

24 Hours of Electrical Pulse Stimulation Upregulates GLUT4 and AMPK Protein Content in Human Myotubes

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ABSTRACT

Electrical pulse stimulation (EPS), an *in vitro* exercise mimetic, has been shown to increase mitochondrial and lipid content in cultured human myotubes. We have recently shown that myotubes retain certain *in vivo* characteristics of the donors. **Purpose:** We aimed to examine the EPS-induced adaptations in relation to Glucose Transporter Type 4 (GLUT4) and 5' Adenosine Monophosphate-activated Protein Kinase (AMPK) content using human myotubes. Additionally, we examined if the duration of EPS as well as cell harvest times (immediate vs. 24hrs. after the cessation of EPS) plays a role in EPS induced changes in GLUT4 and AMPK content. **Methods:** EPS was applied to myotubes 24 and 48 hr. (single bipolar pulses of 1 Hz for 2 ms; 30V) and were harvested at two different time points: immediately after (early harvest) and 24hr after (late harvest) the end of stimulation. Total GLUT4 and AMPK content were measured by western immunoblotting. **Results:** GLUT4 content was ~ 1.7 fold higher after 24 hr. early harvest and ~2.1 fold higher after 48 hr. late harvest stimulation. Total AMPK content was ~3.2 fold higher after 24 hr. early harvest stimulation and ~1.4 fold higher after 48 hr. late harvest stimulation. There was a ~0.6 fold decrease in AMPK after 24 hr. late harvest stimulation. **Conclusion:** These findings suggest that 24Hr of EPS stimulation upregulates GLUT4 and AMPK protein content. Duration and harvesting time (a reflection of post-exercise recovery) with regards to EPS treatment is a key factor leading to GLUT4 and AMPK content adaptations to exercise in human myotubes.