Catabolic Pathways

Cells break down glucose and other organic fuels in order to create ATP.

Fermentation is a process that results in the partial breakdown of glucose to ATP without the use of oxygen.

Aerobic respiration uses oxygen as a reactant while in anerobic processes it uses a different reactant such as sulfur.

The cell can tap into the energy stored in food particles through redox reactions, where electrons completely shift from one substancxe to another.

Oxidation is the loss of electrons from a substance while a reduction is the adding of electrons to another.

During aerobic respiration, glucose is oxidized to CO2 and O2 is reduced to H2O.

Electrons are usually passed first to NAD+ forming NADH, the electrons then move to the electron transport chain, which conducts them to O2 in energy releasing steps.

The three stages of Aerobic respiration are: Glycolysis, the Kreb Cycle, and Oxidative Phosphorylation (ETC)

Photosynthesis converts light energy to food.

In eukaryotes that are autotrophs such as plants, photosynthesis occurs in chloroplasts.

A chloroplast is an organelle containing thylakoids, stacks of thylakoids form grana.

Photosynthesis equation: 6CO2 + 12H2O + Light Energy ----> C6H12O6 + 6O2 + 6H2O

Light reactions in the thylakoid membrane split water, releasing O2.

The Calvin cycle in the stroma forms sugars from CO2.

Glycolisis

Glycolisis splits a glucose molecule into two pyruvate molecules through a series of reactions.

Pyruvate then goes on to be part of the citric acid cycle.

Glycolysis nets 2 ATP and 2 NADH per glucose molecule.

The Kreb Cycle

In eukaryotic cells, after glucose has been split into two pyruvate, the pyruvate is then oxidized to acetyl CoA.

The acetyl CoA then enters the Kreb Cycle and is further oxidized.

Glycolysis + Kreb connect to Metabolic Pathways

Catabolic pathways funnel electrons from many kinds of organic molecules to cellular respiration.

Amino acids of proteins must be deaminated before being oxidized.

Fatty acids undergo deta oxidizaation to two-carbon fragments and then enter the Kreb cycle as acetyl CoA.

Light reactions convert solar energy to chemical

Light is a form of electromagnetic energy, the colors we see as visible light include the wavelengths that drive photosynthesis.

Chlorophyll a is the main pigment of photosynthesis in plants.

A pigment goes from a ground state to an excited state when a photon boosts one of the pigments electrons to a higher energy electron shell.

A photosystem is composed of a reaction center complex surrounded by light harvesting complexes.

Linear electron flow during the light reactions uses both photosystems and produces NADPH, ATP, and Oxygen.

Light reactions convert solar energy to chemical

The ETC and Chemiosmosis

NADH and FADH2 transfer electrons to the ETC.

Electrons move down the chain due to the charge of the Oxygen, these electrons eventually are passed to the O2 forming H2O.

Electron tranfer in the ETC causes protein complexes to H form the mitochondrial matrix to the intermembrane space.

H diffuses back into the membrane through ATP synthase, driving the phosphorylation of ADP

About 34% of the energy in a glucose molecule is transferred to ATP during cellular respiration

Fermentation and Aerobic Respiration

Glycolysis nets 2 ATP by substrate level phosphorylation, this can be done with or without oxygen

Under conditions without oxygen, either anerobic respiration or fermentation can take place.

In anerobic, an ETC is present with a final electron acceptor other than oxygen.

In fermentation, the electrons from NADH are passed to pyruvate or a derivative of pyruvate regenerating the NAD+ required to oxidize more glucose.

Two common types of fermentation are alcohol fermentation and lactic acid fermentation.

Fermentation, anerobic respiration, and aerobic respiration all use glycolysis to oxidize glucose, but the differ in their final electron acceptor and whether an ETC is used.

Calvin Cycle

Light is a form of electromagnetic energy, the colors we see as visible light include the wavelengths that drive photosynthesis.

Chlorophyll a is the main pigment of photosynthesis in plants.

A pigment goes from a ground state to an excited state when a photon boosts one of the pigments electrons to a higher energy electron shell.

A photosystem is composed of a reaction center complex surrounded by light harvesting complexes.

Linear electron flow during the light reactions uses both photosystems and produces NADPH, ATP, and Oxygen.

Calvin cycle occurs in the stroma, it uses electrons from NADPH and energy from ATP. One molecule of G3P exits the cycle per three CO_2 molecules fixed.

C3 plants close their stomata on hot dry days to prevent loss of water.

Under hot conditions, photorespiration can occur, where Rubisco binds O_2 instead of CO_2, consuming ATP but releasing CO_2.

C4 plants are adapted to hot environments, they incorporate CO_2 into four carbon compounds.

CAM plants are also adapted to hot climates, they only open their stomata at night.

By **LoveZevia**
cheatography.com/lovezevia/

Not published yet.
Last updated 19th January, 2023.