

Anaerobic Respiration - Fermentation

▶ Be ready to discuss

- Why do we need oxygen?

Anaerobic Respiration - Fermentation

KEY CONCEPT

Fermentation allows the production of a small amount of ATP without oxygen.



Anaerobic Respiration - Fermentation

- If no oxygen is available, cells can obtain energy through the process of anaerobic respiration.
- A common anaerobic process is fermentation.
- Fermentation is not an efficient process and results in the formation of far fewer ATP molecules than aerobic respiration.

There are two primary fermentation processes:

1. Lactic Acid Fermentation
2. Alcohol Fermentation

Anaerobic Respiration - Fermentation

Lactic acid fermentation occurs when oxygen is not available.

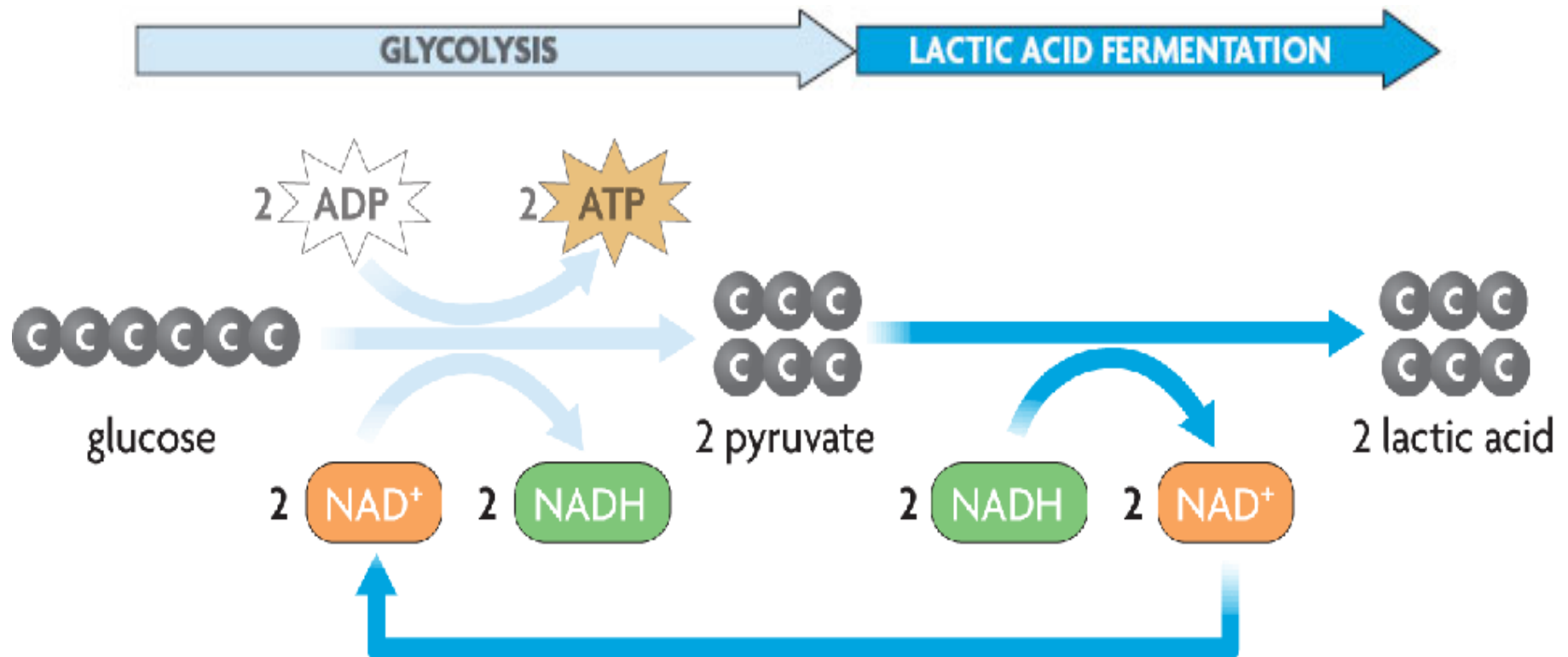
For example, in muscle tissues during rapid and vigorous exercise, muscle cells may be depleted of oxygen. They then switch from respiration to fermentation.



Anaerobic Respiration - Fermentation

The pyruvic acid formed during glycolysis is broken down to lactic acid and energy is released (which is used to form ATP).

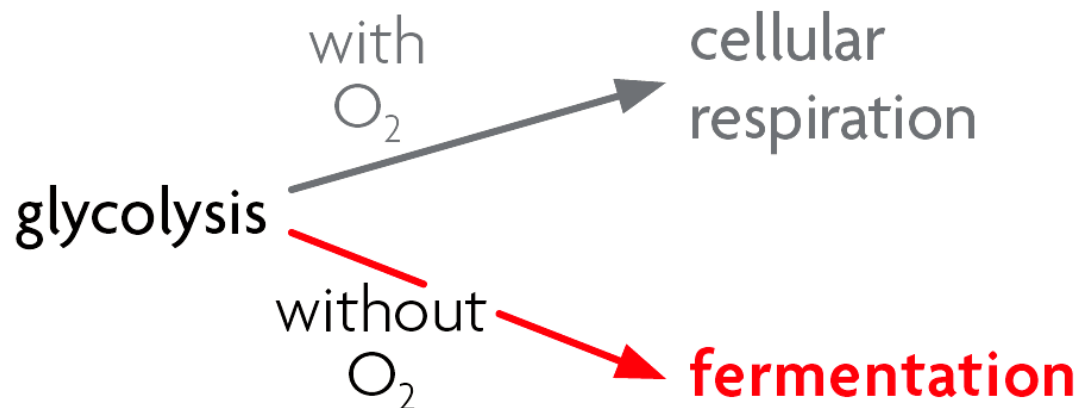
Glucose \rightarrow Pyruvic acid \rightarrow Lactic acid + energy



Anaerobic Respiration - Fermentation

- The process of **lactic acid fermentation** replaces the process of aerobic respiration so that the cell can have a continual source of energy, even in the absence of oxygen.
- However this shift is only temporary and cells need oxygen for sustained activity.


Fermentation is an anaerobic process that allows glycolysis to continue.




Anaerobic Respiration - Fermentation

- Lactic acid that builds up in the tissue causes a burning, painful sensation.

**Extreme Exertion =
Muscle Weakness & Acidosis**



**Energy
Depletion**

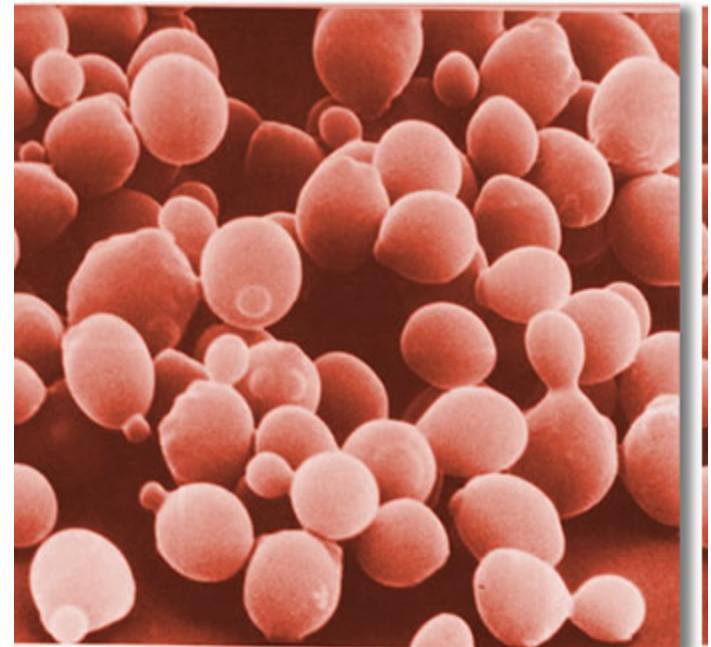
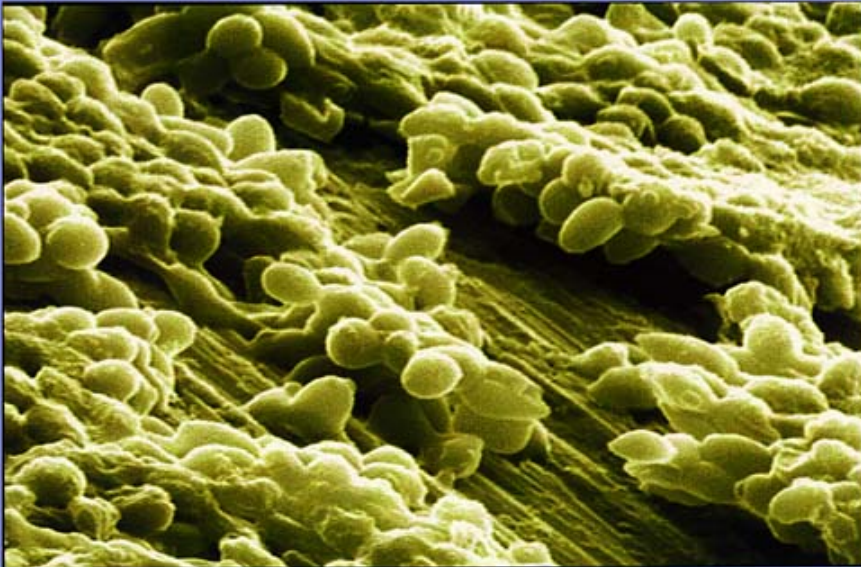


The image is a blue rectangular graphic. At the top, it contains the text 'Extreme Exertion = Muscle Weakness & Acidosis' in yellow. Below this text is a red arrow pointing downwards and to the right. On the left side of the graphic is an anatomical illustration of a human shoulder and upper arm, showing the skeletal structure and the surrounding muscle tissue. To the right of the illustration, the text 'Energy Depletion' is written in large yellow letters. Below this text is a small, circular, serrated gear-like object.

Anaerobic Respiration - Fermentation

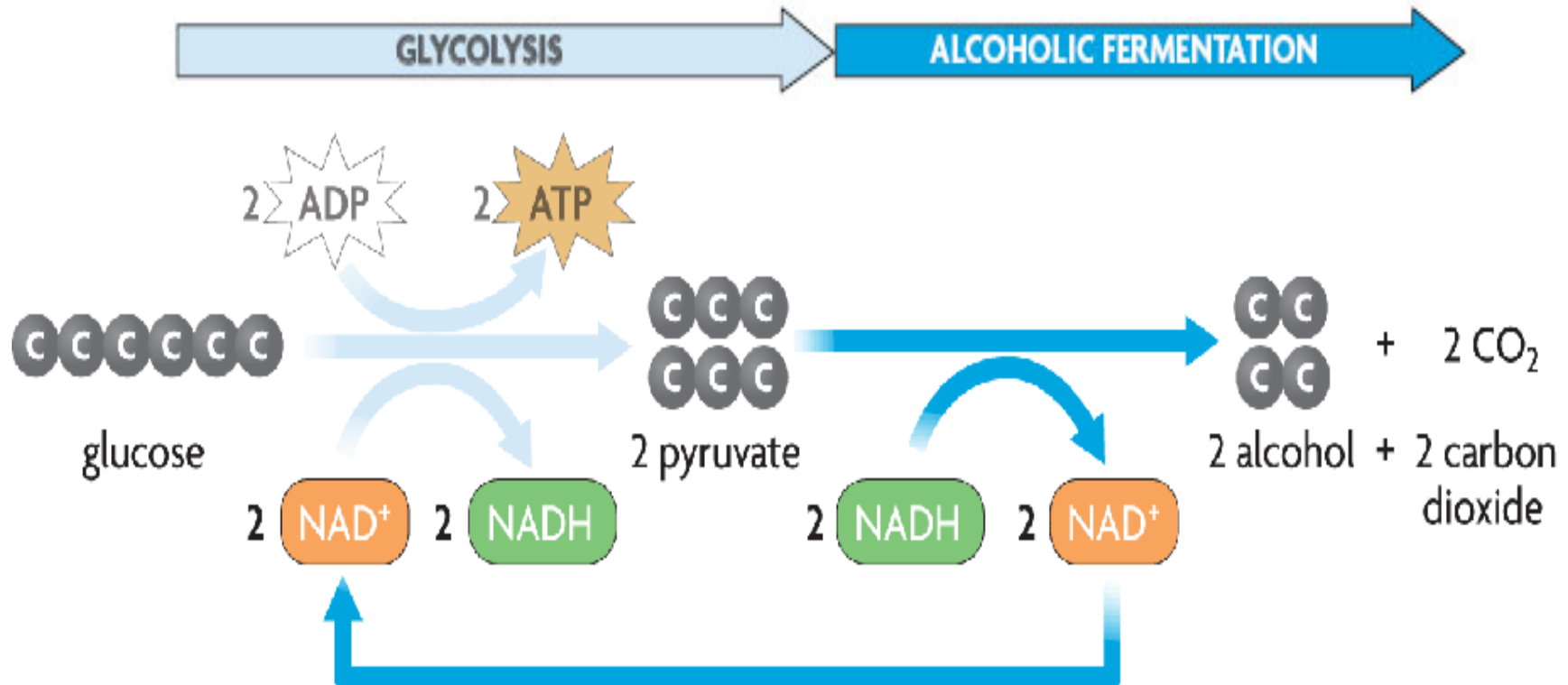
Alcohol fermentation occurs in yeasts and some bacteria.

Pyruvic acid formed during glycolysis is broken down to produce alcohol and carbon dioxide and is released (which is used to form ATP).



Anaerobic Respiration - Fermentation

Glucose \rightarrow Pyruvic acid \rightarrow alcohol + carbon dioxide + energy



Anaerobic Respiration - Fermentation

- Fermentation is used in food production.
 - Yogurt
 - Cheese
 - Bread
 - Beer/ Meade
 - Sauerkraut
 - Soy Sauce
 - Vinegar
 - Olives/Pickles
 - Wine/ Ale
 - Malt

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HW

- Complete Section 4.6 in the Study Guide workbook (p. 41-42)
- Study for Cellular Respiration **Quiz** on Friday!!

Anaerobic Respiration - Fermentation

A microscopic view of yeast cells, showing various stages of fermentation. The cells are spherical and some contain internal structures like vacuoles and nuclei. The background is a dark, textured blue-green color.