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EFFECT OF PROSTAGLANDIN E_2 ON ACTIVITY OF SOME ENZYMES DURING PARENTERAL FEEDING

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UDC 615.874.2: 546.963.2/: 615.456/.
015.2: 615.357: 577.175.859/.
015.4/577.15.012

KEY WORDS: parenteral feeding; prostaglandin E_2; enzymes.

The writers demonstrated previously the anabolic effect of prostaglandin E_2 (PGE_2) during parenteral feeding (PF) [3]. Considering that the principal processes during PF takes place at organ-tissue, subcellular, and molecular levels [1, 2] and do so in accordance with the mediator–enzyme–tissue or hormone–enzyme–tissue principle, and also considering relations between prostaglandins and enzymes [4], it was decided to study the effect of PGE_2 on activity of aspartate aminotransferase (AaAT), alanine aminotransferase (AlAT), and aldolase, which play important roles in the mechanisms of anabolic effects at the organ-tissue level.

EXPERIMENTAL METHOD

Experiments were carried out on 65 male albino rats weighing 180-250 g. AsAT and AlAT were determined by the method in [6], and aldolase by the method in [5] (activity was expressed in micromoles/g wet weight of tissue). The tests were undertaken on objects important for PF such as the liver and striated muscles.

The experimental animals were kept for 6 days on a nonprotein diet, consisting of starch, sugar, yeast, salt mixture, and vitamins. Against the background of this diet on the 7th day of the experiment rats of group 1 received an intramuscular injection of physiological saline, rats of group 2 received casein hydrolysate in a dose of 0.3 g conventional protein per 100 g body weight, and rats of group 3 received casein hydrolysate and PGE_2 (prostenon, USSR), synthesized in the Sector of Pure Substances, Institute of Chemistry, Academy of Sciences of the Estonian SSR, under the direction of Professor Yu. E. Lille, PGE_2 was injected intramuscularly in a dose of 40 μg/100 g body weight. The experimental results were compared with data obtained on healthy rats, kept on the usual animal house diet, and on animals kept on a nonprotein diet and receiving injections of physiological saline.

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Translated from Byulleten' Éksperimental'noi Biologii i Meditsiny, Vol. 100, No. 8, pp. 161-162, August, 1985. Original article submitted June 15, 1984.

TABLE 1. Effect of PGE_2 on AsAT, AlAT, and Aldolase Activity during PF (in μmoles/g wet weight of tissue)

Experimental conditions	Number of animals	AsAT		AlAT		Aldolase	
		liver	muscle	liver	muscle	liver	muscle
1. Intact animals	15	9,3±0,98	8,6±0,7	30,9±2,0	5,5±0,5	5,1±1,1	4,3±0,7
2. Animals kept on nonprotein diet for 6 days	20	5,8±0,43	5,1±0,51	22,9±1,0	5,2±0,6	1,96±0,4	1,7±0,2
P		<0,01	<0,001	<0,001	>0,05	<0,01	<0,01
3. Injection of casein hydrolysate + protein deprivation	15	10,5±0,9	8,1±0,8	32,9±2,0	6,2±0,4	1,7±0,5	2,1±0,4
P_1		<0,001	<0,01	<0,001	>0,05	>0,05	>0,05
4. Injection of PGE_2 and casein hydrolysate + protein deprivation	15	15,2±0,9	12,1±0,5	48,2±2,0	27,6±1,6	7,6±1,8	1,2±0,1
P_2		<0,001	<0,001	<0,001	<0,001	<0,01	<0,5

EXPERIMENTAL RESULTS

The experiments showed that protein deprivation leads to marked (by 1.1-2.6 times) depression of activity of all the enzymes studies (Table 1) in both test objects.

Administration of casein hydrolysate against this background increased AsAT activity considerably (by 1.8 times). PGE_2 increased the activity of this enzyme in the liver even more. Results showing similar trends also were obtained with striated muscle. AsAT activity rose by 1.4 times after injection of PGE_2 compared with its level in rats kept on a nonprotein diet.

Administration of casein hydrolysate restored AlAT activity in the liver. Injection of PGE_2 more than doubled AlAT activity compared with its value in protein-deprived animals, and increased it considerably in intact animals. A very small decrease in activity of this enzyme was observed in striated muscle during starvation. After administration of casein hydrolysate some increase in its activity was observed. After injection of PGE_2 AlAT activity rose sharply compared with its value in intact animals (fivefold), and with its valve in intact animals (fivefold), and with animals on a nonprotein diet (by 5.3 times).

Different results were obtained in the study of aldolase. Activity of this enzyme in the liver fell considably both during protein deprivation and after administration of casein hydrolysate. After injection of PGE_2 aldolase activity rose by 4.3 times compared with its level in rats receiving casein hydrolysate, and was significantly higher than its level in intact animals. In striated muscle, all these procedures lowered aldolase activity. This was evidently due to the specific nature of its metabolism in different tissues.

The results described above demonstrate the important role of enzymes in the mechanism of action of PGE_2 during DF. They are further experimental evidence in support of the clinical use of PGE_2 in order to enhance the effectiveness of parenternal feeding.

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