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**Session Topic (drop down list)**

Muscle Hypertrophy and Regeneration

**Abstract Title**

Mechanisms associated with a gain and loss of leg muscle mass with resistance training followed by high-intensity interval training

**Author List**

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**Abstract**

Skeletal muscle (SkM) is a plastic tissue that uniquely responds to different stimuli. While resistance training (RT) induces SkM hypertrophy, the effects of high-intensity interval training (HIIT) are less clear, with certain evidence indicating mild hypertrophy and other evidence suggesting no change. Our laboratory recently observed an increase in vastus lateralis thickness after seven weeks of RT only (2 d/wk), with values returning to pre-training levels when seven weeks of treadmill HIIT only (3 d/wk) immediately followed. Given that proteolytic mechanisms were not investigated, the purpose of this study was to examine the effects of the aforementioned training paradigm on markers of proteolysis. Vastus lateralis biopsies were collected from 11 untrained college-aged males at baseline (PRE), after seven weeks of RT (MID), and after a subsequent seven weeks of HIIT (POST). Tissue was analyzed for markers of ubiquitin-proteasome, autophagy/lysosomal, and calpain systems. Dependent variables were checked for normality using Shapiro-Wilk tests and analyzed via one-way ANOVAs. Atrogenes MuRF1, Atrogin-1, and FOXO3a all achieved ANOVA level significance ( $p \leq 0.0129$ ), and were significantly upregulated at POST versus PRE ( $p \leq 0.032$ ) and MID ( $p \leq 0.0315$ ). Poly-ubiquitinated proteins, 20S proteasome core proteins, and 20S proteasome activity all demonstrated ANOVA significance ( $p \leq 0.019$ ) with all except poly-ubiquitinated proteins demonstrating increases at POST as compared to PRE ( $p \leq 0.031$ ). Calpain activity did not demonstrate ANOVA significance ( $p = 0.075$ ); however, forced post hoc tests indicated that POST was greater than MID ( $p = 0.035$ ). Additionally, calpain-2 protein abundance demonstrated ANOVA significance ( $p < 0.001$ ), with PRE being less than MID ( $p = 0.009$ ) and POST ( $p = 0.003$ ). LC3II/I ratio, a marker of autophagic flux, did not reach ANOVA significance ( $p = 0.854$ ). These data suggest that 7 weeks of treadmill-HIIT immediately following a 7-week RT period elevates ubiquitin-proteasome system markers and calpain-2 protein in SkM. Moreover, these molecular adaptations may promote the HIIT-induced loss of muscle hypertrophy induced by prior RT.

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