Invited Speaker Plenary 6: Sports Nutrition

Interaction of exercise and diet to maximise the training adaptation

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Training and nutrition are highly interrelated in that optimal adaptation to the demands of repeated training sessions typically requires a diet that can sustain muscle energy reserves. Nutrient stores (i.e. muscle and liver glycogen) play a predominant role in the capacity to undertake both prolonged submaximal endurance exercise as well as intense, intermittent activities. Nutrient availability is vital in the replenishment of energy reserves for subsequent training sessions. Accordingly, the extent to which acutely altering substrate availability might modify the training response/adaptation has been a key research area among exercise physiologists and sport nutritionists for several decades. With regard to training adaptation, it has been proposed that AMPK-PGC-1α signalling mediates endurance training-like responses, while up-regulation of the Akt-TSC2-mTOR pathway underlies the increased protein synthesis observed following resistance exercise. However, the precise molecular signalling mechanisms that transduce the effects of contractile activity to modify skeletal muscle phenotype and function are incompletely understood, as is the effect of training/nutrient interaction on many of these signalling cascades. Here several nutritional interventions that modify the acute responses to exercise (and thus have the potential to impact on subsequent training adaptation) will be examined. Specifically, the molecular and cellular events that occur in skeletal muscle during exercise and subsequent recovery, and the potential for nutrient supplementation (e.g. carbohydrate, fat, protein or combinations) to serve as a potent modulators of many of the adaptive responses to training will be discussed.