ABSTRACT

THESIS: Molecular Responses to Acute Resistance Exercise in Adipose Tissue and Skeletal Muscle

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This investigation aimed to provide insight into the changes in gene expression in human adipose and skeletal muscle tissues in response to a bout of whole-body resistance exercise (RE). Healthy, young individuals (n=6, 25 ± 1y) completed an RE bout consisting of eight upper and lower body exercises (3 x 10 reps at 70% 1RM each). Subjects (n=6, 24 ± 1y) in the control group (CON) remained at rest in the supine position. Biopsies from the subcutaneous adipose tissue and vastus lateralis muscle were obtained before and after ~4 h of RE or CON to assess the mRNA expression of genes involved in energy metabolism (PPARγ, PGC-1α, PDK4, ANGPTL4, LPL), tissue growth (IGF-1, MSTN, Fn14), angiogenesis (VEGFA and HIF-1α), and inflammation (IL-6 and TNF-α). In skeletal muscle, RE increased the expression of PGC-1α, PDK4, Fn14, and VEGFA ($P<0.05$); a main effect of time was observed for ANGPTL4, LPL, and MSTN ($P<0.05$). In adipose tissue, there was no change in the expression of the set of genes examined following RE or CON ($P>0.05$). The modest response in gene expression observed in skeletal muscle aligns with previous research in this area, and highlights the transcriptional activity occurring within this tissue to regulate the various

demands of exercise and the possible adaptations related to RE. The observed main time effects suggest the influence of systemic and/or circadian factors independent of RE on transcriptional activity in skeletal muscle. Although the RE stimulus appeared to have no effect on mRNA activity on the genes examined in adipose tissue, further research in the area of adipose tissue biology is warranted. Overall, these findings expand our understanding of the molecular responses induced by RE in skeletal muscle and the associated health benefits that occur with chronic training, and provide initial insight into adipose tissue biology following acute RE.