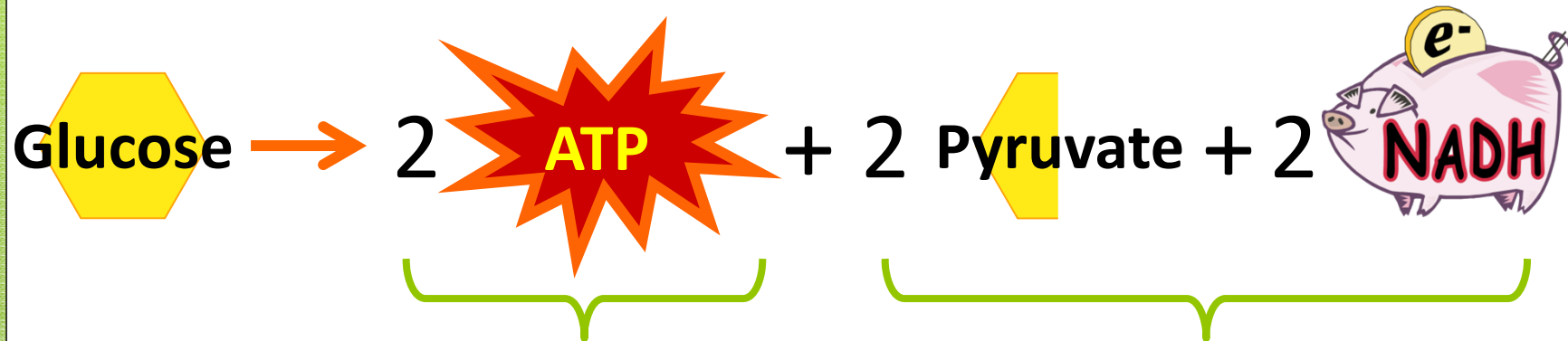


Respiration continued: Fermentation

What happens when
there is no oxygen?

Remember: Summary of glycolysis



Power for the cell

With oxygen: to the mitochondria!

Without oxygen:
fermentation

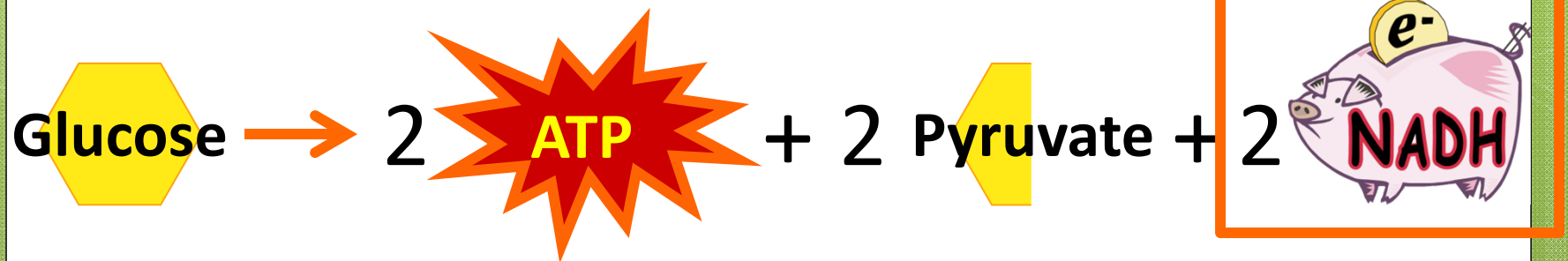
Aerobic vs. anaerobic

- **Aerobic** = uses oxygen
 - Respiration in the mitochondria
 - ~38 ATP total
- **Anaerobic** = no oxygen
 - Fermentation
 - Lactic Acid
 - Alcohol
 - 2 ATP total (from glycolysis)

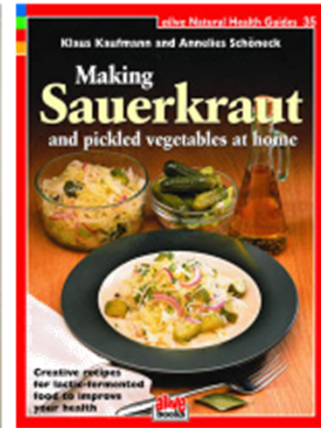


Why fermentation?

- 2 ATP come from **glycolysis**
 - No new energy from fermentation!
 - Remember **2 NADH** from glycolysis too
- **NADH = Euros €**
 - Can't use the energy (we're in the USA!)
 - Need **NAD+** for glycolysis to happen
- Fermentation **uses NADH electrons**
 - Regenerates **NAD+** for glycolysis

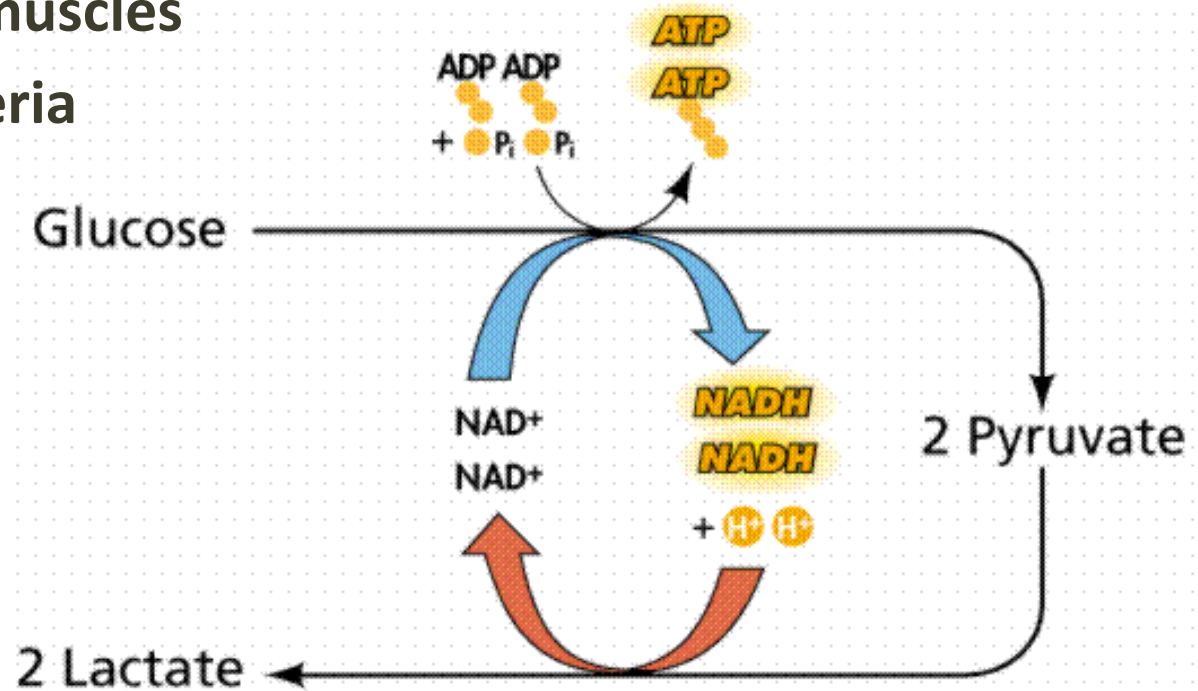


Fermented foods



Lactic acid fermentation

- NAD⁺ generated by making **lactate** (lactic acid)
- Happens in:
 - Exercising **muscles**
 - Some **bacteria**
 - Yogurt



Alcohol fermentation

- NAD⁺ generated by making **ethanol** (alcohol)
- Produces **CO₂** (bubbles!)
- Happens in:
 - Some **bacteria**
 - **Yeast**
 - Bread
 - Beer

