Energy Production in Plants & Animals

Plants (Producers)

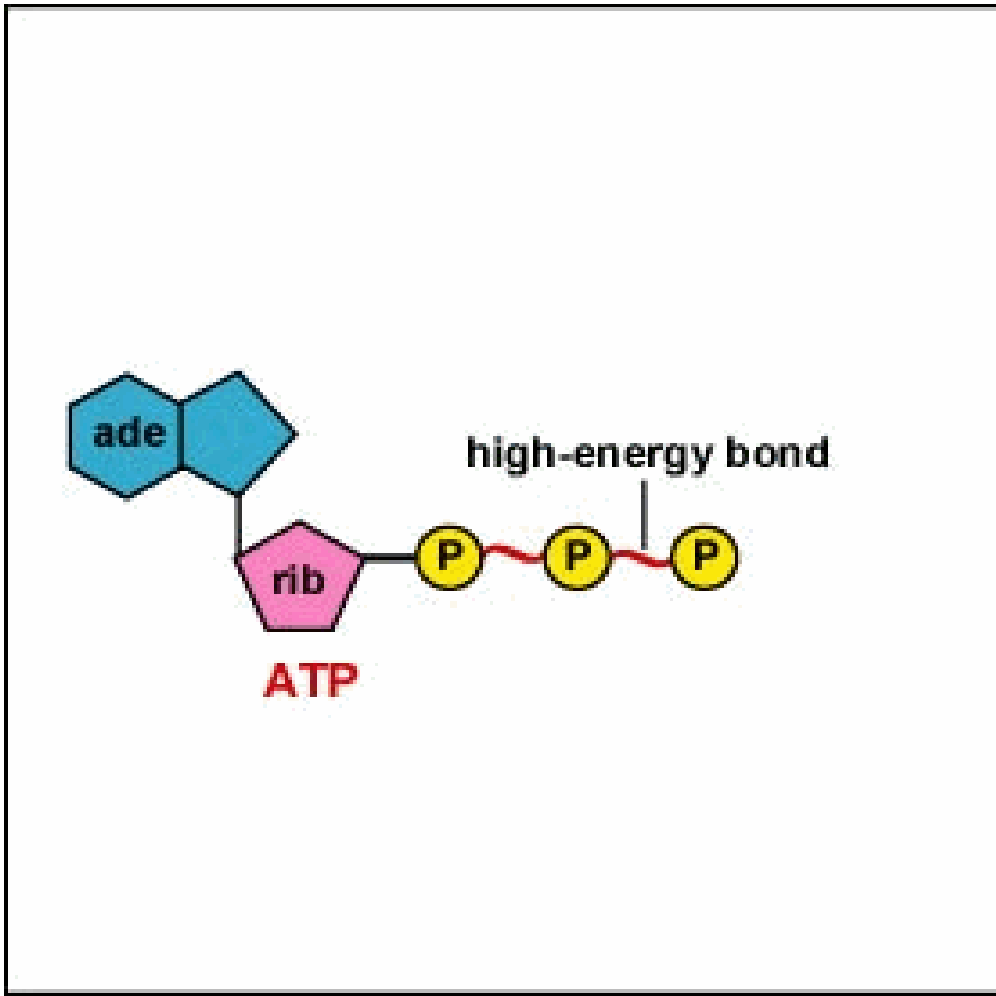
- Autotrophs: ability to make their own “food”
- Photosynthesis: use of SUNLIGHT to make “food” or energy

Animals (Consumers)

- Heterotrophs: cannot make their own “food”, so they must consume food
- Cellular Respiration: the process that breaks down food into energy (ATP), plants also use this process

ATP

- Adenosine Triphosphate
- 3-Phosphates + Sugar + Adenine
- Break bond between the Phosphates to release LOTS of energy

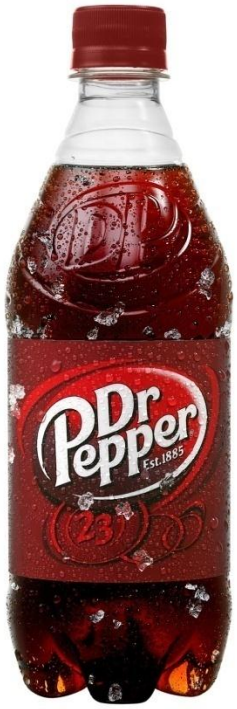


How do Animals Get Energy

- Sunlight is absorbed by plants
- Plants convert sunlight to chemical energy
- Plants use chemical energy to make glucose
- Animals eat plants to get food (glucose)
- Food in animals is converted to ATP

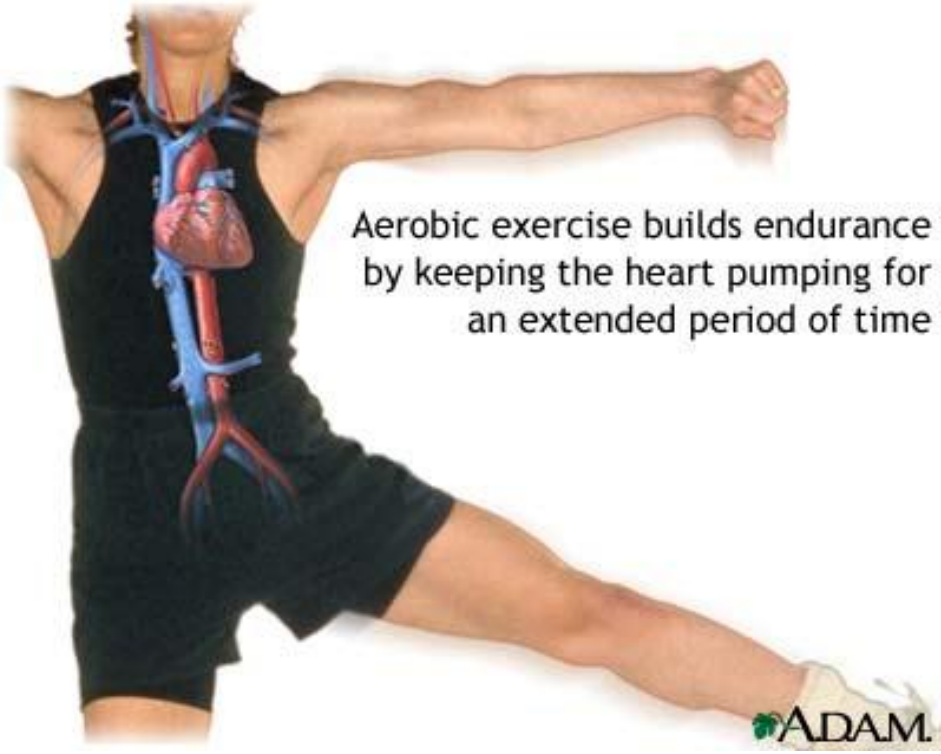
Metabolism

- You eat food and is digested into glucose
- Starch (Carb) + enzymes (stomach) + heat (body) = Glucose (sugar)
- Body uses glucose to make ATP



Cellular Energy

- Aerobic Respiration: require oxygen “air”

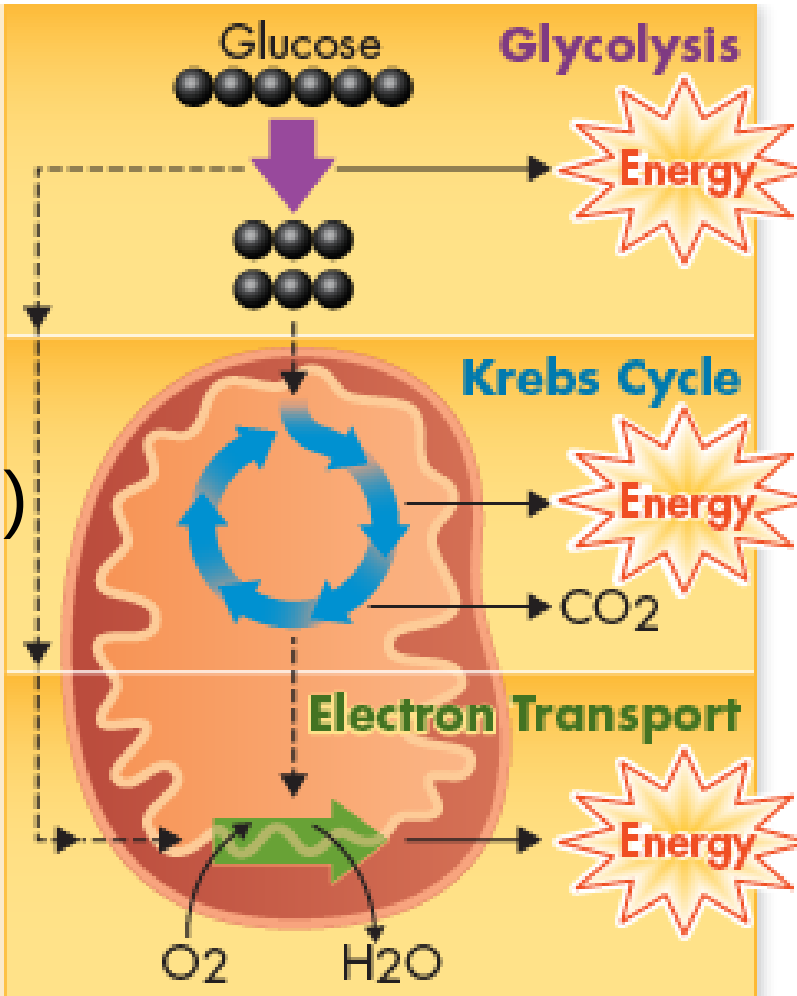


- Anaerobic Respiration: does not require oxygen (fermentation)

Cellular Respiration

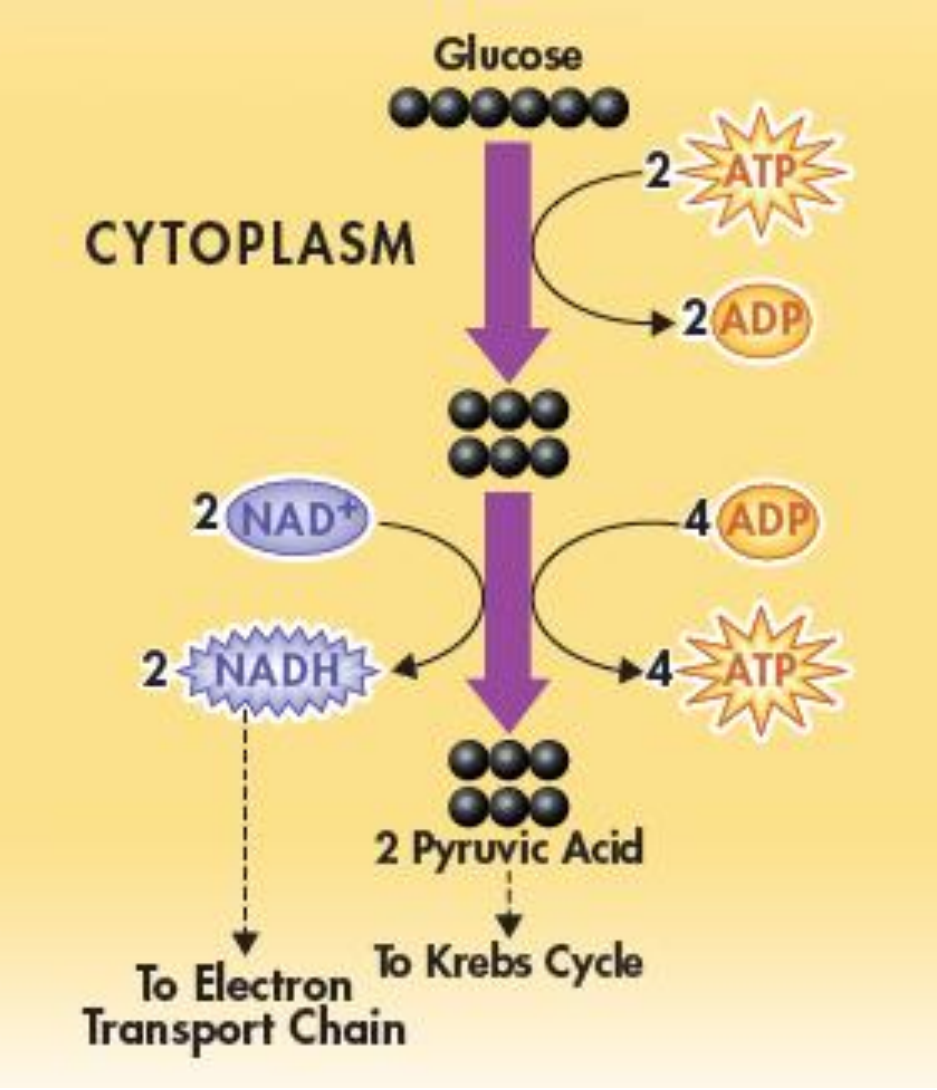
- Breakdown of glucose into energy (ATP)
- Mitochondria: where CR occurs
- Glucose + oxygen =

  carbon dioxide, water, & ATP
- 3 stages
  - Glycolysis
  - Krebs Cycle (citric acid cycle)
  - Electron Transport Chain



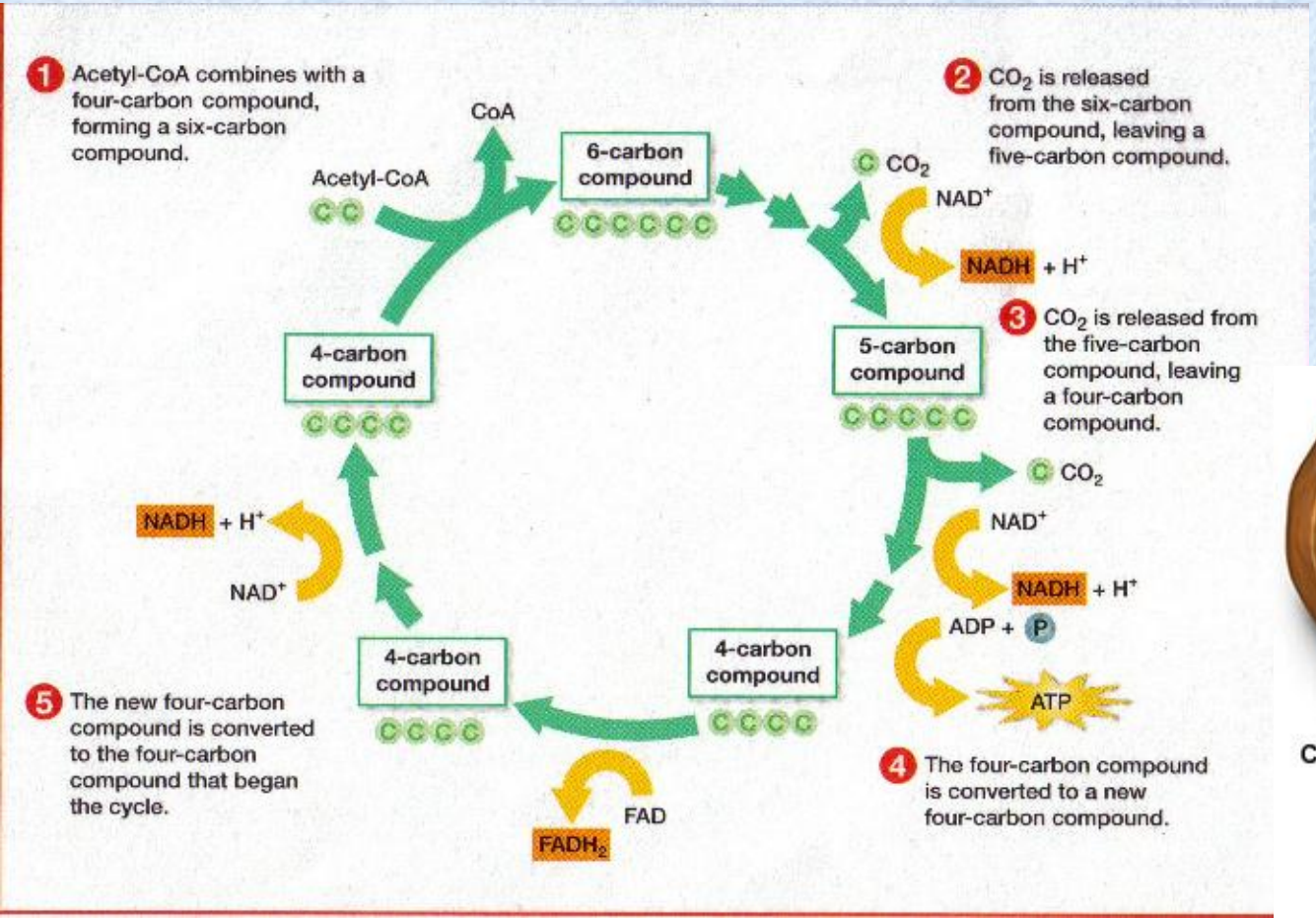
Glycolysis

- Breakdown of glucose into PYRUVIC ACID
- Involves NADH (energy carrier) & ATP

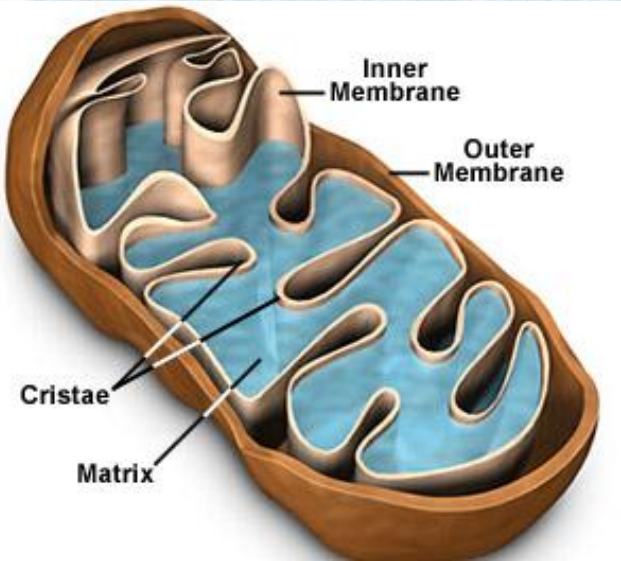


Krebs Cycle (citric acid cycle)

- Pyruvate enters the mitochondria and is converted into Acetyl-CoA (2-Carbons)
- Acetyl-CoA enters the cycle to form a six carbon compound (CITRATE)



- 2 ATP &
- CO_2 Formed



Electron Transport Chain

- Uses NADPH from glycolysis and the Krebs cycle to make ATP.
- The NADPH helps H^+ ions and oxygen to combine form water
- Each time water is formed an ATP is also formed
- Water & 32 ATP are formed

Fermentation

- Occurs when there is not enough oxygen for the electron transport chain to operate
- Lactic Acid Fermentation
- Alcoholic Fermentation

Lactic Acid Fermentation

- If there is no oxygen, the body converts PYRUVIC ACID into LACTATE
- Provides enough energy for about 90sec
- This can build up in muscles causing soreness, so after use there is a lot of heavy breathing to break down the LACTATE

Long-Term Energy

- The body stores energy in the form of the carbohydrate glycogen.
- Last for 15 to 20 minutes of activity.
- After 15-20 minutes body begins to burn its other energy storage, which is fat

Alcoholic Fermentation

- Occurs in yeast, fungus, and bacteria
- PYRUVIC ACID is broken down into ETHANOL
- 12% ethanol kills yeast