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The influence of dietary iodine and environmental temperature on the activity of mitochondria in liver and kidney

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Abstract

It was found that both effect of temperatures and diets influence metabolic changes in rabbits. In animals fed basal and PTU diets (propyl-thiouracil diets) at 34 degrees C for 4 weeks the metabolic response showed a marked reduction in feed intake and body weight, compared with animals fed at normal temperatures. In the animals fed the iodine diet, there was an increase in daily food consumption and weekly body weight gain at 34 degrees C. This indicates a rise in metabolic activity in this case. Studying the activity of kidney mitochondria of the three groups of animals using succinate as a substrate revealed that the P/O ratio tends to decrease in animals kept at 6 degrees C while the RCR value was not altered by changing conditions or produced by the different diets. At the temperature of 6 degrees C both the P/O ratios and the RCR values of liver mitochondria using succinate as a substrate decreased in the group of rabbits fed the basal and iodine diets, but were not significantly different in the group fed the PTU diet. In the experiment on kidney mitochondrial activity using alpha-ketoglutarate as a substrate it was found that both the P/O ratios and the RCR values from animals fed basal and PTU diets at 6 degrees C decreased slightly as compared with animals fed at 20 degrees C and 34 degrees C. In liver mitochondria, using alpha-ketoglutarate as a substrate a significant decrease in the P/O ratio and the RCR value was found for both rabbits fed the basal and the iodine diets at 6 degrees C. In the group of rabbits fed the PTU diet, the P/O ratio also decreased but the fall was not significant. These results suggested that the activity of succinate dehydrogenase in liver mitochondria increases in animals fed basal and iodine diets at 6 degrees C. The enzyme dehydrogenase involved in oxidation of alpha-ketoglutarate which is localized in the outer membrane of mitochondria seems to be affected by different temperatures and diets as compared with succinate dehydrogenase localized in the matrix. The kidney mitochondria activity is less sensitive than that of liver mitochondria. Mitochondrial respiration and phosphorylation due to the tightness of their coupling may respond differently depending on the degree of thyroid activity.

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