

COLD EXPOSURE INCREASES THE Ca²⁺ ATPase EXPRESSION AND THERMOGENIC FUNCTION IN RABBIT SKELETAL MUSCLE

Arruda, A.P.,¹ Ketzer, L.A.,¹ Nigro, M.,¹ Carvalho, D.P.,² and de Meis, L.¹.
¹Institute of Medical Biochemistry, ² Institute of Biophysical Carlos Chagas Filho, UFRJ, RJ, Brazil

The sarcoplasmic reticulum (SR) Ca²⁺-ATPase (SERCA) is an enzyme responsible for the Ca²⁺ transport from the cytosol to SR lumen, using ATP hydrolysis. In addition to its role on Ca²⁺ transport, SERCA 1 is able to hydrolyze ATP without pumping Ca²⁺, producing more heat per ATP cleaved than that released during Ca²⁺ transport. We have already shown that thyroid hormones, the main regulator of mammal's thermogenesis, modulate SERCA expression and function in red skeletal muscle. In this work we verify the effect of acute cold exposure (4°C) on SERCA expression and kinetic properties in rabbit white and red skeletal muscles. In red skeletal muscle, 72hs of cold exposure promotes a marked increase in SERCA 1 expression, but the SERCA 2 expression does not change. The increase of SERCA 1 is accompanied by a 50 % increase in the rate of Ca²⁺-Uptake by SR vesicles. Also, in red muscle, cold treatment induces an increase in both ATPase activity and the amount of heat release during ATP hydrolysis. In white muscle, as we have already observed in hyperthyroidism, cold exposure does not promote significant changes in SERCA expression and function. These findings corroborate the hypothesis that SERCA uncoupled ATP hydrolysis is an important source of heat production in rabbit skeletal muscle.

This work is supported by: CNPq, Faperj and PRONEX

Key words: Thermogenesis, Cold exposure, Ca²⁺ ATPase