

COLD ACCLIMATION AND HYPERTHYROIDISM MODULATE Ca^{2+} -ATPase EXPRESSION AND ACTIVITY IN RABBIT HEART

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Thyroid hormone has profound effects on the cardiovascular system, including alteration in heart rate, oxygen consumption and Ca^{2+} homeostasis. One of the proteins regulated by TH in the heart is the sarcoplasmic reticulum (SR) Ca^{2+} -ATPase (SERCA), an enzyme responsible for the Ca^{2+} transport from the cytosol to the lumen of the SR, using energy derived from ATP hydrolysis. In this study, we examined rabbit heart SERCA2a expression and kinetic parameters in hyperthyroidism (100 μg T4/kg, 8 days) and during cold-exposure (72 hours, 4°C), which is a condition known to increase serum T3 levels. We observed that both hyperthyroidism and cold acclimation promotes an increase in SERCA 2a expression. This effect was accompanied by a significant increase in the rate of Ca^{2+} transport. In hyperthyroidism, the rate of ATPase activity and the amount of heat released during ATP hydrolysis are increased. However, the amount of heat released per mol of ATP cleaved (ΔH^{cal}) does not change. In cold exposure animals no difference in ATPase activity and heat production were observed. We conclude that heart SERCA 2a modulation is similar during cold exposure and hyperthyroidism; however the more pronounced Ca^{2+} -ATPase changes in hyperthyroidism are probably due to higher serum T3 levels for a longer period of time.