June 1, 10:00 AM - 10:15 AM
The Effects of Acute Resistance Exercise on Apoptotic Signaling in Untrained Males


Apoptosis, or programmed cell death, is an essential physiological process regulating cellular development and is often associated with advanced stages of inflammation and disease. However, limited research has focused on skeletal muscle apoptosis as a result of exercise induced muscular trauma.

PURPOSE: To observe the effects of an acute lower-body resistance exercise protocol and subsequent recovery on intramuscular apoptotic signaling.

METHODS: Twenty-eight untrained males (22.3 ± 3.2 y, 1.7 ± 0.1m, 81.1 ± 15.5 kg) were assigned to either a control (CON; n=11) or exercise group (EX; n=17) and completed a lower-body resistance exercise protocol consisting of the back squat, leg press, and leg extension exercise. Skeletal muscle microbiopsies were obtained from the vastus lateralis pre-exercise (PRE), 1-hour (1HR), 5-hour (5HR), and 48-hours (48HR) post-resistance exercise. Multiplex signaling assay kits (EMD Millipore, Billerica, MA, USA) were used to quantify the total protein (Caspase-3,-8,-9) or phosphorylation status of proteins (JNK, FADD, p53, BAD, Bcl-2) specific to apoptotic signaling pathways using MAGPIX® (Luminex, Austin, TX, USA). Mann Whitney U analysis was used to determine the effects of the exercise bout on intramuscular signaling. Additionally, change scores were analyzed by magnitude based inferences to determine a mechanistic interpretation.

RESULTS: Mann-Whitney U analysis revealed that resistance exercise increased JNK phosphorylation at 1H (p=0.001) and 5H (p=0.022), and FADD phosphorylation at 1H (p=0.029). No other differences observed between groups. Magnitude based inferences revealed a “Likely” increase in total Caspase 3 from PRE-5H and from PRE-48H. JNK phosphorylation was “Most Likely” increased from PRE-1H and PRE-5H and FADD was “Likely” increased from PRE-1H. BAD was “Very Likely” increased from PRE-5H and Bcl-2 was “Most Likely” increased from PRE-1H and “Likely” increased” from PRE-5H.

CONCLUSION: These data show that apoptotic signaling is upregulated in response to a typical resistance exercise protocol, providing additional insight into the physiological mechanisms involved in skeletal muscle remodeling following resistance exercise.