



جامعة المستقبل
AL MUSTAQBAL UNIVERSITY
كلية العلوم

قسم الأنظمة الطبية الذكية

General Anatomy and Physiology

(L8) Respiration

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Respiration

- **Respiration** is the process of gas exchange between the air and an organism's cells. Three types of respiration include internal, external, and cellular respiration.
- **External respiration** is the breathing process. It involves inhalation and exhalation of gases.
- **Internal respiration** involves gas exchange between the blood and body cells.
- **Cellular respiration** involves the conversion of food to energy, There are 2 types:

Aerobic respiration is a cellular respiration that requires oxygen while **anaerobic respiration** does not.

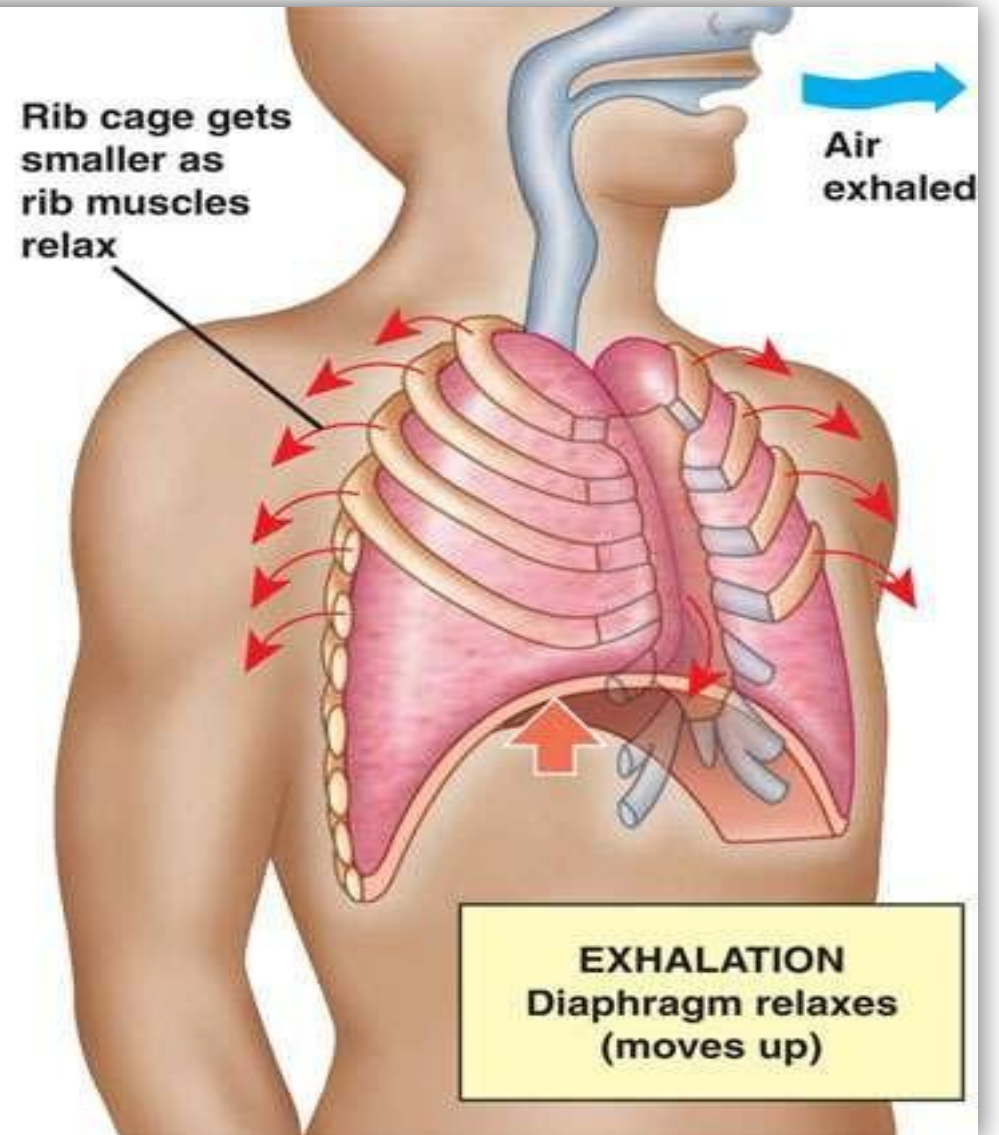
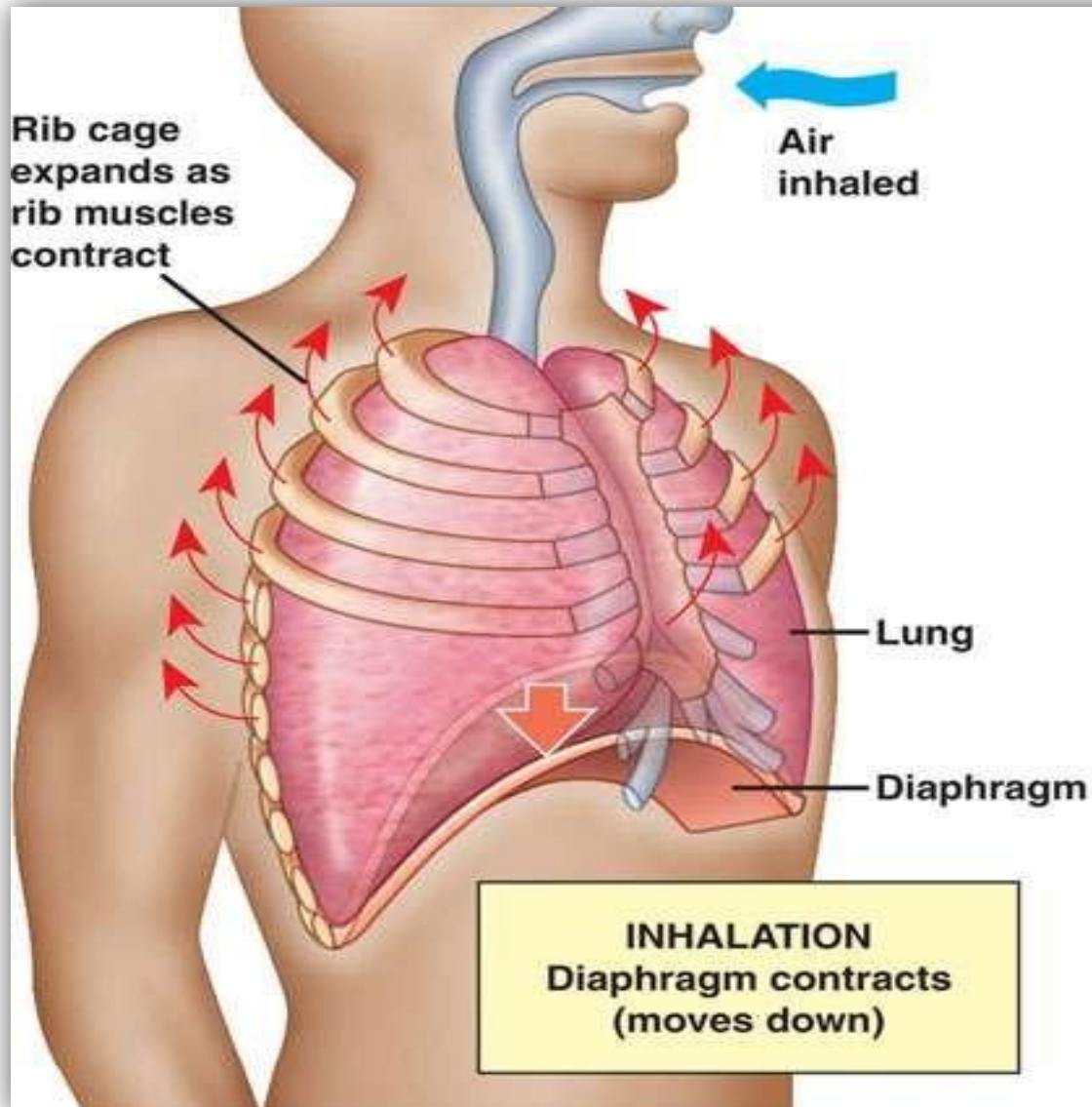
External Respiration

In the human body, oxygen is taken into the lungs by inhalation and carbon dioxide is expelled from the lungs by exhalation. External respiration in mammals encompasses the mechanical processes related to breathing. This includes contraction and relaxation of the diaphragm and accessory [muscles](#), as well as breathing rate.

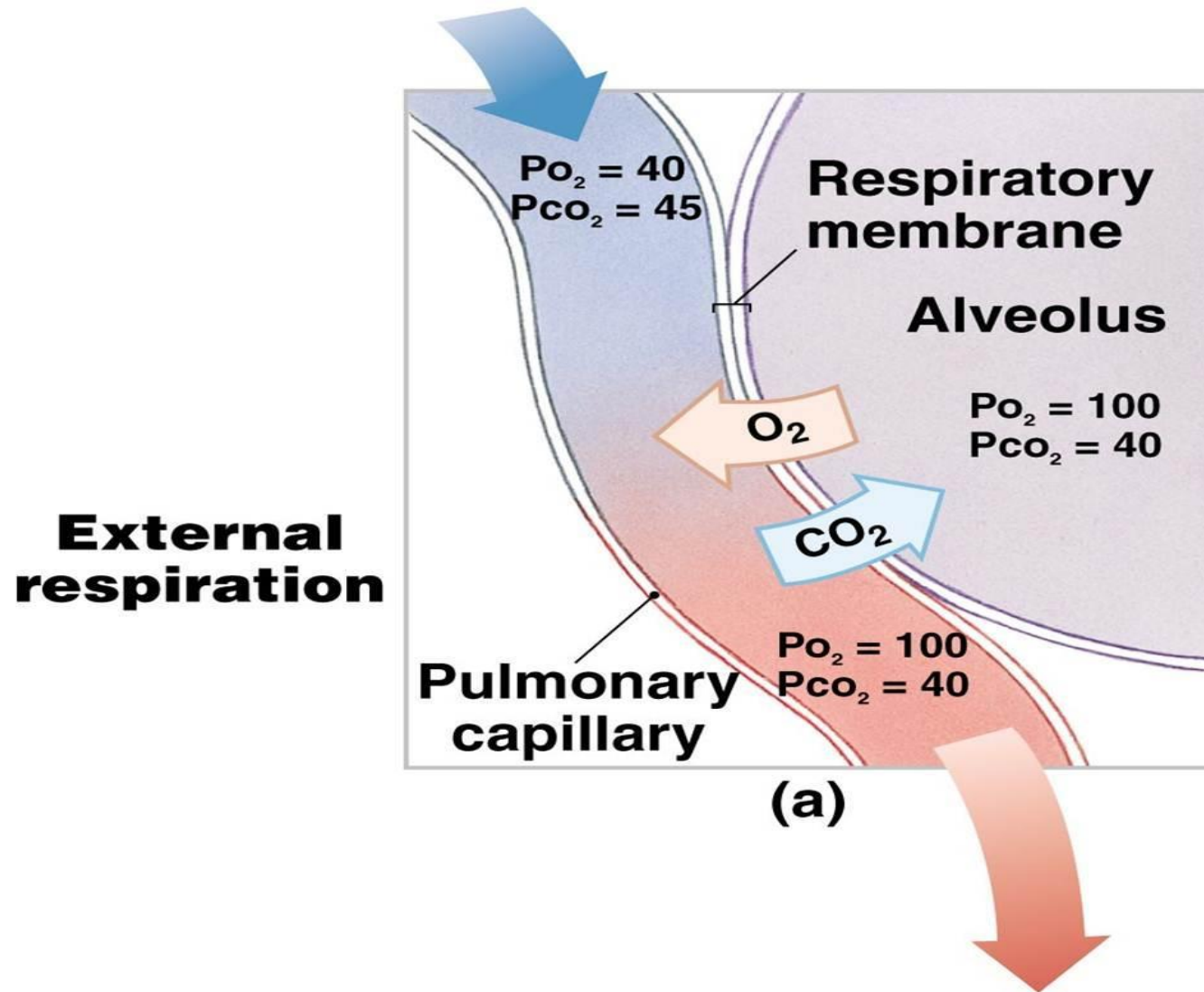
Internal Respiration

Internal respiration involves the transportation of gases between the blood and body tissues. Oxygen within the lungs diffuses across the thin epithelium of lung alveoli (air sacs) into surrounding capillaries containing oxygen depleted blood. At the same time, carbon dioxide diffuses in the opposite direction (from the blood to lung alveoli) and is expelled. Oxygen rich blood is transported by the circulatory system from lung capillaries to body cells and tissues. While oxygen is being dropped off at cells, carbon dioxide is being picked up and transported from tissue cells to the lungs

Mechanism of Breathing

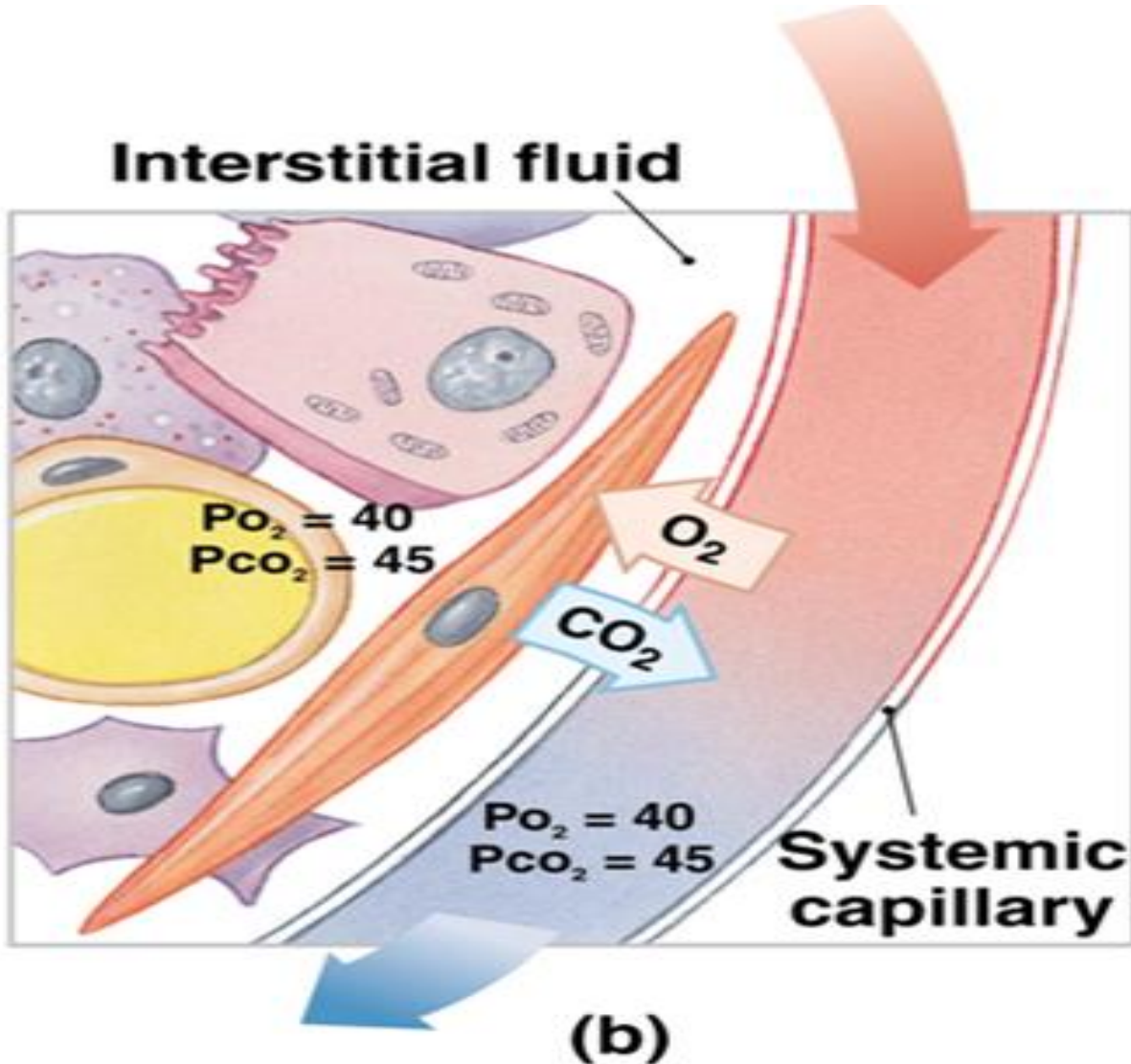


External Respiration



External respiration is a physical process in which oxygen is taken up by capillaries of lung alveoli and carbon-dioxide is released from blood.

Internal Respiration

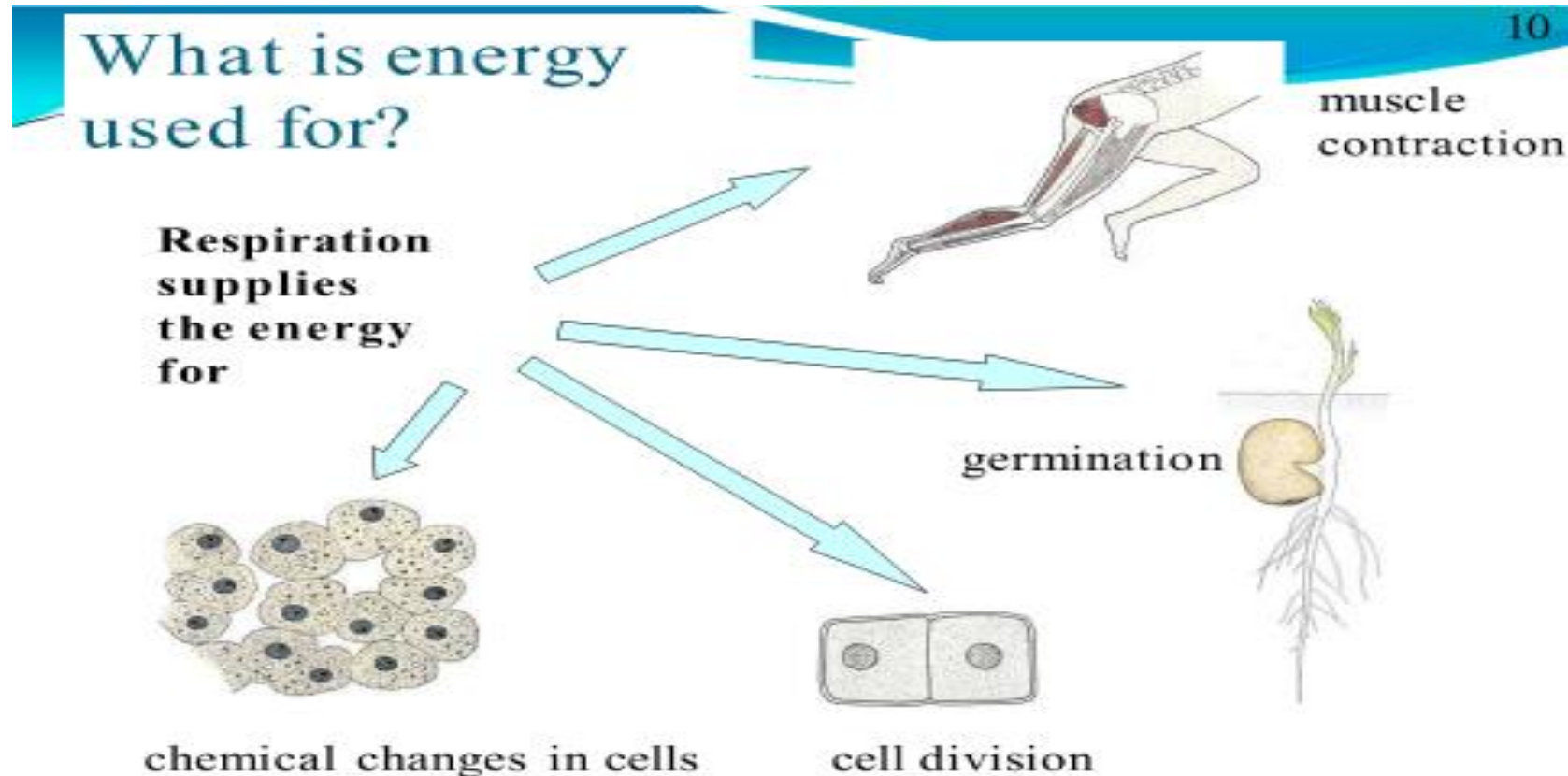


Internal respiration is about ensuring the transport of oxygen in the blood from the lungs to the cells, and the transport of metabolic carbon dioxide from the tissue cells into the blood and to the lungs.

Cellular Respiration

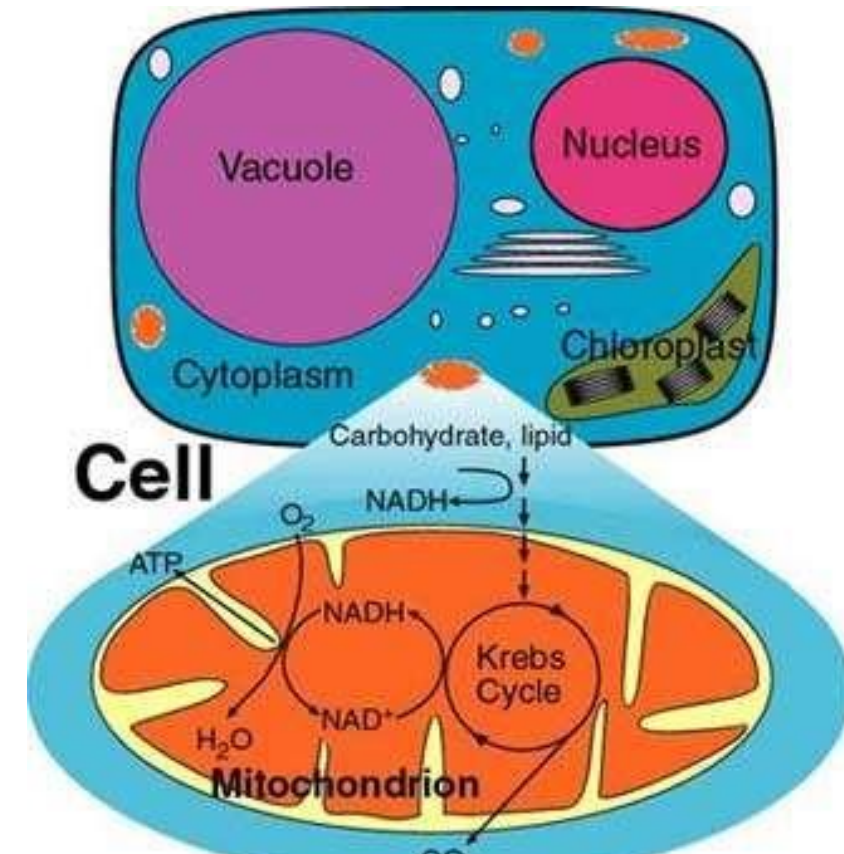
Cellular respiration may be described as a set of metabolic reactions and processes that take place in the cells of organisms to convert chemical energy from nutrients into ATP, and then release waste products.

Cellular respiration is a vital process that occurs in the cells of all living organisms



Cellular Respiration and Production of ATP

- Respiration uses chemical energy in the form of carbohydrates, lipids, or proteins, to produce ATP
- The breakdown of organic molecules (carbohydrates, lipids, proteins) releases energy
- The energy released is used to build molecules of ATP
- When a cell requires some energy it will break down ATP



Respiration

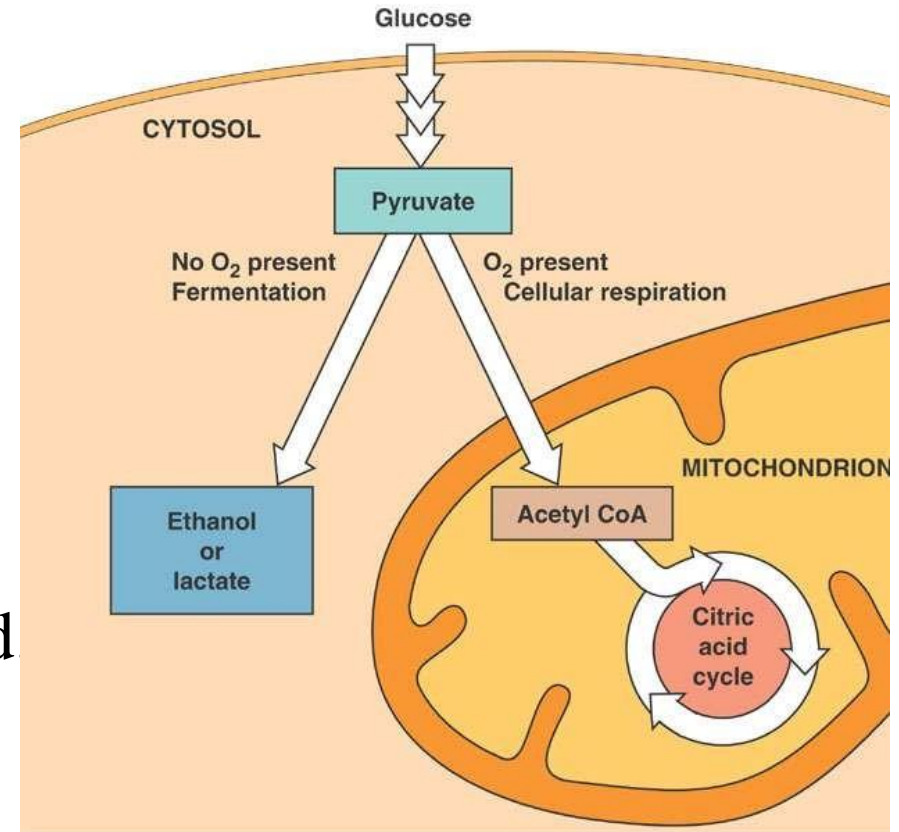
- There are two types of respiration
 - Aerobic (requires oxygen)
 - Anaerobic (does not requires oxygen)
- **Aerobic:** (Requires Oxygen)
- Main type of respiration that occurs in most situations in Plants and Animals
- Involves complete breakdown of glucose back to CO₂ and Water



Anaerobic Respiration

‘Fermentation’

- Releases energy from glucose without the presence of oxygen
- ATP is still produced from glucose but not as efficiently as with Aerobic Respiration
- It is accompanied by the production of lactic acid
 - Produces only 2 ATP

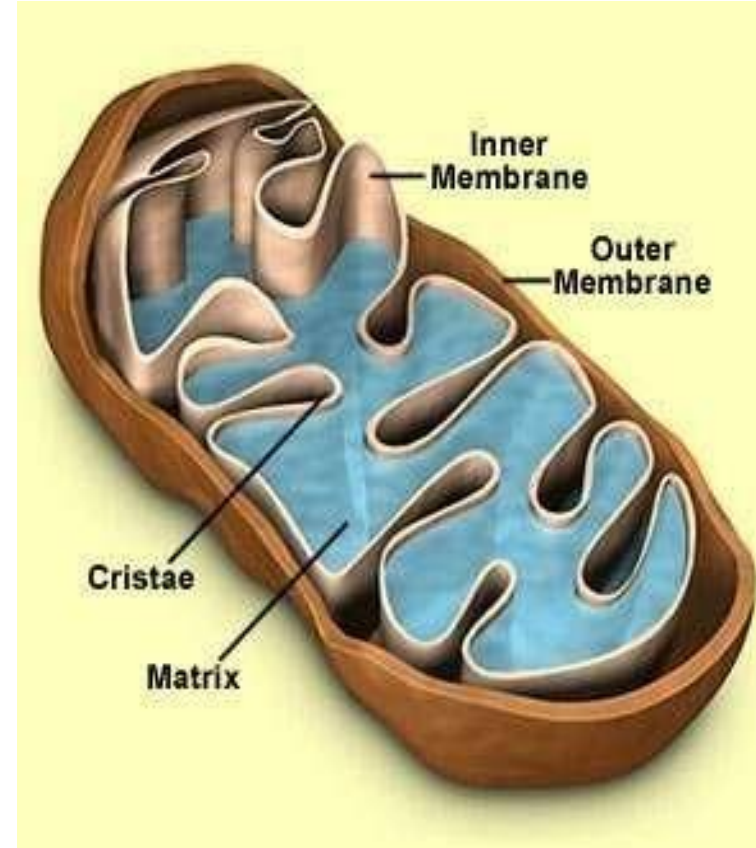


Mitochondria Function

Mitochondria are often called the “powerhouses” or “energy factories” of a cell because they are responsible for making adenosine triphosphate (ATP), the cell’s main energy-carrying molecule. ATP represents the short-term stored energy of the cell.

Cellular respiration is the process of making ATP using the chemical energy found in glucose and other nutrients. **In mitochondria**, this process uses oxygen and produces carbon dioxide as a waste product.

It is important to point out that muscle cells have a very high concentration of mitochondria that produce ATP. When your cells don’t get enough oxygen, they do not make a lot of ATP. Instead, the small amount of ATP they make in the absence of oxygen is accompanied by the production of lactic acid.



<u>Term:</u>	<u>Meaning</u>
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Cellular respiration:	The process by which organisms break down glucose into a form that the cell can use as energy
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ATP:	Adenosine triphosphate, the primary energy carrier in living things
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Mitochondria:	The cell structure where cellular respiration occurs
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Cytoplasm:	The contents of a cell between the plasma membrane and the nuclear envelope; includes cytosol which is the jelly-like substance that fills the space between organelles
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Aerobic:	Process that requires oxygen
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Anaerobic:	Process that does not require oxygen
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Fermentation	An anaerobic pathway for breaking down glucose
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THANK YOU!

