DYNAMICS OF THE DISAPPEARANCE OF BACTERIAL LIPOPOLYSACCHARIDE FROM THE BLOOD AND THE FORMATION OF ENDOGENOUS SERUM PYROGEN IN NORMAL AND THYROIDECTOMIZED RABBITS

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At the present time, great significance in the pathogenesis of fever reactions of various etiologies is attributed to a secondary endogenous pyrogenic substance [1, 4]. However, many aspects of the mechanism of the formation of this substance have been far from sufficiently studied.

In our earlier work, it was shown that thyroidectomy leads to a reduction of the frequency of the detection of endogenous serum pyrogen in the blood of feverish rabbits [2].

In this investigation we studied the question of whether the weakening of the febrile reaction in thyroidectomized rabbits is related to a more rapid disappearance of bacterial lipopolysaccharide from the blood or to a change in the dynamics of the formation of endogenous serum pyrogen.

EXPERIMENTAL PROCEDURE

The method proposed by Atkins and Wood [3] was used for the work. Serum of donor rabbits, taken at various periods (5 min, 1, 2, 3, 4, and 5 h) after the intravenous injection of pyrogenal (bacterial lipopolysaccharide) in a dose of 2.5 μg/kg, was administered to animals of two groups of recipients—normal and tolerant. The state of nonimmunological tolerance in the recipients was created by intravenous injection of pyrogenal in a dose of 2.5 μg/kg daily over a seven-day period. The difference in the degree of the febrile reaction of the rabbits of the two groups of recipients indicated the presence of bacterial lipopolysaccharide in the serum, while its absence indicated the detection only of endogenous serum pyrogen in the blood. For the rest, the procedure was the same as in our earlier work [2]. A total of more than 200 rabbits were used in the experiments. The materials obtained were subjected to statistical treatment.

EXPERIMENTAL RESULTS

The results of the investigations are presented in Figs. 1 and 2. From Figs. 1 and 2 it follows that 5 min and 1 h after the injection of pyrogenal, a pyrogenic substance is present in the blood of normal rabbits, which is apparently a bacterial lipopolysaccharide, which is indicated by the statistically reliable difference between the febrile indices of the normal and tolerant recipients. After two hours, endotoxin cannot be detected in the blood; only endogenous pyrogen is present in the serum (the febrile indices were the same in both groups—113 ± 42 and 126 ± 30 units). As can be seen in Fig. 1, the curve of the febrile reaction of the donors corresponds well to the curve of the formation of endogenous serum pyrogen (curve of febrile indices of tolerant recipients).

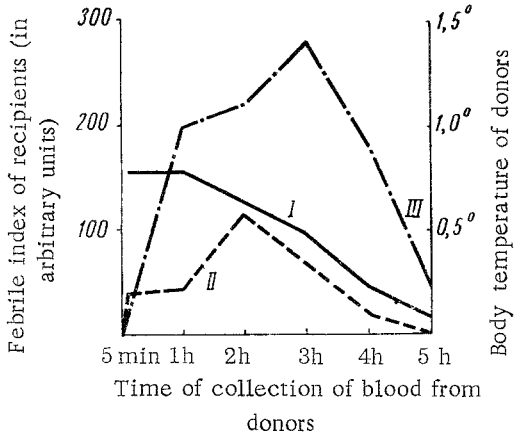

Fig. 1. Dynamics of the disappearance of pyrogenal from the blood and formation of endogenous serum pyrogen in normal rabbits. I) Febrile reaction of normal recipients; II) febrile reaction of tolerant recipients; III) febrile reaction of donors to intravenous injection of pyrogenal in a dose of 2.5 μg/kg.

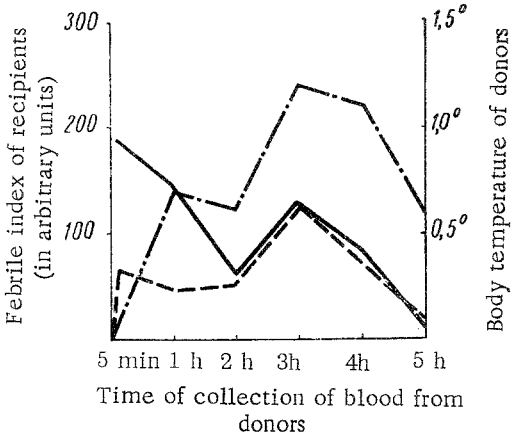

Fig. 2. Dynamics of the disappearance of pyrogenal from the blood and formation of endogenous serum pyrogen in thyroidectomized rabbits. Notations the same as in Fig. 1.

Analogous patterns were also found in thyroidectomized rabbits (see Fig. 2), although the endogenous serum pyrogen was formed in smaller amounts in these rabbits. Thus, two hours after the injection of pyrogenal, the increase in the body temperature of the thyroidectomized donors was 0.5° lower than that in the normals, while the average febrile index of the recipients that received the serum of these donors was equal to 53 ± 13 in comparison with 120 ± 25 units in the recipients that received serum of normal rabbits ($P < 0.05$).

The data that we obtained in experiments on normal rabbits coincide with the results of other investigations [3, 5]. As for the data obtained on thyroidectomized animals, they indicate sufficiently that the reduction of the febrile reaction caused in them by the intravenous injection of pyrogenal is due to the smaller value of the formation of endogenous serum pyrogen, and not to a change in the dynamics of the disappearance of bacterial lipopolysaccharide from the bloodstream, since no difference in the rate of removal of pyrogenal from the blood circulation could be detected in the thyroidectomized rabbits in comparison with normal rabbits.

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