Nutritional Interventions to Improve Muscle Protein Metabolism During Stress

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Abstract
Debilitating injury is accompanied by hypercortisolemia, muscle wasting and disruption of the normal anabolic response to food. We sought to determine if hypercortisolemia alters muscle protein anabolism following ingestion of a more potent anabolic stimulus: essential amino acids (EAA). A 27hr infusion (80µg kg 1· hr -1 ) of hydrocortisone sodium succinate mimicked cortisol levels accompanying severe injury (>30 µg/dl), (C+AA; n=6). The control group received saline (AA; n=6). Femoral arterio-venous blood samples and muscle biopsies were obtained during a primed (2.0 µmol.kg -1 ) constant infusion (0.05 µmol.kg -1 ·min -1 ) of L-[ring-2 H5]phenylalanine. Muscle protein kinetics were calculated before and after ingestion of 15g EAA. Both groups experienced a significant increase in net protein balance following EAA ingestion, however the response in the C+AA group was blunted (40% lower) yet remained positive for a greater period of time (60 vs. 180 min). Mixed muscle fractional synthetic rate (FSR) increased following EAA ingestion (p<0.05). However, no between group differences were evident (p>0.05). Hypercortisolemia also resulted in a greater basal and post EAA increase in blood glucose and insulin concentrations (p<0.05). In summary, ingested EAA can effectively stimulate muscle protein synthesis, acutely reverse negative net protein balance associated with hypercortisolemia and may help minimize muscle loss following debilitating injury.