

The Effect of Protein Intake on Muscle Tissue Before Sleep

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Proteins are critical in improving performance and maintaining health in athletes and are considered the key to success in sports for most athletes [1-3]. Since it plays a role in many important tasks such as the repair and protection of muscle tissue in the body, it is desired that the diet should be sufficient in terms of carbohydrates and the use of protein for energy should be kept to a minimum.

The best sources of protein are foods such as meat (beef, chicken, fish, etc.), soybeans, and beans. Although the essential amino acid pattern in animal protein sources such as meat is at a desirable level, in vegetable protein sources such as soybean, a few nutrients should be mixed to provide the desired amino acid pattern. For example, when peas and rice or corn and peas are consumed together, the amino acid balance increases [1].

Daily protein requirement increases depending on strength, speed, and endurance training. Energy intake, intensity and duration of exercise, gender, age, and protein requirement are among the factors affecting [4-6].

The protein requirement specified by DRI (Dietary Reference Intakes) and RDA (Recommended Dietary Allowance) for individuals aged 19 and over is 0.8 g/kg/day [5,7]. The protein requirement of athletes who do strength and endurance exercises is higher than sedentary individuals. Increased protein requirement is important for muscle tissue regeneration and repair of muscle damage [8]. While the previous recommendations suggested about 1.2 - 1.3 g/kg/day of protein to maintain the nitrogen balance for individuals who do sports, in the latest information, a greater amount of protein should be consumed about 1.4 - 2.0 g/kg/day for the preservation of muscle mass in people who consume energy-restricted diets. Consuming protein-containing foods every 3 - 4 hours also provides benefits [5,9].

Although the timing of protein intake affects muscle protein synthesis, its effect on muscle mass and strength changes is not clear. However, in some long-term studies, there is evidence that protein intake in the first hours after exercise increases muscle mass and strength [10]. Young male individuals were given egg protein at a rate varying between 0 - 40g following strength exercise and muscle protein synthesis was measured. At the end of the study, the highest increase in muscle protein synthesis was seen after ~ 20g protein intake and it was determined that excessive protein consumption increased oxidation. It is concluded that following resistance exercise, it is necessary to consume 20 - 25g of high-quality protein to achieve maximal protein synthesis [11].

Recent studies have focused on the beneficial effect of liquid protein intake 2 hours after dinner and 30 minutes before bedtime on muscle protein synthesis and recovery [10,12]. Several studies have shown that taking 30 - 40g of casein protein 30 minutes before sleep increases muscle protein synthesis [10]. Another study showed that 30g of whey, 30g of casein and 33g of carbohydrate taken 30 minutes before sleep each had a positive effect on morning resting metabolic rate compared to placebo [13].

It is stated that protein taken before sleep is effectively digested and absorbed during night sleep, thus increasing the muscle protein synthesis rate during the night. It is emphasized that protein consumption before sleep reduces appetite at breakfast the next day and

increases muscle mass and strength when applied with long-term strength training. Protein consumption before sleep supports many beneficial processes, such as improved muscle protein synthesis, recovery from exercise and increased lean muscle mass, especially when exercising in the evening (rather than in the morning). Contrary to popular belief, these additional calories before sleep do not have a negative effect on fat metabolism while sleeping or on resting metabolism the next morning. It turns out that protein taken before sleep does not dull fat metabolism and may even help improve body composition over time [14-16].

In conclusion, protein intake before sleep is an effective interventional strategy to increase muscle protein synthesis rates during sleep during the night and can be applied to support skeletal muscle adaptive response in resistance-type training. Casein protein intake (30 - 40g) before sleep increases muscle protein synthesis rate and metabolic rate without affecting lipolysis.

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