Amino Acids July 2015, Volume 47, Issue 7, pp 1389-1398

L-Alanylglutamine inhibits signaling proteins that activate protein degradation, but does not affect proteins that activate protein synthesis after an acute resistance exercise

Wanyi Wang, Ran Hee Choi, Geoffrey J. Solares, Hung-Min Tseng, Zhenping Ding, Kyoungrae Kim, John L. Ivy

Abstract

Sustamine™ (SUS) is a dipeptide composed of alanine and glutamine (AlaGln). Glutamine has been suggested to increase muscle protein accretion; however, the underlying molecular mechanisms of glutamine on muscle protein metabolism following resistance exercise have not been fully addressed. In the present study, 2-month-old rats climbed a ladder 10 times with a weight equal to 75 % of their body mass attached at the tail. Rats were then orally administered one of four solutions: placebo (PLA-glycine = 0.52 g/kg), whey protein (WP = 0.4 g/kg), low dose of SUS (LSUS = 0.1 g/kg), or high dose of SUS (HSUS = 0.5 g/kg). An additional group of sedentary (SED) rats was intubated with glycine (0.52 g/kg) at the same time as the ladder-climbing rats. Blood samples were collected immediately after exercise and at either 20 or 40 min after recovery. The flexor hallucis longus (FHL), a muscle used for climbing, was excised at 20 or 40 min post exercise and analyzed for proteins regulating protein synthesis and degradation. All supplements elevated the phosphorylation of FOXO3A above SED at 20 min post exercise, but only the SUS supplements significantly reduced the phosphorylation of AMPK and NF-kB p65. SUS supplements had no effect on mTOR signaling, but WP supplementation yielded a greater phosphorylation of mTOR, p70S6k, and rpS6 compared with PLA at 20 min post exercise. However, by 40 min post exercise, phosphorylation of mTOR and rpS6 in PLA had risen to levels not different than WP. These results suggest that SUS blocks the activation of intracellular signals for MPB, whereas WP accelerates mRNA translation.