

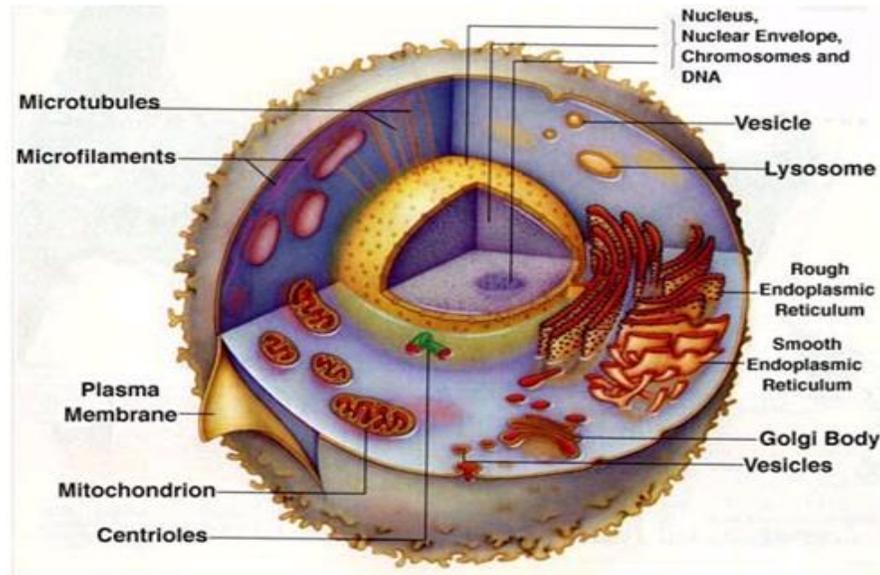
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Topic 3.3 – Nutrition & Energy Systems

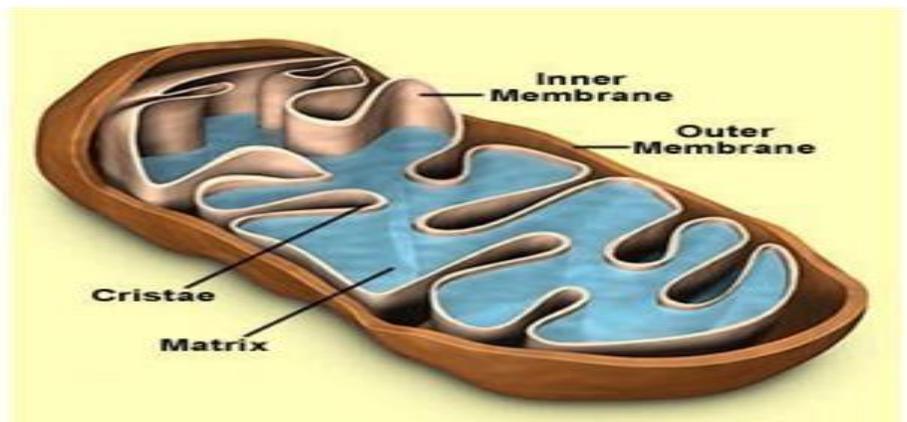
IB SEHS

3.3.1 Draw a diagram to show the ultrastructure of a generalized animal cell.



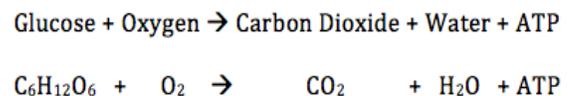
3.3.2 Draw a diagram to show the ultrastructure of a mitochondrion.

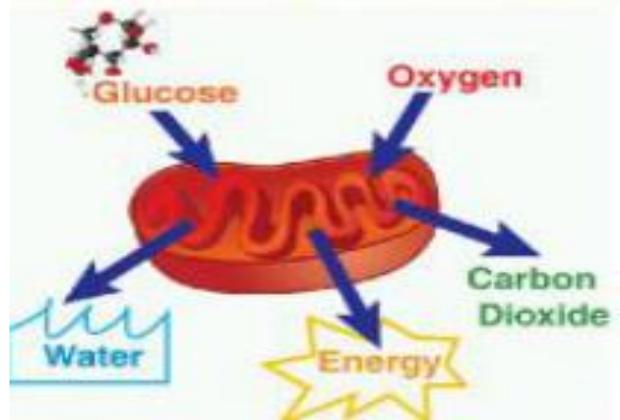
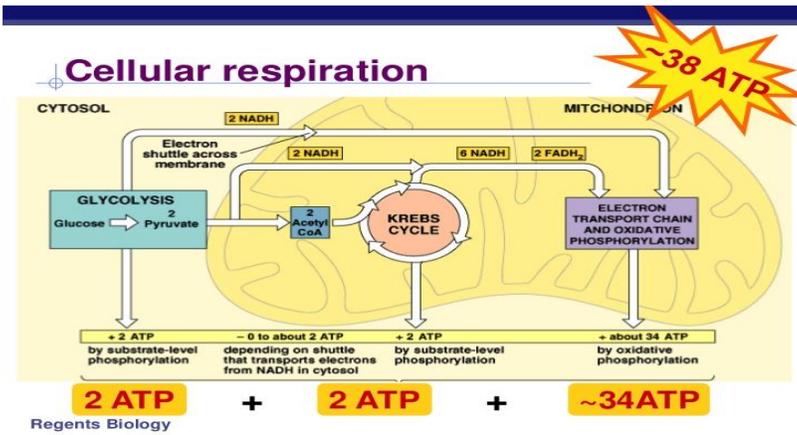
- Mitochondria are _____-enclosed [organelles](#) distributed through the cytosol of cells.
- Their number within the cell ranges from a few _____ to, in very active cells, thousands.
- Their main function is the conversion of the _____ energy of food molecules into ATP. Mitochondria have: an outer membrane that encloses the entire structure
- an inner _____ that encloses a fluid-filled matrix
- between the _____ is the intermembrane space



3.3.3. Define the term cell respiration

- Cell _____ is defined as the controlled release of energy in the form of ATP from organic compound in cells.
 - ATP is a chemical compound that provides energy for muscle _____. Cellular respiration can also be fueled by _____, fats and proteins. These are all macronutrients.
- There are two types of respiration: aerobic respiration, and anaerobic respiration.
 - _____ respiration results in **MORE** energy for cell use. It also **NEEDS** the presence of oxygen.
 - _____ respiration results in **LESS** energy for cell use. This happens in **LOW** or **ABSENCE** of oxygen.
- Any movement made by the body requires a series of _____ muscle contractions, which requires energy. For movement to happen, the body _____ stored chemical energy to mechanical energy.
 - Adenine _____ needs to be broken down to meet the chemical energy requirement.

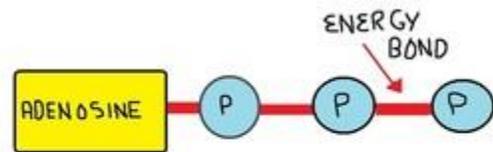




- We can divide cellular respiration into _____ metabolic processes: _____, the Krebs cycle, and oxidative phosphorylation. Each of these occurs in a specific region of the cell.
 - Glycolysis occurs in the _____. In the absence of oxygen, glycolysis occurs in the cytosol as well.
 - The Krebs cycle takes place in the _____ of the mitochondria.
 - Oxidative _____ via the electron transport chain is carried out on the inner mitochondrial membrane.
 - the metabolic pathway in which cells use enzymes to _____ nutrients, thereby releasing energy which is used to reform ATP. In most eukaryotes, this takes place inside mitochondria.

3.3.4 Explain how adenosine can gain and lose a phosphate molecule.

- ATP consists of one _____ of adenosine and three molecules of phosphate.
- Energy is released from ATP by the _____ of the bonds that hold the molecules together.
- The adenosine triphosphate (ATP) molecule stores _____ when it is not needed, but is able to release it when the body needs it.
- ATP works by losing the endmost _____ group when told to do so by an enzyme. This releases a lot of energy, which can then be used to build _____, contract muscles, etc.
 - The end product is adenosine _____ (ADP), and a phosphate molecule.
 - Additional energy can be _____ by removing a second phosphate group to produce adenosine-monophosphate (AMP) (**RARE**).
- When the body is resting and energy is not _____ needed, the _____ reaction takes place and the phosphate group is reattached to the molecule using energy obtained from food.



3.3.5 Explain the role of ATP in muscle contraction

- ATP provides _____ amount of energy for muscle contraction. 2 _____ supply of energy
 - ATP breaks down the _____-actin cross-bridge, freeing the myosin for the next contraction
 - First, ATP binds to myosin, breaking down an actin-myosin bridge and causing muscle _____ to stop.

- ii. The free myosin and its bridge then move to a point where they can attach to actin. At this point, ATP is broken down into _____ diphosphate and P (inorganic phosphate), generating energy.
- iii. ADP (adenine diphosphate), P and the _____ bridge then attach to actin, causing muscle contraction.
- iv. During the muscle _____ phase, actin displaces ADP and P at the myosin cross bridge. ADP and P are then reconstituted into ATP by the body, and the _____ starts again.
 1. _____ contraction also requires the brain, the nervous system and other body systems to _____ properly.