

FEMME FATALE *Physique*



I Love Leucine

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Do you remember HMB? Come on! Don't you remember way back when it was touted as having 'Deca-like' effects. Haha! Who the hell believed that crap? Okay, somebody did. HMB is fine. But recent work shows leucine to be perhaps even finer! A recent study looked at the effects of dietary leucine supplementation on the exercise performance of outrigger canoeists. Thirteen (ten female, three male) competitive outrigger canoeists underwent testing before and after 6-week supplementation with either capsulated L-leucine (45 mg/kg.d) [that's equal to 3.15 grams of leucine for a 154 lb individual] or placebo (corn flour). Testing included anthropometry, 10 second upper body power and work and a row to exhaustion at 70-75% maximal aerobic power where perceived exertion (RPE), heart rate (HR) and plasma BCAA and tryptophan concentrations were assessed. What happened?

Leucine supplementation resulted in significant increases in plasma leucine and total BCAA concentrations. Upper body power and work significantly increased in both groups after supplementation but ***power was significantly greater after leucine supplementation*** compared to the placebo. Rowing time significantly increased and average RPE significantly decreased with leucine supplementation while these variables were unchanged with the placebo. Leucine supplementation had no effect on the plasma tryptophan to BCAA ratio, HR or anthropometric variables. Six weeks' dietary leucine supplementation significantly improved endurance performance and upper body power in outrigger canoeists.[1] As an amateur outrigger canoeist myself, I can testify to the benefits of the essential aminos, esp. leucine!

During exercise, muscle protein synthesis decreases together with a net increase in protein degradation and stimulation of BCAA oxidation (the BCAAs are of course leucine, valine and isoleucine). The decrease in protein synthesis is associated with inhibition of translation initiation factors 4E and 4G and ribosomal protein S6 which are under regulatory controls of intracellular insulin signaling and leucine concentrations. In essence, both insulin and leucine are key regulators in muscle protein synthesis![2] Another interesting tidbit is that leucine by itself increases muscle protein synthesis.[3] By combining leucine with protein and carbohydrate, you get quite the anabolic super-effect. For example, in one study eight male subjects were randomly assigned to three trials in which they consumed drinks containing either carbohydrate (CHO), carbohydrate and protein (CHO+PRO), or carbohydrate, protein, and free leucine (CHO+PRO+Leu)

following 45 min of resistance exercise. They discovered that plasma insulin response was higher in the CHO+PRO+Leu compared with the CHO and CHO+PRO trials. Whole body protein breakdown rates were lower, and whole body protein synthesis rates were higher, in the CHO+PRO and CHO+PRO+Leu trials compared with the CHO trial; moreover, the addition of leucine in the CHO+PRO+Leu trial resulted in a lower protein oxidation rate compared with the CHO+PRO trial. And to top it off, muscle protein synthesis, measured over a 6-h period of post-exercise recovery, was significantly greater in the CHO+PRO+Leu trial compared with the CHO trial with intermediate values observed in the CHO+PRO trial.[4]

So next time you suck down your protein shake, throw a chunk of leucine in it. It'll do the body good!

1. Crowe, M.J., J.N. Weatherson, and B.F. Bowden, *Effects of dietary leucine supplementation on exercise performance*. Eur J Appl Physiol, 2005: p. 1-9.
2. Norton, L.E. and D.K. Layman, *Leucine regulates translation initiation of protein synthesis in skeletal muscle after exercise*. J Nutr, 2006. **136**(2): p. 533S-537S.
3. Lang, C.H., *Elevated Plasma Free Fatty Acids Decrease Basal Protein Synthesis but Not the Anabolic Effect of Leucine in Skeletal Muscle*. Am J Physiol Endocrinol Metab, 2006.
4. Koopman, R., et al., *Combined ingestion of protein and free leucine with carbohydrate increases postexercise muscle protein synthesis in vivo in male subjects*. Am J Physiol Endocrinol Metab, 2005. **288**(4): p. E645-53.