GLUCOKINASE, HEXOKINASE, AND GLUCOSE-6-PHOSPHATE DEHYDROGENASE ACTIVITIES IN THE LIVERS AND MYOCARDIA OF RABBITS WITH PYROGENAL-INDUCED FEVER

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Glucokinase, hexokinase, and glucose-6-phosphate dehydrogenase activities of the liver and myocardium were studied in experiments on rabbits in various stages of pyrogenal-induced fever. Activity of the first stage of glycolysis was found to be depressed. In the postfebrile period, activities of these enzymes returned to normal.

KEY WORDS: pyrogenal-induced fever; glucokinase; hexokinase; glucose-6-phosphate dehydrogenase.

In pyrogenal-induced fever hexokinase activity is lowered in the muscles, myocardium, and myelokaryocytes of the bone marrow [1-4]. However, activity of the enzymes of carbohydrate metabolism in the liver, which contains glucokinase (EC 2.7.1.2) and controls the blood sugar level [5], has been inadequately studied during fever.

In this investigation the activity of glucokinase, hexokinase, and glucose-6-phosphate dehydrogenase G6PD) in the liver and myocardium of rabbits with pyrogenal-induced fever was studied.

EXPERIMENTAL METHOD

Fever was induced in rabbits weighing 2.5-3.5 kg by intravenous injection of pyrogenal in a dose of 5 μg/kg body weight. The rabbits were decapitated in one stage of fever or in the postfebrile period.

TABLE 1. Activities of Hexokinase, Glucokinase, and G6PD in Livers and Myocardia of Rabbits at Different Stages of Pyrogenal-Induced Fever

Group of animals	Activity of enzymes (in μmoles $NADPH_2$/g protein/min)				
	liver			myocardium	
	hexokinase	glucokinase	G6PD	hexokinase	G6PD
Intact	1,8±0,3 (15)	9,1±0,7 (15)	18,9±4,2 (8)	8,7±1,3 (8)	5,1±1,9 (6)
Experimental:					
at stage of rising temperature	1,3±0,2 (20)	5,3±0,4 (20)	11,9±1,8 (10)	3,3±0,1 (10)	1,5±0,2 (10)
P	>0,05	<0,001	>0,05	<0,001	>0,05
at stage of maintenance of high temperature	1,0±0,1 (15)	3,2±0,6 (15)	11,8±2,5 (9)	3,2±0,1 (9)	2,9±0,1 (7)
P	<0,05	<0,001	>0,05	<0,001	>0,05
at stage of falling temperature	0,9±0,1 (15)	3,5±0,7 (15)	15,9±3,3 (8)	3,4±0,8 (12)	1,3±0,9 (7)
P	<0,01	<0,001	>0,05	<0,01	>0,05
in postfebrile period	1,3±0,2 (13)	9,1±1,0 (13)	22,8±2,4 (10)	8,1±0,1 (11)	5,4±1,3 (10)
	>0,05	>0,05	>0,05	>0,05	>0,05

Note. Number of animals shown in parentheses

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Activity of the enzymes [6, 7] was determined in the hyaloplasm of the liver and myocardium, from which low-molecular-weight components had previously been removed on a column measuring 0.5 × 15 cm, with Sephadex G-50, equilibrated with 0.05 M tris-HCl buffer, pH 7.4; activity was expressed in μmoles NADPH /g protein/min. Protein in the samples was determined by Lowry's method [8]. The results were analyzed by the constant method of indirect differences.

EXPERIMENTAL RESULTS

Injection of pyrogenal evoked a marked febrile response which lasted 7-9 h. The results of determination of the activities of the various enzymes at different stages of fever are given in Table 1. Hexokinase and glucokinase activities fell during pyrogenal-induced fever and reached a minimum at the stage of maintenance of a high temperature. The activity of the enzymes returned to normal in the postfebrile period.

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