

Editor Note on Ketogenesis

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Editorial

Ketogenesis is that the biochemical process through which organisms produce ketone bodies through breakdown of fatty acids and ketogenic amino acids. This process supplies energy under circumstances like fasting or caloric restriction to certain organs, particularly the brain, heart and striated muscle. Insufficient gluconeogenesis can cause hypoglycemia and excessive production of ketone bodies, ultimately resulting in a life-threatening condition referred to as non-diabetic ketoacidosis.

Ketone bodies aren't obligately produced from fatty acids, but rather any meaningful amount of them is synthesized only during a situation of carbohydrate and protein insufficiency, where fatty acids are the sole readily available fuel for his or her production.

Ketone Bodies

Fatty acids undergo β -oxidation within the liver mitochondria to get a high amount of energy and form three compounds, that are referred to as "ketone bodies". These ketone bodies are water-soluble and don't require lipoproteins for transportation across the membrane. Ketone bodies are lipid molecules having a group attached to 2 -R groups.

The three ketone bodies formed are:

- Acetoacetate
- D-3-hydroxybutyrate
- Acetone

Ketogenesis Pathway

Our body normally derives energy from stored carbohydrate by the method of glycogenolysis (glycogen \rightarrow glucose) or from non-carbohydrate sources like lactate by the method of gluconeogenesis. Ketogenesis occurs continuously during a healthy individual, but under certain conditions, when there's an increased concentration of fatty acids or carbohydrate reserves are decreased, ketogenesis happens at a better rate:

- Under low blood sugar level, e.g. during fasting or starvation
- On exhaustion of carbohydrate reserve, e.g. glycogen
- When there's insufficient insulin, e.g. Type-1 diabetes
- All the most body parts like the brain, skeletal muscles, heart, etc. can utilise the energy formed by ketogenesis.
- Insufficient gluconeogenesis leads to hypoglycemia and excessive production of ketone bodies leading to a fatal condition called ketoacidosis.

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