

<S6-1>

Impacts of Exercise/Nutrition on Skeletal Muscle and its Microvasculature in Relation to Ageing

Philip J. Atherton
University of Nottingham, UK

Skeletal muscle is a highly plastic tissue, and one which is crucial for the maintenance of metabolic and physical health. As such, given robust existing epidemiological and physiological associations between muscle mass/function and morbidity and mortality - understanding interactions between physical activity, nutrition and ageing is paramount. Of all exercise-types, resistance exercise (RE) coupled to nutrition (dietary essential amino acids) both acutely positively influences muscle protein metabolism, and in the longer-term, enhances muscle mass/function, metabolic health and cardiovascular remodelling. Nonetheless, ageing is associated with a degree of maladaptation to RE, for example, blunted muscle growth, via mechanisms relating to impaired muscle protein synthesis and ribosomal biogenesis (but not stem cell activities). In the general area of RE-induced

hypertrophy, controversy still exists as to whether chemo-mechano/transduction or the hypothalamic-pituitary-gonadal axis is the dominant driving force for muscle growth. If it is the latter, then age-related hypogonadism may underlie blunted anabolic-responsiveness of aged muscle to RE, and perhaps, also negatively impact metabolic health outcomes (e.g. glycemic control). In order to address these aspects, two randomized placebo-controlled trials will address: i) the impacts and mechanisms of suppressing endogenous testosterone production in younger adults in relation to RE-induced hypertrophy and metabolic health, and ii) the impact of exogenous testosterone provision adjuvant to RE, on muscle hypertrophy and metabolic health in old age. In sum, this talk will highlight the impacts of exercise on health as a function of ageing.