

Nutrition and exercise – divergent or similar regulation of anabolic signalling pathways that regulate muscle protein synthesis

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Protein synthesis is increased in skeletal muscle by provision of nutrients to fasted animals or humans, as well as following resistance exercise. Moreover, recent studies suggest that provision of nutrients enhances the stimulation of muscle protein synthesis that is triggered by resistance exercise, suggesting that the two anabolic stimuli might act through independent signalling pathways. However, rapamycin, a selective inhibitor of the protein kinase termed mammalian target of rapamycin (mTOR), attenuates both the nutrient- and exercise-induced stimulation of protein synthesis, implicating the mTOR signalling pathway in the effect. Interestingly, a similar effect has been reported for amino acids and insulin, which act through independent pathways to synergistically promote signaling through mTORC1. In this presentation, the signaling pathways activated in response to amino acids and resistance exercise will be compared and contrasted, with the primary focus being on those that control activation of mTORC1.