American Journal of
Biomedical Science & Research

www.biomedgrid.com
ISSN: 2642-1747

Letter to Editor



# The Ketogenic Diet is an Inducible Muscle Fat and Ketone Body Catabolism to Reduce Aging Sarcopenia

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***To Cite This Article:*** *Jia Ping Wu*. The Ketogenic Diet is an Inducible Muscle Fat and Ketone Body Catabolism to Reduce Aging Sarcopenia. Am J Biomed Sci & Res. 2024 22(5) AJBSR.MS.ID.003003,* DOI: 10.34297/AJBSR.2024.22.003003

**Received:** May 31, 2024; **Published:** June 04, 2024

## Editorial

The ketogenic diet is super high in fat (about 80% to 90% of your daily), super low in carbohydrates (up to 4% of your daily) and moderate in protein (6~8% of your daily) [1]. The most important component of the keto diet is a natural process called ketosis. When you cut back on carbs or just haven't eaten in a while, your body looks for other energy sources to fill the void [2]. Fat is typically that source. When your blood sugar drops because you're not feeding your body carbs, fat is released from your cells and floods the liver. The liver turns the fat into ketone bodies, which your body uses as its second choice for energy [3]. Muscle catabolism of ketone bodies in aging sarcopenia. Acetyl-CoA produced by the β-oxidation of liver tissue fatty acids can be converted into ketone bodies, including acetoacetate (30%), β-hydroxybutyrate (70%), and acetone. The utilization of β-hydroxybutyric acid is first catalyzed by β-hydroxybutyrate dehydrogenase, which is dehydrogenated to acetoacetic acid, and then converted into acetyl CoA for oxidation [4]. Normally, the amount of acetone produced is very small. Acetone is a volatile substance that can be exhaled through the lungs. The acetone content in the ketone body is also greatly increased, and it is discharged through the respiratory tract, producing a special "rotten apple smell". Ketones are intermediate products produced by fatty acids in the catabolism of the liver. The formation of ketone bodies is based on acetyl-CoA produced by fatty acid β-oxidation, which is completed in liver mitochondria. Ketone bodies are utilized by extrahepatic tissues, such as muscle, through the conversion of β-hydroxybutyrate to acetoacetate and of acetoacetate to acetoacetyl-CoA [5]. The first step involves the reversal of the β-hydroxybutyrate dehydrogenase reaction, and the second step involves the action of acetoacetate: succinyl-CoA transferase [6]. Additionally, liver tissue lacks an enzyme system that utilizes ketone bodies, so ketones are transported through the bloodstream to extrahepatic tissues for oxidative utilization. Many tissues outside the liver have highly active enzymes that use ketone bodies, which can re-cleave ketone bodies into acetyl CoA, and completely decompose and oxidize them through the tricarboxylic acid cycle [7]. The physiological significance of ketone body generation, ketone body is soluble in water, small molecule, can be transported in the blood, and can also pass through the blood-brain barrier and the capillary wall of muscle and other tissues, which is a form of energy delivery from the liver to extrahepatic tissues, especially when long-term hunger, insufficient sugar supply or glucose utilization disorder, ketone body can replace glucose to become the main energy substance of brain and muscle tissue [8]. However, during starvation, ketogenic diet, and diabetes, ketone production also increases due to increased fat mobilization. This ensures that muscle have access to ketone body as a fuel source during ketogenic diet ketogenesis [9]. Some of these effects depend on ketone bodies. The use of non-carbohydrates as a source of energy during ketogenic diet ketogenesis so that the depletion of muscle glycogen stores is delayed [10]. If fat, for example, makes a greater contribution to a sarcopenia effort during the initial stages of muscle loss, more ketone body will be available for the later stages and muscle fatigue will be delayed.

## Acknowledgment

None.

## Conflict of Interest

None.

## References


1. Park SB, Yang SJ (2024) Ketogenic diet preserves muscle mass and strength in a mouse model of type 2 diabetes. PLoS One 19(1): e0296651.
2. Nakao R, Abe T, Yamamoto S, Oishi K (2019) Ketogenic diet induces skeletal muscle atrophy via reducing muscle protein synthesis and possibly activating proteolysis in mice. Sci Rep 9(1): 19652.
3. Chen X, Ji Y, Liu R, Zhu X, Wang K, et al. (2023) Mitochondrial dysfunction: roles in skeletal muscle atrophy. J Transl Med 21(1): 503.
4. Gu X, Wang W, Yang Y, Lei Y, Liu D, et al. (2022) The Effect of Metabolites on Mitochondrial Functions in the Pathogenesis of Skeletal Muscle Aging. Clin Interv Aging 17: 1275-1295.
5. Guo J, Huang X, Dou L, Yan M, Shen T, et al. (2022) Aging and aging-related diseases: from molecular mechanisms to interventions and treatments. Signal Transduct Target Ther 7(1): 391.
6. Vargas López M, Quiroz Vicente CA, Pérez Hernández N, Gómez Chávez F, Bañuelos Hernández AE, et al. (2024) The ketone body β-Hydroxybutyrate as a fuel source of chondrosarcoma cells. Heliyon 10(9): e30212.
7. Soni S, Tabatabaei Dakhili SA, Ussher JR, Dyck JRB (2024) The therapeutic potential of ketones in cardiometabolic disease: impact on heart and skeletal muscle. Am J Physiol Cell Physiol 326(2): C551-C566.
8. Kolwicz SC (2023) Special Issue on Metabolic Adaptations in Cardiac and Skeletal Muscle during Acute and Chronic Exercise. Metabolites 13(9): 1015.
9. Baylie T, Ayelgn T, Tiruneh M, Tesfa KH (2024) Effect of Ketogenic Diet on Obesity and Other Metabolic Disorders: Narrative Review. Diabetes Metab Syndr Obes 17: 1391-1401.
10. Zhao MF, Zhang XG, Tang YP, Zhu YX, Nie HY, et al. (2024) Ketone bodies promote epididymal white adipose expansion to alleviate liver steatosis in response to a ketogenic diet. J Biol Chem 300(2): 105617.