

Muscle protein metabolism, exercise, and nutrition

Stuart M. Phillips, Ph.D. McMaster University, Hamilton, Canada

Skeletal muscle is a critical organ serving as the primary site for postprandial glucose disposal and contractile force generation. Human skeletal muscle mass depends on the temporal relationship between changes in muscle protein synthesis (MPS) and muscle protein breakdown. Muscle proteins are turned over at a rate of $\sim 1.5\%/d$. This constant turnover is the basis of adaptation to differing stimuli, including exercise. Resistance exercise undoubtedly leads to the remodelling of myofibrillar proteins and the collagenous protein lattice. Aerobic exercise, in contrast, stimulates the turnover of myoplasmic and mitochondrial proteins. A central question addressed by a good portion of Dr. Kevin Tipton's work was how protein ingestion affected this protein remodelling and whether the remodelling rates could be augmented. The main aims of this talk are to reinforce notions that, at the time, were revolutionary and yet are now part of what we understand as dogma. The interaction of contraction, protein ingestion, and other nutritional practices will be explored. The contributions of Dr. Kevin Tipton, one of the pioneers in this field, will be emphasized, and a framework for understanding muscle and its adaptive capacity will be constructed.