Promoting oxidative adaptation in skeletal muscle with divergent exercise modes

Vernon G. Coffey, Exercise Metabolism Group, Health Innovations Research Institute & School of Medical Sciences, RMIT University, Melbourne, Australia

The specificity of training principle dictates that repeated bouts of similar contractile activity result in adaptation specific to the overload stimulus applied to skeletal muscle. A simplistic approach is to characterise an exercise stimulus as prolonged, low-moderate intensity contractions which generate an aerobic phenotype or as short, high-intensity contractions that promote muscle hypertrophy and a phenotype adapted for high force production/strength. Intuitively, this is obvious when comparing the training-induced phenotypes of endurance and strength/power athletes that may represent opposite ends of an "adaptation continuum". The molecular profile generated following an acute bout of exercise may provide valuable information regarding the specificity and magnitude of the adaptation response. However, while the adaptation response in skeletal muscle to traditional endurance training is well-established recent studies have shown that a variety of contractile stimuli has the capacity to promote mitochondrial adaptation. Moreover, when undertaking divergent exercise modes with concurrent training it is unclear what affects combining endurance and resistance exercise have on the capacity to enhance or inhibit the specificity of training adaptation for oxidative metabolism. This information is important for exercise prescription to optimise adaptation for sports performance, and the potential for time efficient (concurrent) training that promotes maintenance of metabolic health and functional capacity with aging. This presentation will focus on our current understanding of the capacity to generate an aerobic adaptation profile and promote mitochondrial protein synthesis with endurance and resistance exercise, and the effect of nutrient provision on the adaptation response.