Study Coordinator: Karen Riska, MS

Title: Molecular & Architectural Changes in Skeletal Muscle Extracellular Matrix after Eccentric Exercise.

The primary goal of this study is to examine muscle adaptation in men and women in response to eccentric exercise. Eccentric exercise is known to produce skeletal muscle damage as evidenced by analysis of muscle biopsy samples, as well as indirect indicators such as prolonged strength loss and the development of muscle soreness. Our laboratory, and others have shown that one bout of eccentric exercise produces an adaptation such that there is less strength loss and muscle soreness in response to a repeated bout of the same exercise – this phenomenon is termed the "repeated bout effect" (RBE). A stair descent exercise was used to examine molecular underpinnings of the RBE in men and women. Of interest are potential molecular changes in the extracellular matrix (ECM).

After performing a bout of eccentric exercise, muscle soreness peaks at 24-48h post-eccentric exercise and resolves within 7-10d. Upon performing a second bout of eccentric exercise, the muscle becomes "accustomed" the strain, and this repeated bout produces less soreness and strength loss. I believe the ECM is involved in the manifestation and recovery of muscle damage and also the adaptation, which results in an attenuation of muscle damage upon a repeated bout of exercise. Therefore, I expect that at 24h post-eccentric exercise there will be extensive disruption to the ECM and at 24h post-repeated bout of eccentric exercise there will be less disruption than after the first bout. Muscle soreness was assessed at 24 hr post-eccentric exercise and prior to the muscle biopsy and muscle strength loss was measured immediately before and after the eccentric exercise.

In preliminary analyses, I found that after the second bout of exercise there was less soreness and strength loss, demonstrating the classic repeated bout effect. Currently, protein and gene expression levels of ECM components (e.g. Collagen III and Collagen IV, Laminin, Biglycan, Decorin, and Integrins) are being assessed via Western Blotting and quantitative real time polymerase chain reaction (qRT-PCR). Additionally ECM components will be assessed using fluorescent microscopy to determine the localization of these products.

Staff assistant:
Justin Keadle

Undergraduate student assistants:
Allison Blacker
Megan Danzell
Kristen Hirsch
Shiyi Zan