

ACTN3 GENOTYPE IS NOT ASSOCIATED WITH EITHER EXERCISE-INDUCED MUSCLE DAMAGE OR REPEATED BOUT EFFECT

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Introduction

Alpha-actinin-3 anchors myofibrillar actin filaments to the Z disc of the type II muscle fibers. A common nonsense mutation results in absence of the protein in about one-fifth of the human population (North et al., 1999).

Alpha-actinin-3 (ACTN3) R/X polymorphism was shown unlikely to be associated with the extent of muscle damage after unaccustomed eccentric exercise using arm (Clarkson et al., 2005), though improvement of isokinetic concentric knee extension torque after isokinetic training was higher in RR vs. XX homozygotes (Norman et al., 2009). The aim of the present study was to compare muscle function between ACTN3 genotypes in response to jumping (plyometric) session performed and repeated two weeks later.

Methods

ACTN3 R577X polymorphism was determined by PCR amplification followed by RFLP analysis (Moran et al., 2007) from the samples of the cohort of subjects recruited to participate in the association study. Two groups of young adult males homozygous for R or X alleles, i.e. with either RR (n=9) or XX (n=8) ACTN3 genotype, were subsequently enrolled into the study, which was two bouts of 50 stretch-shortening actions (drop jumps from 50 cm height to ~90° at the knee joints performed with maximal counter-movement) separated by two weeks. Plasma creatine kinase activity, drop jump height, maximal voluntary contraction force (MVC), electrically stimulated isometric torque, and peak concentric isokinetic torque were measured before, immediately after, and 2, 7 and 14 days after each bout. Knee extension torque of the dominant leg was measured on isokinetic dynamometer. Muscle soreness was estimated daily throughout the study.

Results

Except for the less substantial reduction in MVC of XX homozygotes immediately after the second bout of 50 drop jumps when compared to RR homozygotes ($p < 0.05$), no differences between the groups were detected in either of the parameters measured throughout the study.

Discussion

Our results suggest that ACTN3 genotype has negligible if any association on the degree of muscle damage after unaccustomed exercise, as well as minor effect on the variation in size/speed of adaptation to demanding plyometric training.

TOPIC: PHYSIOLOGY

PRESENTATION FORM: ORAL

SESSION ART: THEMATIC