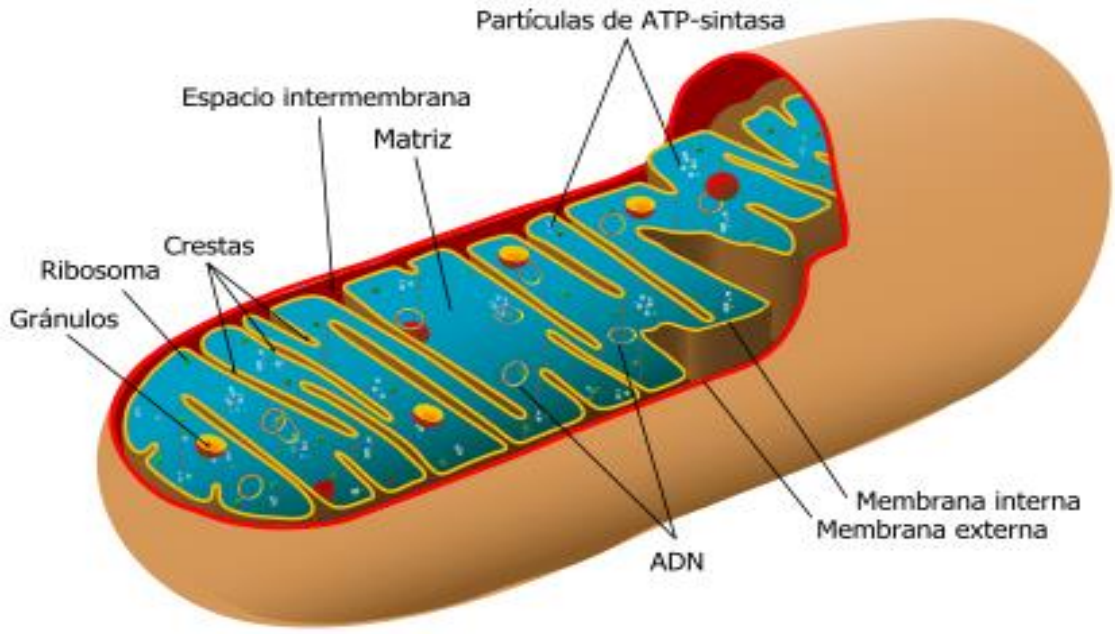
- The outer mitochondrial membrane bas a smooth contour and forms a continuous bet relatively porous covering. It is freely permeable to various small molecules.
- **The inner mitochondrial membrane** is less porous and is therefore semipermeable, It has numerous infoldings, or cristae, that project into the mitochondrion's interior. The mitochondrial cristae or most cells are shelf like. but those in steroid secreting typically more tubular.

The mitochondrial membranes create 2 membrane-limited spaces. The intermembrane space is located between the inner and outer membranes and is continuous which the intercristal space that extends inion the cristae. The intercristal space, or matrix space, is echoed by the inner membrane and contains the mitochondrial matrix.

The mitochondrial matrix contains water, solutes, and large matrix granules, believed to be concerned which mitochondrial calcium-ion concentrations, It also contains

Circular DNA and mitochondrial ribosomes similar to those of bacteria.

The matrix contains numerous soluble cozy involved in such specialized mitochondrial functions as the Krebs cycle , tricarboxylic acid cycle ,b-oxidation of lipids, and mitochondrial DNA synthesis.



Function the provider of cell with the energy for chemical and mechanical work by storing energy generated from cellular metabolites in the high-energy bonds of ATP.

Mitochondria are found in nearly all eukaryotic cells, and in most they are dispersed throughout the ectoplasm.

- However, they accumulate in the highest concentrations in cell types and intracellular regions with the highest cherry requirements.
- Cardiac muscle cells are notable for the abundance of their mitochondria.
- Epithelial cells linkage the kidney tubules howe abundant mitochondria interdigitated between basal plasma membrane infoldings where active transport of ions and water occurs.

Cellular respiration

The process by which organisms combine oxygen with foodstuff molecules, diverting the chemical energy in these substances into life-sustaining activities and discarding, as waste products, carbon dioxide and water. Organisms that do not depend on oxygen degrade foodstuffs in a process called fermentation. (For longer treatments of various aspects of cellular respiration, *see* tricarboxylic acid cycle and metabolism.)

One objective of the degradation of foodstuffs is to convert the energy contained in chemical bonds into the energy-rich compound adenosine triphosphate (ATP), which captures the chemical energy obtained from the breakdown of food molecules and releases it to fuel other cellular processes. In eukaryotic cells (that is, any cells or organisms that possess a clearly defined nucleus and membrane-bound organelles) the enzymes that catalyze the individual steps involved in respiration and energy conservation are located in highly organized rod-shaped compartments called mitochondria. In microorganisms the enzymes occur as

components of the cell membrane. A liver cell has about 1,000 mitochondria; large egg cells of some vertebrates have up to 200,000.

Aerobic respiration

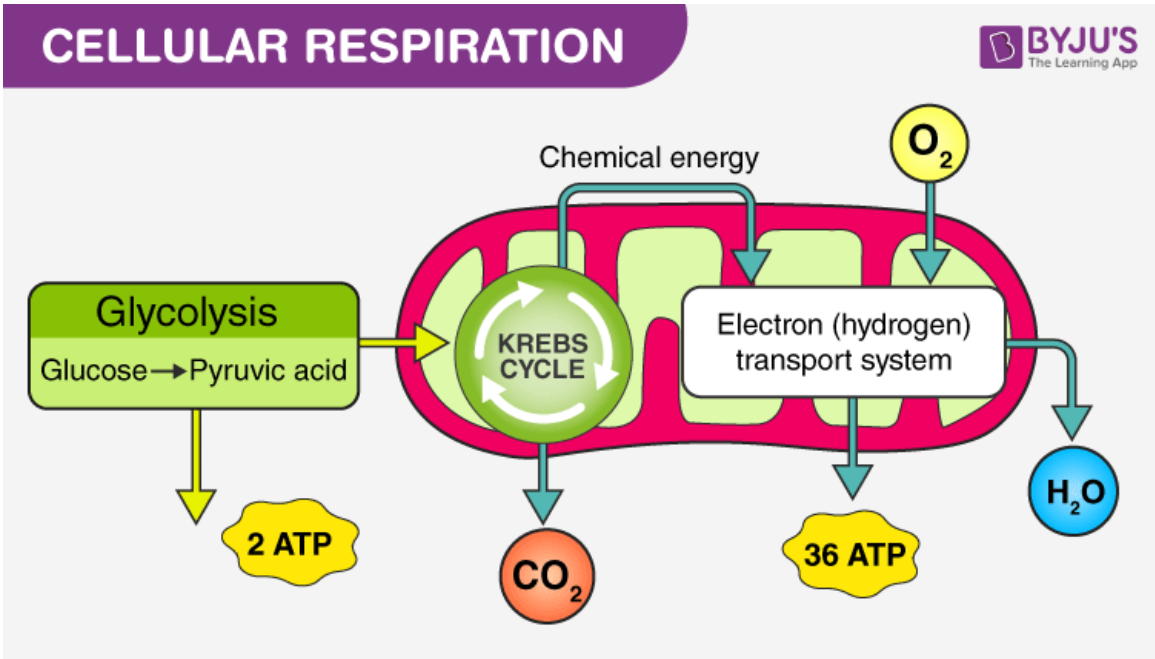
Aerobic respiration requires oxygen (O_2) in order to create ATP.

Although carbohydrates, fats, and proteins are consumed as reactants, aerobic respiration is the preferred method of pyruvate breakdown in glycolysis, and requires pyruvate to the mitochondria in order to be fully oxidized by the citric acid cycle. The products of this process are carbon dioxide and water, and the energy transferred is used to break bonds in ADP to add a third phosphate group to form ATP (adenosine triphosphate), by substrate-level phosphorylation, NADH and $FADH_2$.

$C_6H_{12}O_6 + 6\ O_2 \rightarrow 6\ CO_2\ \ 6\ H_2O$ + heat

Main metabolic processes

Biologists differ somewhat with respect to the names, descriptions, and the number of stages of cellular respiration. The overall process, however, can be distilled into three main metabolic stages or steps:1- glycolysis, the 2- tricarboxylic acid cycle (TCA cycle), and 3- oxidative phosphorylation (respiratory-chain phosphorylation).


CELLULAR RESPIRATION
BYJU'S
The Learning App
Chemical energy
O_2
Glycolysis
Glucose → Pyruvic acid
KREBS CYCLE
Electron (hydrogen) transport system
H_2O
2 ATP
CO_2
36 ATP