Cellular Respiration & Photosynthesis

Summary Slides

Aerobic Cellular Respiration

Glycolysis

- Break down of glucose in the cytoplasm
- Use 2 ATP
- Get hydrogens, store them on NAD
- Release enough energy to form 4 ATP
- End with 2 molecules of pyruvic acid

The Krebs Cycle (aka The Citric Acid Cycle)

- Pyruvic acid moves to the inner membrane of the mitochondria
- Break carbons and hydrogens off of pyruvic acid
- Release hydrogens and store them on NAD or FAD
- Release enough energy to form 2 ATP
- Release CO_2

Aerobic Cellular Respiration

The Electron Transport Chain

- All of the hydrogens stored on the NAD and FAD are passed from protein to protein
- They move along an energy gradient, and the electrons get excited and increase in energy level
- At the end of the chain, all of the excited electrons get accepted by oxygen
- The final enzyme, the oxygen, and the excited electrons drive the production of ATP

Anaerobic Cellular Respiration

Lactic Acid Fermentation

- Not enough oxygen to accept all the excited electrons at the end of the electron transport chain
- To keep producing energy, the cells use pyruvic acid and H stored on NAD to produce lactic acid
- Our livers change lactic acid in to glucose
- Lactic acid fermentation will continue until enough oxygen is present
- Only 4 ATP get made

Alcoholic Fermentation

- Oxygen is not available
- To produce energy, the cells use pyruvic acid and H stored on NAD to break a carbon off, which produces ethyl alcohol and CO_2
- The NAD gets recycled and gets sent to the cytoplasm to help during glycolysis
- Will continue as long as there is glucose OR until alcohol levels rise to far

Photosynthesis – Light Reactions

Photosystem II

- Sunlight hits the chlorophyll molecules in Photosystem II
- (a) The electrons in the chlorophyll get excited and move to higher energy states
- (b) One electron gets so excited it breaks off
- (c) That electron splits water; oxygen is released, hydrogen is stored on NAD
- (d) The electron moves down an electron transport chain, losing energy as it goes
- (e) Enough energy is released to drive the movement of hydrogen through a protein to make an ATP

Photosystem I

- More light comes in and hits the chlorophyll molecules in Photosystem I
- (a)
- (b)
- (c)
- (d)
- (e)
- The electron gets stored on a hydrogen as NADPH

Photosynthesis – Dark Reactions

- CO_2 combines with RuBP, a 5-carbon molecule with the help of an enzyme
- This makes an unstable 6-carbon molecule that immediately splits into two molecules of PGA
- ATP and NADPH from the Light Reactions donate their electrons
- This converts the 3-carbon molecule PGA into the 3-carbon sugar PGAL
- One of the PGAL molecules is converted to glucose with the help of CO_2
- The other five PGAL are converted into RuBP to act as a receptor for the next round of Dark Reactions