Cellular Respiration

11 / 27 / 06
Energy

- obtained by eating food
- calorie
- amount of energy needed to raise temp of 1 gram of water, by 1°C
How do we get energy?

- **cellular respiration**
- process that releases energy by breaking down glucose and other food molecules in the presence of oxygen.
Where?

✧ Cells
✧ cytoplasm
✧ mitochondria
Cellular Respiration

$6O_2 + C_6H_{12}O_6 \rightarrow$ Oxygen + Sugar
Cellular Respiration

$\rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP}$

$\rightarrow \text{Carbon dioxide} + \text{water} + \text{energy}$
Cellular Respiration

$6O_2 + C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O + ATP$

- glycolysis
- Krebb Cycle
- Electron Transport Chain
The diagram illustrates the process of glucose metabolism. Glucose enters the cell through Glucose transporters located in the cell membrane. In the cytoplasm, glucose undergoes Glycolysis, which produces Pyruvic acid. Pyruvic acid then enters the Mitochondrion, where it undergoes the Krebs Cycle and the Electron Transport Chain. Electrons carried by NADH and FADH$_2$ are transferred through the Electron Transport Chain, generating ATP (adenosine triphosphate) in each step. The ATP is then used to power cellular processes.
Glycolysis

✦ “lysis” = break down
✦ “glyco” = glucose
✦ breaks down glucose
a. Glucose broken down by 2ATP
b. Makes 3 Carbon molecules

c. Makes 4 ATP

d. 2 NADH for electron transport
e. Makes Pyruvic Acid
Glycolysis

- Only broke down 10% of energy from glucose
- Rest stored in pyruvic acid
Oxygen

✧ needed to get rest of energy
✧ process is called AEROBIC
Kreb Cycle

- 2nd step
- breaks down pyruvic acid
- CARBON DIOXIDE
- breathe it out
- high energy molecules
Kreb Cycle

- high energy molecules
- ATP
- NADH
- FADH$_2$
Electron Transport Chain

- uses the high energy molecules from glycolysis and Kreb Cycle
- creates more ATP
Anaerobic

★ does not require oxygen
Anaerobic

- Glycolysis follows a different path
- Fermentation
- releases energy without oxygen
Fermentation

- Two types
  - alcoholic fermentation
  - lactic acid fermentation
Alcoholic Fermentation

✧ used in baking

Pyruvic acid + NADH

----> alcohol + CO$_2$ + NAD$^+$
Lactic Acid Fermentation

✧ produced in muscles

Pyruvic acid + NADH → lactic acid + NAD$^+$