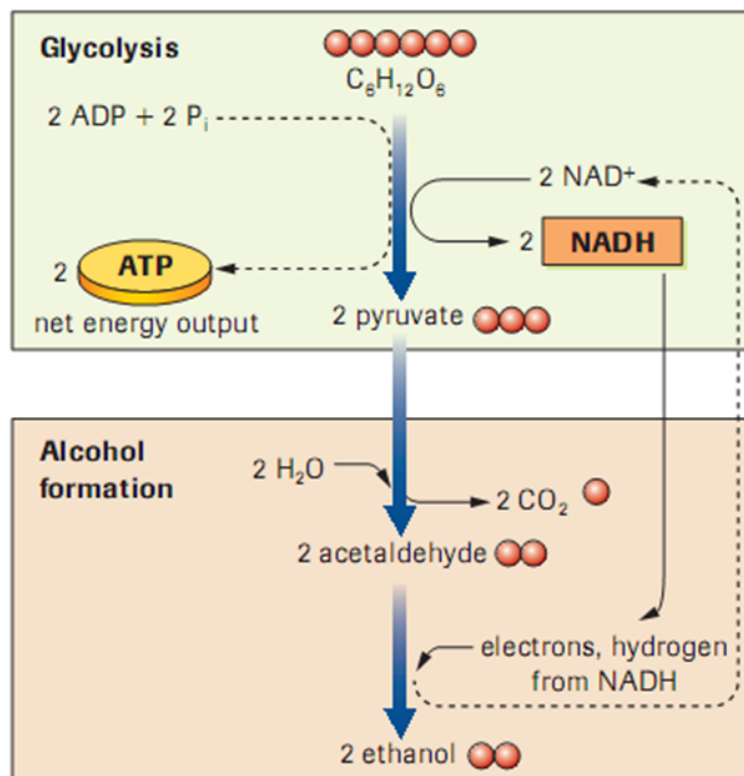


## Cellular Respiration – Chapter 7 – Lesson 3 – Anaerobic Cellular Respiration

- If the cell lacks oxygen, like during intense exercise, aerobic cellular respiration cannot occur
  - The cell still requires **ATP** to be produced
  - Anaerobic cellular respiration makes ATP in the absence of oxygen in the cell.
- There are two types of anaerobic cellular respiration
  - o Alcohol fermentation – occurs in **yeast**
  - o Lactic acid fermentation – occurs in **animal cells**

### Alcohol Fermentation

- Occurs in two stages
  - o Glycolysis – occurs in the cytoplasm
  - o Alcohol fermentation – also occurs in the cytoplasm



### IMPORTANT

- The production of ethanol allows the  $NAD^+$  to be recycled so glycolysis can continue to make ATP

Read Applications of Alcohol Fermentation on pg 222 and do # 1-3 on pg 222

## Lactic Acid Fermentation

- Under normal conditions, animals such as humans obtain energy from glucose by aerobic respiration

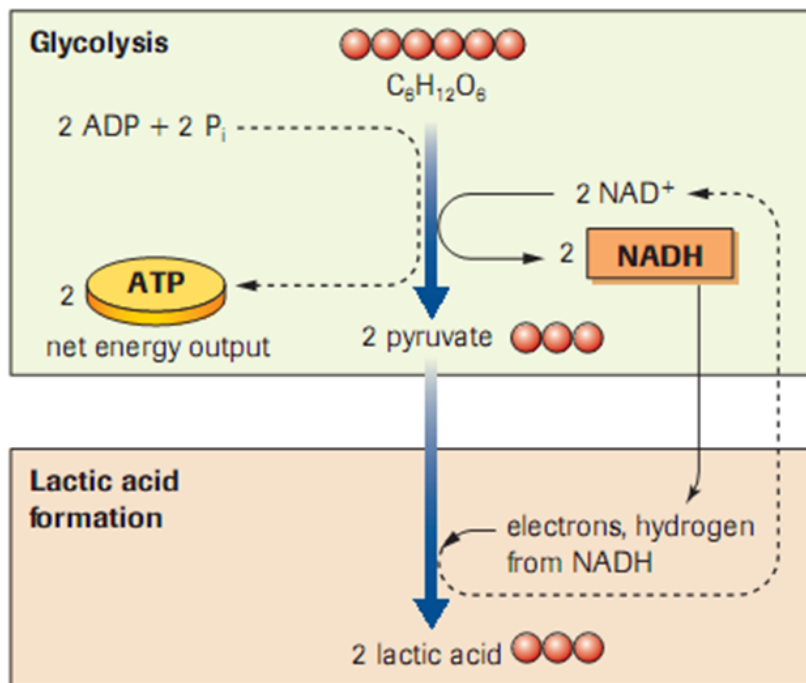
- During strenuous exercise, there is not enough oxygen for our cells to make enough <sup>ATP</sup> by aerobic cellular respiration

o This is when our cell go through Lactic acid fermentation

- Occurs in two stages

o Glycolysis

o Lactic acid fermentation – occurs in the cytoplasm



## IMPORTANT

- The production of lactic acid allows the NAD<sup>+</sup> to be recycled so glycolysis can continue to make ATP

- Accumulation of lactic acid molecules in muscle tissue causes stiffness, soreness, and fatigue

- When vigorous exercise ceases, lactic acid is converted back to pyruvate, which then goes through the remaining stages of aerobic respiration

Read 'Exercise Physiology: VO<sub>2</sub> max and the Lactic Acid Threshold

### Lesson 3 Review

Read pgs 221-228

1. What is the key advantage of anaerobic respiration? Suggest some specific situations in which this would benefit organisms in the natural environment.
2. Name a nonalcoholic final product of alcohol fermentation, other than ATP.
3. (a) How many molecules of ethanol are produced by the fermentation of one molecule of glucose?  
(b) How many molecules of carbon dioxide are produced during the fermentation of one molecule of glucose?  
(c) How much oxygen is used during the fermentation of one glucose molecule?
4. In addition to ATP, name the other final products of both types of fermentation.
5. How does a human feel the presence of lactic acid in the tissues of the body?
6. List two differences between aerobic respiration and fermentation.
7. A student regularly runs 3 km each afternoon at a slow, leisurely pace. One day, she runs 1 km as fast as she can. Afterward, she is winded and feels pain in her chest and leg muscles. What is responsible for her symptoms?
8. What role does alcohol fermentation play in the food industry?
9. Define maximum oxygen consumption,  $VO_{2max}$ .
10. (a) Determine the value of the lactic acid threshold from Figure 10.

(b) What does this value mean?

