TACSM Abstract

Autophagy, but Not Proteolysis, May Aid in Muscle Protein Synthesis

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ABSTRACT

For muscle growth to occur, protein synthesis must be greater than protein degradation. However, up to this point, anabolic pathways have garnered the brunt of investigations examining anabolic capacity with little investigation into the connectedness of catabolic signaling on these anabolic targets. **PURPOSE**: The purpose of this study was to elucidate the contributions of proteasomal-dependent and autophagic-dependent catabolic pathways on anabolism via analysis of fractional synthetic rates (FSR) in L6 myotubes. **METHODS**: Differentiated, cultured L6 myoblasts were treated with media containing 4% deuterium oxide (stable isotope label) and a corresponding pharmacological treatment (NSC 185058 [autophagic inhibitor; 100 µM], MG-262 [proteasomal inhibitor; 0.01 µM] or DMSO control; n=3/group) during the final 24-hours of the differentiation period prior to harvest. The myofibrillar pellet of the processed samples was used to determine FSR via mass-spectrometry analysis. DMSO-treated myotubes served as controls, with a one-way analysis of variance and Tukey's post-hoc test used to test for any differences among groups. **RESULTS**: Our results indicate that MG-262 had no impact on myofibrillar FSR when compared to DMSO control (MG-262 1.0993 %/day vs. control 1.239 %/day). However, NSC 185058 lowered myofibrillar FSR (NSC 185058 0.9009 %/day vs. control 1.239 %/day; P=0.0282). **CONCLUSION**: These data suggest that inhibition of autophagic machinery can impair anabolism. This may be due to autophagy's role in increasing the amino acid pool within the cell. Further, the lack of inhibition seen from MG-262 suggests that there is a delineation of roles within the catabolic pathways in regard to their influence on anabolism in healthy, metabolically unchallenged myotubes.