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Effects of ATP and adenosine on contraction amplitude of rat soleus muscle at different temperatures

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Abstract

 Introduction: The aim of this study was to evaluate the effects of adenosine 5′-triphosphate (ATP) and adenosine on the contractility of mammalian skeletal muscle under hypothermic conditions. Methods: Contractions of isolated rat soleus muscle were induced by either electrical stimulation (ES) or carbachol at physiological temperatures (37°C) and hypothermic conditions (30–14°C) and recorded in the presence of ATP, adenosine, suramin, and 8-(p-sulfophenyl)-theophylline (8-SPT). Results: At 37°C, incubation of the muscles with ATP inhibited ES-induced contractions; the inhibitory effect of ATP disappeared at 14°C. Adenosine inhibited ES-induced contractions at all temperature levels; 8-SPT fully prevented the action of adenosine. ATP and adenosine did not significantly affect carbachol-induced contractions at 37°C, while at lower temperatures ATP potentiated them. Suramin fully prevented effects of ATP. Conclusions: ATP is involved in both pre- and postsynaptic regulation of rat soleus muscle contractility, and these processes are significantly more pronounced at low temperatures. Muscle Nerve 55: 417–423, 2017.

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Keywords

adenosine, ATP, hypothermia, P2 receptors, skeletal muscle, suramin

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