Cellular Respiration

Cellular Respiration — The process used primarily by heterotrophs to obtain cellular energy from glucose

Aerobic Respiration — Cellular respiration that requires oxygen (O_2)

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

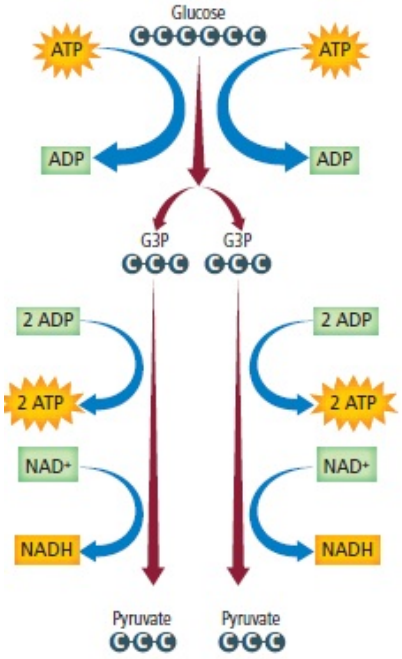
Glucose + Oxygen → Carbon Dioxide + Water + Energy

Glucose is broken apart using oxygen. The energy released by breaking apart the glucose is captured and stored as ATP. Carbon dioxide and water are also produced in the process.

The reaction is the opposite of photosynthesis: plants take in CO_2 and produce oxygen; animals take in O_2 and produce CO_2.

Overall produces 36 ATP

Glycolysis

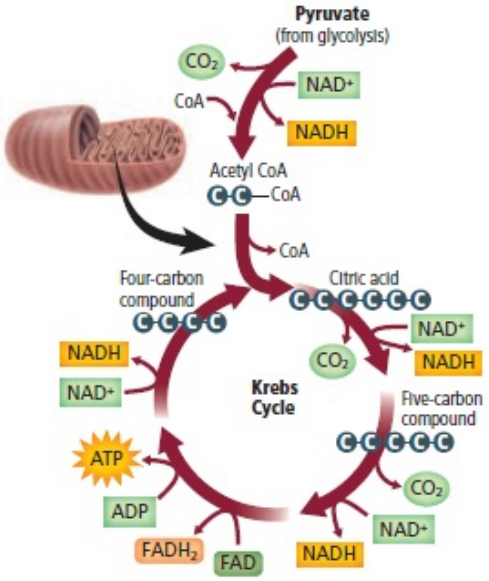


Aerobic respiration process of glucose being broken down: Glykys = sugar lysis = break apart

In glycolysis, 2 ATP are required to break apart a single molecule of glucose but yields 4 molecules of ATP: Overall gain of 2 ATP

2 molecules of pyruvate are produced

Kreb Cycle

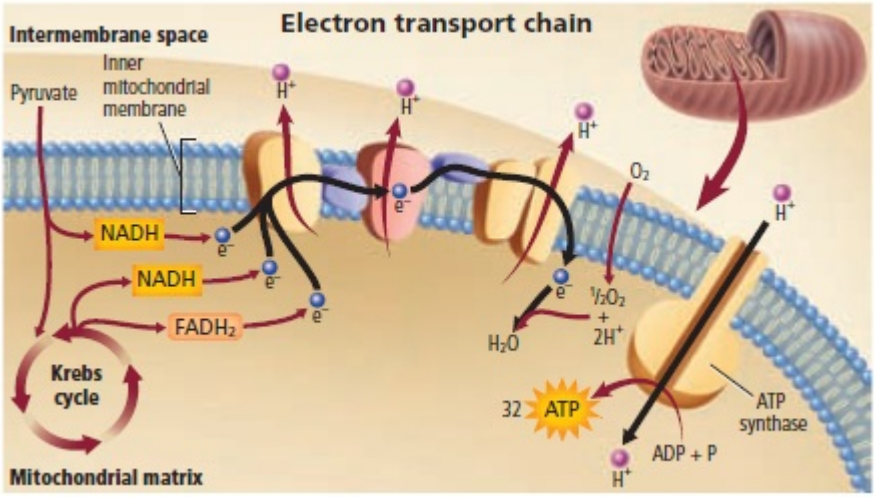


The series of reactions where the pyruvate produced during glycolysis is broken down

2 ATP are produced

Results in CO2, NADH and $FADH_2$

NADH and FADH2 are used in the electron transport chain

Electron Transport Chain	 The final stage of aerobic respiration that occurs in the mitochondria Virtually all of the ATP from glucose is produced during the electron transport chain Electrons and H^+ (hydrogen ions)are released from the NADH and FADH2 formed during the kreb cycle and are used to generate ATP Called electron transport chain because electrons are transported across the membrane within mitochondria and their movement generates energy which is captured as ATP Results in 32 ATP
Anerobic Respiration	Cellular respiration that does not require oxygen, often called fermentation
Lactic Acid Fermentation	The pyrutate created during glycolysis is converted to lactic acid by enzymes Produces less ATP then the kreb cycle and electron transport chain Occurs in muscle tissue when oxygen levels are low and causes muscle fatigue and soreness The lactic acid produced by microorganisms are used to make cheeses an yogurts
Alcohol Fermentation	The pyrutate created during glycolysis is converted alcohol by enzymes Similar to lactic acid fermentation Occurs in yeast and some bacteria