Knockdown of STARS alters protein synthesis and degradation

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Background and Aim: Striated muscle activator of Rho signalling (STARS) is a muscle specific actin-binding protein (Arai *et al.*, 2002). We have recently shown that STARS is up-regulated in hypertrophied human skeletal muscle following resistance exercise and is decreased following atrophy-stimulating detraining (Lamon *et al.*, 2009). STARS mRNA is also reduced in sarcopenic mice (Sakuma *et al.*, 2008). These studies suggest that STARS may be involved in skeletal muscle protein synthesis and/or degradation; however this has not been determined. Therefore, the aim of this study was to establish the role of STARS in protein synthesis and degradation in C2C12 myotubes.

Methods: STARS over-expression and knockdown in C2C12 myotubes was achieved using adenoviral infection and siRNA transfection, respectively. Myotubes were also treated with insulin (100nM) to promote protein synthesis or dexamethasone (DEX) (10μM) to promote protein degradation. Protein synthesis and degradation was determined by the amount of radio-labelled ^{3}H-tyrosine incorporation into and release from the myotubes, respectively.

Results: STARS over-expression did not influence basal protein synthesis or degradation, nor did it influence insulin stimulated or dexamethasone attenuated protein synthesis. However, knockdown of STARS significantly reduced basal and insulin stimulated protein synthesis by 25%. Additionally, knockdown of STARS significantly increased basal and dexamethasone-induced protein degradation by 20% and 50%, respectively.

Conclusion: These observations show that STARS is necessary to maintain the fine balance between basal protein synthesis and degradation. Furthermore, a reduction in STARS reduces the influence of anabolic stimuli and enhances the effect of catabolic stimuli. A minimum amount of STARS may be required to sustain a healthy level of protein turnover.

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