

 **Glossary****Acetyl-CoA**

A common substrate into which all nutrients in the body that are used for energy are converted at the beginning of the Krebs cycle.

Adenosine diphosphate (ADP)

A molecule that gets “recharged” with energy when it is combined with a phosphate during the Krebs cycle; what ATP becomes after its energy is used.

Adenosine triphosphate (ATP)

A molecule in which energy from glucose is stored during the Krebs cycle.

Adrenal gland

The gland that sits on top of the kidney and maintains the body’s glucose levels. One part, the adrenal cortex, releases glucocorticoids, which activate the breakdown of protein in muscle tissue when too few carbohydrates are consumed to maintain blood glucose levels. The other part, the adrenal medulla, releases epinephrine, which stimulates the liver to begin breaking down amino acids into glucose in a process called *gluconeogenesis*.

Aerobic metabolism

The process of creating energy from glucose through the Krebs cycle, which requires oxygen.

Anaerobic metabolism

The process of creating energy by splitting glucose molecules into pyruvic acid, which does not require oxygen.

Carbohydrates

Macronutrients that provide the body with glucose, which is the main source of energy. There are three classifications of carbohydrates: *monosaccharides*, *disaccharides*, and *polysaccharides*.

Cytochrome

A type of protein that transfers the final bit of energy to an ATP molecule during *oxidative phosphorylation*. This process requires oxygen and is the reason breathing is necessary.

Diabetes

A condition characterized by sustained high levels of blood glucose. There are five primary types of diabetes: type I, a rapid-onset condition found in children that is caused by a failure of beta cells to produce insulin; type II, which is found in adults and caused by the failure or desensitization of insulin receptors; prediabetes, the state of having sustained blood glucose levels that are higher than normal but do not yet qualify as type II; gestational diabetes, which presents in about 4% of pregnant women and is caused by the failure of insulin receptors due to pregnancy hormones; and macrosomia, in which a fetus becomes unusually large due to high levels of blood glucose from its mother being picked up by its sensitive insulin receptors.

Digestive enzymes

Enzymes that break down certain types of disaccharides and polysaccharides into monosaccharides. Examples include sucrase (for sucrose), maltase (for maltose), lactase (for lactose), and amylase (for starches).

Disaccharides

A type of carbohydrate made up of multiple *monosaccharides*. Three common disaccharides are sucrose, maltose, and lactose.

Flavin adenine dinucleotide (FAD)

A substance that picks up an unstable four-carbon molecule in the Krebs cycle. It holds the energy from this molecule until the final stage of the cycle, where the molecule is converted and broken down to give off more energy.

Glucagon

A substance produced by alpha cells that stimulates the start of *glycogenolysis* in the liver.

Gluconeogenesis

The process through which the liver produces glucose from non-carbohydrate substances. This involves removing amino groups from amino acids and combining the remaining molecules.

Glycogenolysis

The breakdown of glycogen stored in the liver back to glucose in order to raise blood glucose levels.

Hypoglycemia

A condition characterized by low blood glucose levels. There are two types of hypoglycemia: fasting, which occurs when too much time passes between meals and blood glucose begins to drop, and reactive, which occurs when the insulin response is exacerbated, either by excessive production of insulin or overactivation of insulin receptors.

Hypothalamus

The brain structure that works to regulate blood glucose levels.

Insulin

A hormone secreted in the pancreas that regulates blood glucose levels.

Islets of Langerhans

Cell clusters in the pancreas made up of alpha cells (which produce glucagon), beta cells (which produce insulin), or delta cells (which release somatostatin, a hormone that regulates the activity of alpha and beta cells).

Krebs cycle

A series of aerobic reactions during which energy is extracted from food and converted to ATP.

Monosaccharides

The simplest form of carbohydrate, or “simple sugars.” Three common monosaccharides are glucose, fructose (“fruit sugar”), and galactose (found in mother’s milk).

Niacin (B₃)

A B vitamin that is a necessary component of NAD.

Nicotinamide adenine diphosphate (NAD)

A substance that carries the energy produced from the conversion of pyruvate to acetyl-CoA during the Krebs cycle. At the end of the Krebs cycle, the NAD molecule will transfer its excess energy either to an ATP directly or to power *oxidative phosphorylation*.

Oxaloacetate

A four-carbon molecule combined with acetyl-CoA to produce an unstable six-carbon molecule that will eventually be picked up by NAD.

Oxidative phosphorylation

The process through which energy transported by NADs and FADs is combined with oxygen to create ATPs in the final step of the Krebs cycle.

Pantothenic acid (B₅)

A B vitamin that is a major component of coenzyme A, which is necessary for the formation of acetyl-CoA.

Polysaccharides

A type of carbohydrate composed of monosaccharides and disaccharides. Three common polysaccharides are starches, fiber (which cannot be broken down), and glycogen (which is not found in nature and produced only inside the body as a means of temporarily storing monosaccharides).

Pyridoxine (B₆)

A B vitamin that allows the process of transamination, or the transport of amino groups, to occur, thereby enabling *gluconeogenesis*.

Pyruvic acid

A three-carbon molecule formed when glucose is split during anaerobic metabolism. Pyruvic acid is later converted to acetyl-CoA in the mitochondria.

Riboflavin (B₂)

A B vitamin that is a necessary component of FAD.

Starch march

The process through which carbohydrates, which have already been broken down into glucose in the digestive tract, are absorbed through the small intestine and travel through the bloodstream to the liver. Any glucose not processed in the liver gets dumped into the bloodstream, raising blood glucose levels.

Thiamine (B₁)

A B vitamin that plays a critical role in transferring pyruvic acid into the mitochondria. Without thiamine, pyruvic acid would build up in the cell and form lactic acid, which is what makes exercise painful.
