"Muscle growth and protein turnover: a personal journey and current state of the art."

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Early animal studies of in vivo rates of muscle protein synthesis established the characteristics of proteostasis in muscle, during growth and development and in response to malnutrition, with manipulations of the hormonal status revealing the endocrinological basis of nutritional control in terms of the roles of insulin, IGF-1, thyroid hormones and glucocorticoids. Extension of these studies to bone growth identified the sensitivity of length growth to dietary protein and the important role of mechanotransduction of muscle-growth by bone length-growth. This resulted in the elaboration of a Protein Stat growth model. The basis of this is that the main component of phenotypic muscle mass, especially appendicular muscle, is controlled by long bone-growth, itself a function of adequate protein intakes, which creates, via mechanotransduction mechanisms, a controlled capacity for muscle-growth, a function of its connective tissue architecture. This is then filled in response to adequate dietary intakes of protein and other key type 2 nutrients. The applicability of the Protein Stat model to human growth in childhood can be demonstrated by both the current state of the art in terms of molecular mechanisms, and the phenomenology of the growth of muscle and stature in childhood and its nutritional regulation.