

Medicine & Science in Sports & Exercise

Issue: Volume 42(5) Supplement 1, May 2010, p 374

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Publication Type: [B-32 Free Communication/Poster - Muscle I: JUNE 2, 2010 1:00 PM - 6:00 PM: ROOM: Hall C]

DOI: 10.1249/01.MSS.0000384673.05082.af

ISSN: 0195-9131

Accession: 00005768-201005001-01124

[B-32 Free Communication/Poster - Muscle I: JUNE 2, 2010 1:00 PM - 6:00 PM: ROOM: Hall C]

The Effects of Age and Repetitive Mechanical Loading on Systemic Whole Genome Gene Expression: 1716: Board #153 June 2 2:00 PM - 3:30 PM

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(No disclosure reported)

Aging increases injury susceptibility and impairs skeletal muscle's ability to adapt to repetitive high-intensity mechanical loading.

PURPOSE: The purpose of the present study was to investigate the systemic effects of these exposures on the gene expression profile in blood and if aging affects the gene response.

METHODS: The left dorsiflexor muscles of young (12 wks age, N = 8) and old (30 mo age, N = 8) male Fischer 344 × Brown Norway rats were exposed 3×/week for 4.5 weeks to a protocol of 80 maximum SSCs per exposure in vivo. Animals were sacrificed 24 hours after the last exposure and RNA was isolated from the blood leukocytes. cRNA samples were prepared and loaded onto Sentrix Rat-Ref12 Beadchips (Illumina, cat#BD-27-303) following standard protocols.

RESULTS: Old rats had a significantly higher expression than young rats in genes such as RANTES, ADORA2A, and IL17RA, associated with arthritis and apoptosis. Other genes involved in cell growth and proliferation were also upregulated in the old rats such as AIF1, CD59 and XDH. Conversely, genes associated with hypertrophy of normal cells, such as ALOX15, and cell death, such as CYP1B1, were downregulated in the old animals compared to the young. Significant differences were 1.5 fold or greater.

CONCLUSION: Understanding the sets of genes specifically associated with chronic mechanical loading leading to either a positive (adaptation) or negative (maladaptation) response and the effects of aging has immediate relevance for the development of new strategies that optimize muscle performance and muscle quality in aging skeletal muscle.

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Version: OvidSP_UI03.11.00.120, SourceID 59447