

CARDIOVASCULAR RESPONSES IN EXPERIMENTAL
NONINFECTIOUS PERITONITIS
COMMUNICATION III. CONDITION OF THE SYMPATHO-ADRENAL SYSTEM

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We have previously shown [1, 2] that in rabbits with noninfectious peritonitis, after the injection of substances having a pressor action, as far as the cardio-vascular system is concerned a depressor component prevails, whereas the substances which normally elicit a depressor response have their action enhanced. Therefore, in noninfectious peritonitis there is an increased cholinergic tone.

Here we have set out to study the condition of some of the indices of the sympatho-adrenal system in noninfectious peritonitis.

METHOD

The work consisted of two groups of experiments. One group of animals contained five healthy control rabbits, and in them the free and bound adrenaline in the adrenals was determined. The second group consisted of six rabbits, and before peritonitis was induced, a determination was made of adrenaline-like substances in the blood, and after the peritonitis, in addition, measurements were made of the free and bound adrenaline of the adrenals. Noninfectious peritonitis was induced by a method we have described previously [1]. Adrenaline-like substances in the blood were determined by the calorimetric adsorption method of Shaw, as modified by A. M. Utevkii [3]; free and total adrenaline in the adrenals was determined by a fluorescent analytical method developed by S. R. Frenkel' [4].

TABLE 1. Amount of Adrenaline-like Substances and Adrenaline (in $\mu\text{g}\%$) in the Blood of the Rabbits Used

Indices	Before peritonitis		After peritonitis	
	adrenaline-like substances	adrenaline	adrenaline-like substances	adrenaline
Mean value . . .	15.56	15.56	12.91	28.44
m \pm	3.74	3.74	8.91	4.10

TABLE 2. Amount of Free and Bound Adrenaline in the Adrenals of the Control Rabbits and of Rabbits with Peritonitis

Indices	Control rabbits			Rabbits with peritonitis						
	weight of adrenals (in mg)	free adrenaline		bound adrenaline		weight of adrenals (in mg)	free adrenaline		bound adrenaline	
		tissue con- centration (in $\mu\text{g}/\text{mg}$)	total amount (in μg)	tissue con- centration (in $\mu\text{g}/\text{mg}$)	total amount (in μg)		tissue con- centration (in $\mu\text{g}/\text{mg}$)	total amount (in μg)	tissue con- centration (in $\mu\text{g}/\text{mg}$)	total amount (in μg)
Mean value . . .	315	0.23	66.78	0.25	72.71	378	0.15	56.87	0.06	23.71
m±	48	0.03	0.58	0.03	4.75	43	0.01	11.00	0.02	9.81

RESULTS

Tables 1 and 2 give the results for the content of adrenaline and adrenaline-like substances in the blood of the experimental groups, and also of adrenaline in the adrenals.

In the three experimental rabbits before peritonitis it was found that the content of the adrenaline-like substances in the blood was high in comparison to the adrenaline, whereas in the other three the reverse relationship

obtained. In most cases the difference between the content of the adrenaline-like substances and adrenaline was about 12 $\mu\text{g}\%$.

In the adrenal control rabbits, the amount of free adrenaline was somewhat less than the amount which was bound.

In five out of the six experimental rabbits which developed peritonitis, it was found that there was a preponderance in the blood of adrenaline as compared with adrenaline-like substances, and only in one rabbit was the relationship reversed. The difference in the amounts of adrenaline and adrenaline-like substances in these rabbits was on average 33 $\mu\text{g}\%$. In them, the adrenals contained $2\frac{1}{2}$ times less free than bound adrenaline.

In most of the rabbits with peritonitis, the adrenaline-like substances had almost completely disappeared from the blood (Fig. 1). In them, the amount of adrenaline in the blood had increased almost two-fold compared with the

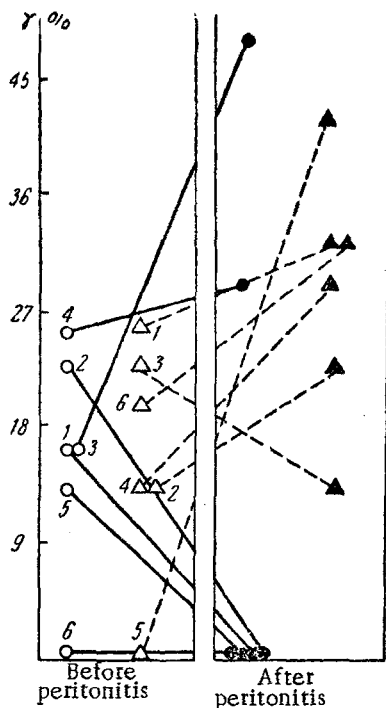


Fig. 1. Amounts of adrenaline-like substances and adrenaline in the blood of the experimental rabbits before and after peritonitis. Circles indicate adrenaline-like substances, triangles indicate adrenaline; figures indicate the number of rabbits, the points representing one rabbit are joined by lines.

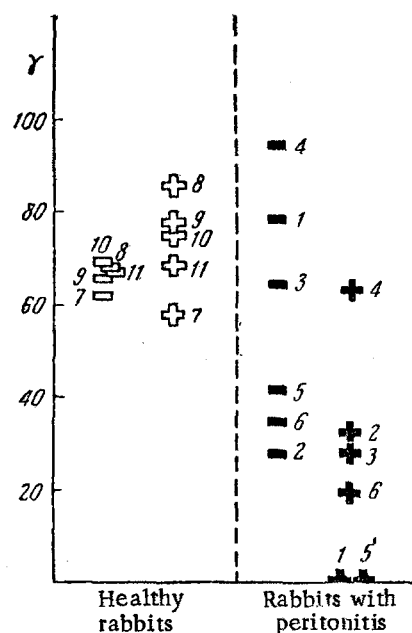


Fig. 2. Amount of free and bound adrenaline in the adrenals of the control and experimental rabbits with peritonitis. Rectangles indicate free adrenaline, and crosses bound adrenaline. The figures indicate the number of the rabbit.

amount before peritonitis. In such rabbits there was almost the same amount of free adrenaline as in the healthy animals, but the amount of bound adrenaline was about one third as much (Fig. 2). Therefore, in the rabbits with peritonitis, the total adrenaline of the adrenals was also much less. However, the adrenals of these rabbits weighed somewhat more than those of the healthy animals.

Thus, when peritonitis develops there is a reduction in the amount of adrenaline-like substances in the blood and an increased amount of adrenaline; also the amount of free adrenaline in the adrenals is reduced.

It is therefore evident that in rabbits with peritonitis, besides an increased cholinergic tone, there is also an increase of sympatho-adrenal function.

However, as our previous investigations showed, the effect of the intravenous injection of adrenaline into such rabbits was much weaker [1]. This result indicates the presence in peritonitis of a lack of correspondence between

the amount of adrenaline in the blood and the manifestations of its action, an effect which is found also in other pathological conditions [3].

The results reported give reason to suppose that in experimental peritonitis the increased amount of adrenaline in the blood, i.e., the increased sympatho-adrenal function is a composite response of the organism to stress.

SUMMARY

A study was made of some indices of the sympatho-adrenal system in rabbits with noninfectious peritonitis. In this condition there was an increase of the free and bound adrenaline in the blood, and it was present in greater amount than were the adrenaline-like substances. In the adrenal glands there was a reduction of the bound adrenaline, and more free adrenaline was present. The enhanced function of the adrenal system in peritonitis may be regarded as a compensatory reaction of the body to stress.

LITERATURE CITED

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4. S. R. Frenkel', Ukr. biokhim. zhurn., (1951), No. 3, p. 348.

All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.
