

Chemical Energy and ATP

ATP & ADP

ADP is changed into ATP when a phosphate group is added

Energy is used and it turns back into ADP-repeat

Carbs make ATP the most

Fats store the most NRG

Proteins are the least likely to be broken down to make ATP

Fermentation

Lactic acid fermentation

occurs in muscle

1. glycolysis splits glucose into 2 pyruvate molecules

2. 2 pyruvates and 2 NADH enter fermentation

3. NRG from NADH converts pyruvate into lactic acid

NADH changed back to NAD+

-Does not produce ATP

-Anaerobic

Alcoholic fermentation

1. glycolysis splits glucose and the products enter fermentation

2. NRG from 2 NADH is used to split 2 pyruvate into 2 alcohol molecules and 2 CO₂

3. NADH is recycled back into NAD+

4. NAD+ is recycled to glycolysis

used in food production and by bacteria

photosynthesis vs. cell respiration

Photosynthesis

in chloroplasts

reactants- CO₂, water, NRG

ETC-thylakoid membrane

chem rxn cycles-calvin cycle

products- sugar, oxygen

ETC- electron transport chain

Cell respiration

in mitochondria

reactants- sugar, oxygen, NRG

ETC- inner membrane

krebs cycle

CO₂, water, ATP

Photosynthesis

light-dependent rxn/ Stage 1

grana- stacks of coin shaped membranes; each compartment is called a thylakoid

grana-stage 1- light dependent reactions

Stage 1: sunlight is absorbed, NRG transferred along thylakoid membrane to stage 2-oxygen released.

photosystem 2- capture and transfer NRG

1. e- enter ETC

2. e- and H+ are released and O is released as a waste

3. e- move from protein to protein releasing NRG to pump H+ ions in thylakoid

Stage 2/Calvin Cycle/light-indep

stroma-fluid that surrounds grana-stage 2: light indep

1. CO₂ molecules are added to 5 carbon molecules=6 carbon molecule

2. NRG from stage 1 is used by enzymes to split 6 carbon into 2 3 carbons

3. 1 high NRG 3 carbon molecule leaves cycle. After 2 3 carbon molecules have left, they bonf together to make a 6 carbon molecule

Photosynthesis (cont)

photosystem 1- captures NRG & produces NRG carrying molecules

4. e- are energized and leave the thylakoid membrane

5. NADPH is transferred to light indep rxn

6. concentration of H+ ions is higher inside thylakoid membrane

6 cont. difference is called chemiosmotic gradient & stores NRG-ions flow through protein channel by diffusion

7. adds phosphate group to ADP as H+ ions flow through

photosynthesis formula- $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \rightarrow \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

NRG=energy

Cell Respiration

glycolysis

Krebs Cycle

Electron transport chain

Does not require oxygen

produces NRG carrying molecules

uses NADH and FADH2 to make ATP

splits glucose into 2 three carbon molecules

1. pyruvate is broken down

H+ ions flow through protein channel in membrane

produces 2 ATP molecules

2. intermediate molecule enters w?/ CoA

ATP synthase produces ATP

3. citric acid is formed

water is formed when oxygen picks up e- and H+ ions

4. citric acid is broken down, CO2 is released, NADh is made

5. 5-carbon molecule is broken down, CO2 is released, NADH & ATP are made

6. 4-carbon molecule is rearranged, NADH and FADH2 are made

takes place in the matrix

Cell respiration takes place in the mitochondria

NRG-energy

formula- $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow \rightarrow \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$



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