

Medicine & Science in Sports & Exercise:

May 2001 - Volume 33 - Issue 5 - p S67

B16k Free Communication/Poster Cellular Regulatory Mechanisms

Effect of Creatine and Guanidino-Propionic Acid on Myotube Growth

Louis, M¹; Awede, B¹; Lebacq, J¹; Francaux, M¹



Author Information

¹Université catholique de Louvain, Louvain-la-Neuve, Belgium

(Sponsor: Jacques Poortmans, FACSM)

Since the paper of Roger Harris and his collaborators (Clin. Sci. 83: 367-374,1992), creatine has been largely used as an ergogenic supplement, in the hope of improving muscle performance. Recently, positive effects have been observed in patients suffering from neuro-muscular disorders like myopathies, Huntington or Parkinson diseases. A secondary effect, commonly reported, of creatine supplementation is an increase in lean body mass attributed to water retention, muscle hypertrophy or both. In this study, we applied creatine or guanidino-propionic acid (GPA), a creatine analogue, to myotube cultures to test the hypothesis of a possible role of creatine in the mechanism of hypertrophy. C2C12 cells were seeded at 5×10^4 cell/cm² in DMEM medium (Gibco, Basel, Switzerland) containing 10% of foetal calf serum. When cell confluence reached 70%, the proliferation medium was replaced by a differentiation medium containing 1% horse serum. 20 mM creatine or GPA was added to the medium. Fusion of myoblasts into myotubes occurred after 2 days in culture and was completed within 24 hours. Six cultures were prepared in each condition, including a control condition. The myotube content of each culture was counted on the basis of 2 randomly chosen fields. The size of the myotubes was estimated by measuring their diameter. No difference in the number of myotubes in cultures was found. Their diameter was however increased by 40% in the presence of creatine in the medium ($P < 0.001$) and decreased by 25% in the presence of GPA ($P = 0.008$). In conclusion, creatine added to the differentiation medium promotes myotube growth while GPA depresses it. As, GPA replaces creatine in the cell and reduces phosphoryl-creatine content, myotube growth could be controlled by the energy status of the cell.

©2001The American College of Sports Medicine