Effect of Different Thyroid States on the Subcellular Distribution of Hexokinase and Glucose 6-Phosphate Dehydrogenase activities in Mice Tissues

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Hexokinase (HK) and glucose 6-phosfate dehydrogenase (G6PDH) are important enzymes in glucose metabolic pathways, such as glycolysis and pentose phosphate pathway. Once that thyroid hormones play a crucial role on the energy metabolism control, the aim of this study was to investigate whether HK and G6PDH activities would be modulated by hypo-, eu- and hyperthyroidism states. HK and G6PDH specific activities were measured in mitochondrial and cytosolic fractions from brown adipose tissue (BAT), heart and skeletal muscles (soleus, gastrocnemius and EDL) from different groups. Hypo-, eu- and hyperthyroidism states were induced by administration of 0.04% propylthiouracil, vehicle or 0.25 µg/g body mass T3, respectively, during 3 weeks. We observed in BAT that soluble HK activity was about 1.4-fold lower in hyperthyroid then hypothyroid, while no changes were observed in euthyroid group. Concerning mitochondrial fraction, HK activity was 37% and 29% lower in BAT from hypo- and hyperthyroid, respectively, whereas an increase was detected in heart (13%) and gastrocnemius (250%) of hyperthyroid ones. Analysis of G6PDH activity showed an increase in the cytosolic fraction from hypo- (2x) and hyperthyroid (1.7x) groups in gastrocnemius muscle, and a decrease in soleus muscle from hyperthyroid animals (about 2.9x). In BAT, EDL and heart no changes were detected in the mitochondrial fraction. G6PDH activity was not measured in soleus and gastrocnemius muscles. These results suggest that thyroid hormones are able to modulate HK and G6PDH activities in a tissue-specific manner. Moreover, this modulation seems to be tissue-specific and subcellular localization.

Key words: Glucose 6-phosfate dehydrogenase, Hexokinase, Thyroid states
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