

# Anaerobic Pathways

## Lactate Fermentation



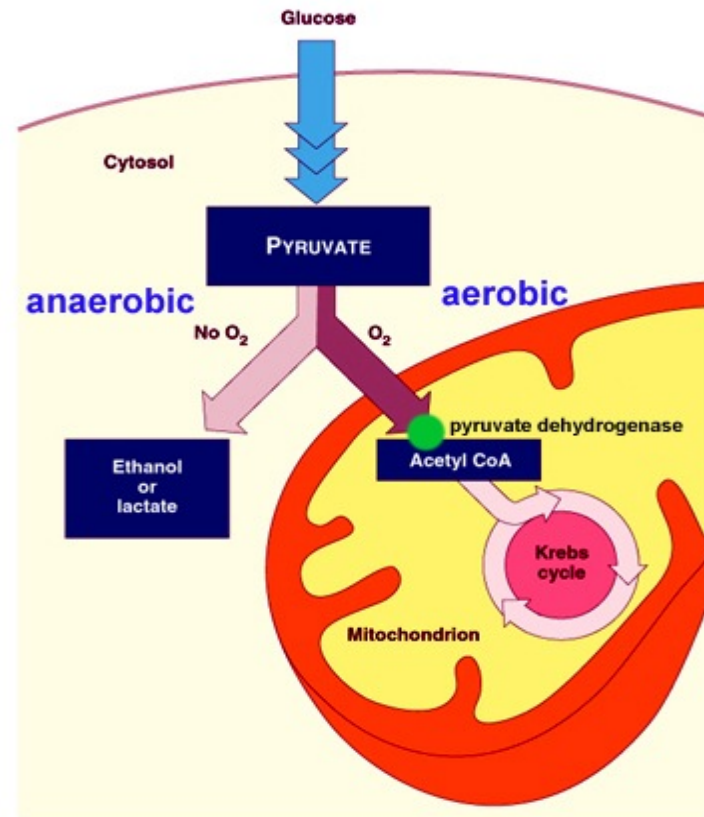
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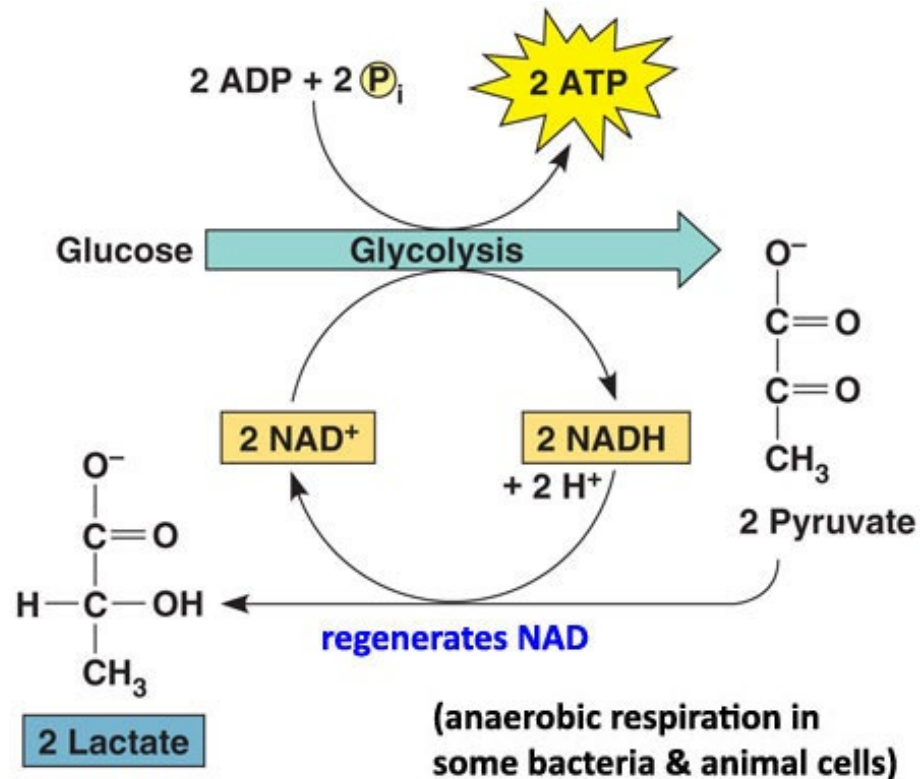


# What happens to pyruvate muscle cells when oxygen is low?

- fermentation is the anaerobic reduction of pyruvate to lactic acid



# Lactate Fermentation



(b) Lactic acid fermentation

# Lactate Fermentation Summary

- Muscle Cells that operate in the low of O<sub>2</sub> will reduce pyruvate to Lactate.
- The net gain is 2 ATP per sugar molecule gained during glycolysis
- NADH is oxidized to regain NAD<sup>+</sup>
  - > This is \*\*\*Key since NAD<sup>+</sup> is needed to maintain the glycolysis reaction

## NET REACTION

Glucose + 2 ADP → 2 Lactate + 2 ATP

(pyruvate + NADH → Lactate + NAD<sup>+</sup> )

# Lactate Threshold

- lactate production is ongoing during strenuous exercise
- lactate is sent to the liver (to avoid lactate in the muscles)
- a threshold is reached when the build up of lactate exceeds our ability to shuttle it out of the muscle cell
- threshold can be increased through endurance training

# Lactate Fermentation Questions

1. Given that alcohol and lactate fermentation both yield two ATP molecules for every glucose molecule, do you think it would make any difference which pathway was used? Explain.
2. Using what you know about lactate fermentation, explain why a person cannot perform strenuous exercise indefinitely.
3. How could you increase the amount of time and that you can exercise comfortably?
4. Imagine that a muscle cell had a limited number of mitochondria with a very high oxygen supply. If this muscle cell were required to generate a great deal of power, do you think it would benefit from lactate fermentation? Why or why not?