

Review

Effective exercise and nutritional strategy to increase muscle mass for athletes

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ABSTRACT

Skeletal muscle is a critical organ for generating force. To increase muscle mass effectively and to maximize performance, the combination of resistance exercises with skill training is important. Nutritional intake, especially protein, stimulates muscle protein synthesis within 1 to 2 hours. This anabolic response is induced mainly by leucine, which is an essential amino acid. An increase in the blood leucine concentration leads to muscle protein synthesis. Resistance exercise is another intervention that acutely increases muscle protein synthesis. Resistance exercise-induced augmentation in muscle anabolism depends on the force-time integral (load \times contraction time). Therefore, low-intensity resistance training with a high number of repetitions until failure can induce as much muscle hypertrophy as that achieved using high-intensity exercise. There should be three considerations in respect to protein intake with resistance exercise: 1) the additive effect of protein intake is most prominent when provided immediately after exercise, but protein intake for up to 24 hours after exercise can still induce a significant additive anabolic effect, 2) the dose-response relationship of protein intake reaches a plateau with 20 to 25 g of high-quality protein, and 3) the quality of protein (i.e., the leucine content as well as the absorption of the protein) can affect post-exercise muscle protein synthesis significantly.

Keywords: resistance exercise, skeletal muscle, protein, muscle protein metabolism, essential amino acids