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Topical Review

Metabolism of ketone bodies during exercise and training: physiological basis for exogenous supplementation

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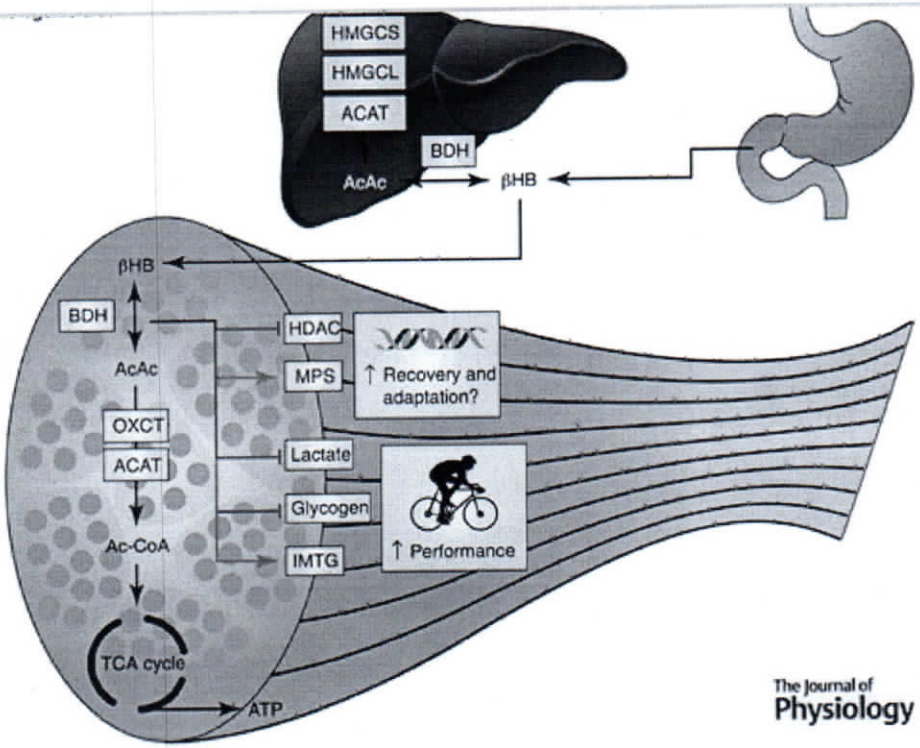
Abstract

Optimising training and performance through nutrition strategies is central to supporting elite sportspeople, much of which has focused on manipulating the relative intake of carbohydrate and fat and their contributions as fuels for energy provision. The ketone bodies, namely acetoacetate, acetone and β-hydroxybutyrate (βHB), are produced in the liver during conditions of reduced carbohydrate availability and serve as an alternative fuel source for peripheral tissues including brain, heart and skeletal muscle. Ketone bodies are oxidised as a fuel source during exercise, are markedly elevated during the post-exercise recovery period, and the ability to utilise ketone bodies is higher in exercise-trained skeletal muscle. The metabolic actions of ketone bodies can alter fuel selection through attenuating glucose utilisation in peripheral tissues, anti-lipolytic effects on adipose tissue, and attenuation of proteolysis in skeletal muscle. Moreover, ketone bodies can act as signalling metabolites, with βHB acting as an inhibitor of histone deacetylases, an important regulator of the adaptive response to exercise in skeletal muscle. Recent development of ketone esters facilitates acute ingestion of βHB that results in nutritional ketosis without necessitating restrictive dietary practices. Initial reports suggest this strategy alters the metabolic response to exercise and improves exercise performance, while other lines of

and potential benefits for performance and recovery in athletes.



Citing Literature

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