INVESTIGATING THE PROTEIN CONSTITUENTS OF SERUM GLYCOPROTEINS IN THYMECTOMIZED RATS WITH EXPERIMENTAL MYOCARDITIS

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The connective tissue and, more particularly, fibroblasts take part in the metabolism of glycoproteins. The increase in the protein components of serum glycoproteins occurs as the result of their intensive synthesis in the liver, consequent to the augmented intake of polysaccharide complexes from pathologically altered connective tissue structures in the course of a rheumatic process (7, 9).

The thymus gland, assumed as an immune reactivity organ, exerts effect on the allergic and autoimmune processes developing mainly in the connective tissue (1, 2, 3, 6, 8, 10). It has been also demonstrated that it participates in the regulation of carbohydrate, protein and fat metabolism (4, 5, 11).

We made it our aim to investigate the influence exerted by thymectomy on the protein components of serum glycoproteins in experimental myocarditis as a model of rheumatism.

Material and Methods

The experiments were conducted in a group of 48 white rats, aged 3 months and weighing 150-200 g, divided up in two groups: thymectomized and non-thymectomized.

Myocarditis was experimentally induced within 15 days of thymectomy through triple B. Streptococcus haemolyticus injection into the tail vein, using 0.2 cc 1 000 000th suspension dose, at weekly intervals. Before and after thymectomy, blood was taken from one of the sectioned carotid arteries. Serum glycoproteins, erythrocyte sedimentation rate and leukocytes were studied on the third day after each injection, and once weekly after the third injection for a period of three weeks. Of the glycoproteins the following protein components were investigated: 1) haptoglobin — according to the method of Turchenko and Tukachinsky, and 2) orosomucoid — after the method of Dachosal. ESR was studied according to Panchenko.

Results

The data from haptoglobin study outline the following dynamics (Diagr. 1)

The impression is that the level of haptoglobins in the serum of thymectomized animals increases after each consecutive injection of hemolytic streptococcus, reaching its maximum one week after the last (third) injection. Thereafter, an acute tendency towards reduction is noted, and by the end of the ex

periment, haptoglobins fail to regain their initial, normal level. From 81.1 mg % mean initial level the haptoglobins in thymectomized animals increase to 129.5 mg % after the first injection, 153 mg % — after the second, 156.7 mg % — after

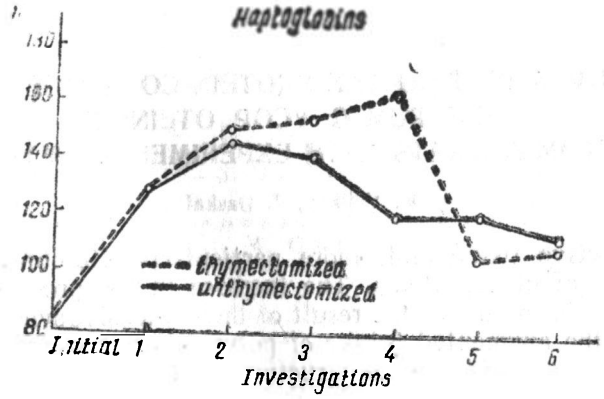

Fig. 1. Dynamics of haptoglobins in rats with experimental myocarditis

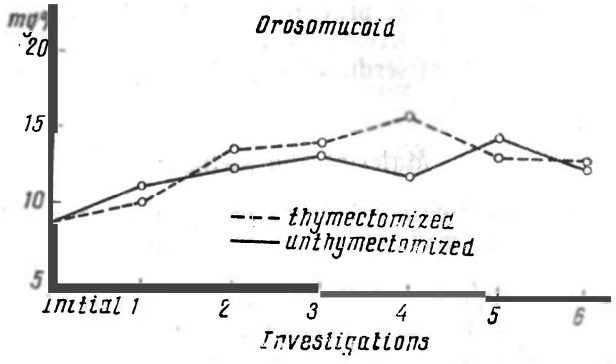

Fig. 2. Dynamics of orosomucoid in experimentally induced myocarditis in rats

the third, and in the first week after the last injection they reach up to 166.7 mg %. Within two weeks of the last injection, the haptoglobin level falls to 109.8 mg % while during the third week it is 112.7 mg %. Haptoglobins in non-thymectomized animals, treated analogically, display a similar dynamics. The rise reaches its maximum (148.4 mg %) after the second streptococcus injection, and is followed by a gradual reduction: 120.8 mg % in the first week after the third injection, and 115.4 mg % — during the last week.

The results of orosomucoid study are illustrated in Diagram 2.

Orosomucoid level in the serum of thymectomized animals increases gradually, reaching its highest value in the first week after the third hemolytic streptococcus injection. Following the first injection, the average increase is insignificant, after the second it amounts to 14.2 mg % after the third

14.9 mg %, while in the first week after the last injection it amounts to 15.9 mg %. During the second and third week, the level shows a gradual fall to 14.4 mg % and 13.8 mg % resp.) although it is maintained at a compara-

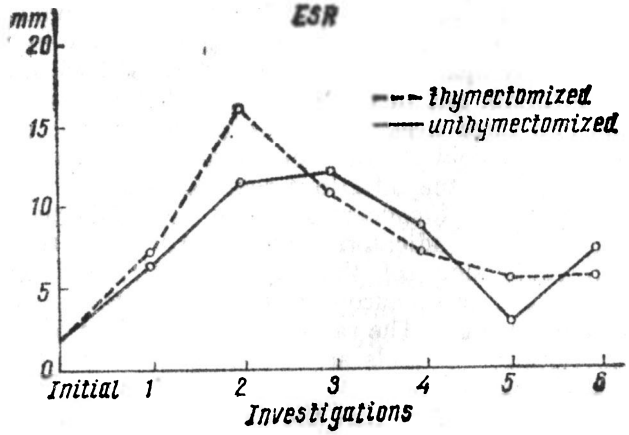

Fig. 3. ESR dynamics in experimentally induced myocarditis in rats

ively high level, as compared to the initial value (8.7 mg %) till the end of the experiment. The mean orosomucoid level among non-thymectomized animals displays a gradual rise, reaching its highest values after the third injection, and in the second week after the last injection, but anyway it is substantialy higher than the starting value throughout the full period of the experiment. From 8.7 mg % the increase reaches 14.2 mg % after the third injection, and 15.5 mg % within two weeks of the last injection. The results are statistically reliable relative to the starting normal value both for thymectomized and non-thymectomized animals ($P < 0.001$).

Data worthy of notice were obtained in the study of ESR (Diagr. 3).

The highest ESR value is recorded after the second injection of thymectomized animals. From a 2.4 mm mean initial value it increases to 17.6 mm. Thereafter a tendency for a comparatively rapid ESR reduction is observed; after falling to 6.9 mm in the first week after the last injection, it maintains this level and fails to regain the initial level by the end of the experiment. ESR rise in non-thymectomized animals is slower as compared to thymectomized ones, and reaches the highest value (14.1 mm) after the third hemolytic streptococcus injection. During the first and second week after the last injection, ESR decreases to 9.7 and 4.2 mm respectively, while during the third week a tendency for an increase is observed (7 mm). The results are statistically reliable ($P < 0.001$).

In the study of leukocytes the highest values are recorded after the second and third hemolytic streptococcus injection (13 600).

Discussion

The results of investigating the protein components of glycoproteins in thymectomized and non-thymectomized rats, injected with B. Streptococcus haemolyticus, show an increase in haptoglobins and orosomucoid after each injection. The mean haptoglobin and orosomucoid values in thymectomized animals are higher in comparison with non-thymectomized animals after the second and third injection, and in the first week after the last injection, whilst during the second and third week the values are lower. The elevated level of haptoglobins and orosomucoid in either of the animal groups might be related to the influence exerted by the infectious agent on the connective tissue, and to the splitting processes of connective-tissue mucopolysaccharides ensuing. The highest values of these indicators coincide with the optimally manifested macro- and microscopic signs of the experimentally induced myocarditis. Hence, haptoglobins and orosomucoid could be considered as indicators of the acute phase of the process. The rather elevated values of the cited indicators among thymectomized animals are attributable to the impaired immune and allergic protection of animals.

One is impressed by the fact that the data of ESR study are synchronous with those regarding haptoglobins and orosomucoid. Our results are in agreements with those published by S. Razboynikov and A. Karakashov (1976) and I. Daskalov et al (1970), obtained in the study of rheumatic patients in the acute phase.

Conclusions

1. Thymectomy exerts a definite effect on the protein components of serum glycoproteins. Their elevated level compared to non-thymectomized animals is explained by the impaired immune and allergic protection of animals.

2. Insofar as dynamics is concerned the obtained results are similar to those in the study of patients in the acute phase of rheumatism.

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О БЕЛКОВЫХ ФРАКЦИЯХ ГЛИКОПРОТЕИНОВ СЫВОРОТКИ У ТИМЭКТОМИРОВАННЫХ КРЫС С ЭКСПЕРИМЕНТАЛЬНЫМ МИОКАРДИТОМ

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РЕЗЮМЕ

При экспериментальном миокардите у тимэктомированных и нетимэктомированных белых крыс исследованы глюкопротеины сыворотки, РОЭ и лейкоциты. Кровь для исследования брали до и после тимэктомии.

Результаты показывают повышение хаптоглобина и оросомукоида в сыворотке обоих групп животных еще после первого инъектирования гемолитического стрептококка. Повышение лучше выражено у тимэктомированных крыс. После второго и третьего исследования нетимэктомированнхы животных и четвертого тимэктомированных установлено понижение хаптоглобина и оросомукоида, которое до конца исследования не достигает исходного уровня. Подобную динамику показывают и результаты исследования РОЭ и лейкоцитов.

На основании полученных данных считают, что тимэктомия оказывает влияние на белковые фракции гликопротеинов сыворотки.