PEROXISOME PROLIFERATOR-ACTIVATED RECEPTOR DELTA POLYMORPHISMS ARE ASSOCIATED WITH MUSCLE ENZYME ACTIVITIES: THE HERITAGE FAMILY STUDY

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PURPOSE: Peroxisome proliferator-activated receptor delta (PPARD) is a nuclear receptor that modulates the expression of many target genes, including those involved in muscle energy metabolism (1). Since regular endurance training activates the endogenous ligands for PPARD (2), we hypothesized that PPARD gene polymorphisms are associated with maximal muscle enzyme activity responses to endurance training.

METHODS: Associations between PPARD Exon 4 +15 C/T and Exon 7 +65 A/G polymorphisms and muscle enzyme activity responses to 20 weeks of endurance training were investigated in healthy males and females (n=78).

RESULTS: Exon 7 +65 G/G homozygotes showed 7.4% decreases in glycolytic glyceraldehyde phosphate dehydrogenase (GAPDH) and phosphofructokinase (PFK) activities with the endurance training program, whereas the common allele homozygotes (A/A) had increases ranging from 5 to 11% (genotype main effect p=0.016 for both enzymes). Similarly, a blunted GAPDH training response was observed in the Exon 4 +15 C allele carriers (p=0.037) compared to the T/T homozygotes. In the sedentary state, the activity of hexokinase (HK) was higher in Exon 4 +15 C allele carriers compared to T/T homozygotes (p=0.017), and in Exon 7 +65 G/G homozygotes compared to A allele carriers (p=0.012). No associations were found between PPARD polymorphisms and the changes in activity of several enzymes of aerobic metabolism.

CONCLUSION: DNA sequence variation at the PPARD locus is a potential modifier of exercise training-induced changes in skeletal muscle enzyme activities in healthy, but sedentary individuals.

REFERENCES:

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