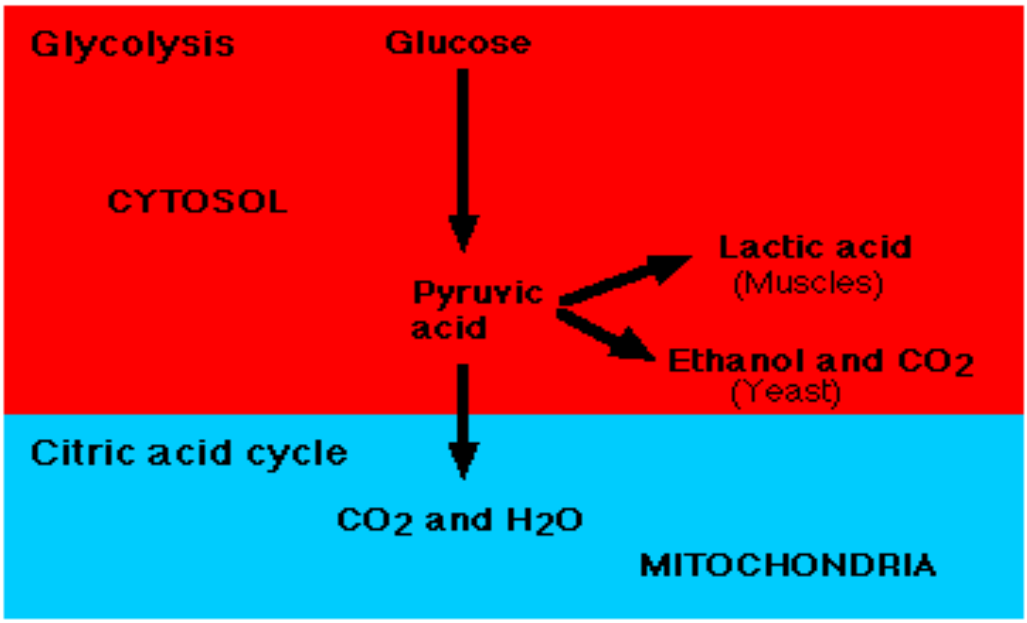
Glycolysis

Glycolysis is the anaerobic catabolism of glucose.

- **It occurs in virtually all cells.**
- **In eukaryotes, it occurs in the cytosol.**
- **It converts a molecule of glucose into 2 molecules of pyruvic acid.**
- **$C_6H_{12}O_6 + 2NAD^+ \rightarrow 2C_3H_4O_3 + 2NADH + 2H^+$**
- **The free energy stored in 2 molecules of pyruvic acid is somewhat less than that in the original glucose molecule.**
- **Some of this difference is captured in 2 molecules of ATP.**



The Fates of Pyruvic Acid

In Yeast

- **Pyruvic acid is decarboxylated and reduced by NADH to form a molecule of carbon dioxide and one of ethanol.**
- **$C_3H_4O_3 + NADH + H^+ \rightarrow CO_2 + C_2H_5OH + NAD^+$**
- **This accounts for the bubbles and alcohol in, for examples, beer and champagne.**
- **The process is called alcoholic fermentation.**
- **The process is energetically wasteful because so much of the free energy of glucose (some 95%) remains in the alcohol (a good fuel!).**

In Red Blood Cells and active Muscles

- **Pyruvic acid is reduced by NADH forming a molecule of lactic acid.**
- **$C_3H_4O_3 + NADH + H^+ \rightarrow C_3H_6O_3 + NAD^+$**
- **The process is called lactic acid fermentation.**
- **The process is energetically wasteful because so much free energy remains in the lactic acid molecule. (It can also be debilitating because of the drop in pH as the lactic acid produced in overworked muscles is transported out into the blood.)**

In Mitochondria

- **Pyruvic acid is oxidized completely to form carbon dioxide and water.**
- **The process is called cellular respiration.**
- **Approximately 40% of the energy in the original glucose molecule is trapped in molecules of ATP.**