Egg Nutrition Center

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Protein Research

Layman DK, Walker DA. Protein importance of leucine in treatment of obesity and the metabolic syndrome. *J Nutr* 2006;136:319S-23S.

Diets with total protein intake >1.5 g.kg(-1).d(-1) and carbohydrate intake <150 g/d are effective for treatment of obesity, type 2 diabetes, and the Metabolic Syndrome. These diets improve body composition and enhance glycemic control. During weight loss, protein-rich diets reduce loss of lean tissue and increase loss of body fat. Specific mechanisms to explain each of these clinical outcomes remain to be fully elucidated. We propose that keys to understanding the relationship between dietary protein and carbohydrates are the relationships between the branched-chain amino acid leucine and insulin and glucose metabolism. Leucine is known to interact with the insulin signaling pathway to stimulate downstream signal control of protein synthesis, resulting in maintenance of muscle protein during periods of restricted energy intake. Leucine also appears to modulate insulin signaling and glucose use by skeletal muscle. Whereas total protein is important in providing substrates for gluconeogenesis, leucine appears to regulate oxidative use of glucose by skeletal muscle through stimulation of glucose recycling via the glucose-alanine cycle. These mechanisms produce protein sparing and provide a stable glucose environment with low insulin responses during energy-restricted periods.