

## THE SERUM ASCORBIC ACID CONTENT IN RATS WITH EXPERIMENTALLY INDUCED MYOCARDITIS

K. Georgiev

Numerous studies (Merezhinsky, 1959; Zbarsky; Ivanov; Mardashev, 1960) prove the restorative properties of ascorbic acid in a variety of morbid conditions. Its participation in oxidizing processes and its antitoxic and bactericidal action as well (Willisson, 1943; Ido, 1955 — cited by Simakova, 1963) render it an important factor in promoting the reactive capacity of the organism in terms of a number of pathogenic stimulants. Numerous studies have been dedicated to the desensibilization effect of the ascorbic acid (Paryiskaya, 1959; Mamich, 1960) whilst others emphasize its serum content reduction in infectious diseases and rheumatism. Its participation in the functional activity of the adrenal glands (Kemileva, 1962; Gervazieva, 1962) warrants the assumption that it has an essential bearing on the course of certain immune reactions within the organism.

Against the background of the data presented and of the nature of experimentally induced myocarditis in rats (Kemileva, Popov, Panayotov, Georgiev, Dyakova, Vasilev, and Markov, 1963) it is believed that there exists an interrelationship between the ascorbic acid content in the serum and the myocarditis, provoked by the authors, by analogy with the experience gained during investigations of rheumatic patients (Semenova, 1959 and others). This would be a further proof for the close relationship existing between spontaneously occurring rheumatic process in humans and experimental myocarditis in animals. The chief goal of the studies referred to is to clarify certain aspects of the listed problems.

### Material and Method

The experiments were performed on a series of 66 white albino female rats, weighing from 150—200 grams. The animals were divided in two main groups: one for control purposes, consisting of 20 rats and a second one of 46 rats. All the animals were fed on ordinary dietary regimen. Experimental myocarditis was induced according to the method routinely employed at the Pathophysiological Department and it accounted for the appearance of pronounced histological and ECG changes in the myocardium (Kemileva, Popov, Panayotov, Georgiev, Dyakova, Vasilev and Markov, 1963; Kemileva, Georgiev, 1965), following five-fold injection of alive  $\beta$ -Streptococcus haemolyticus culture, group A, into the tail vein of rat. Injections were made weekly at a dose 0.2 cc, 1 milliard suspension. Observations of the animals were carried out daily. On the third day after each contamination one group of animals was sacrificed through exsanguination, by severing one of the carotis communis arteries of a previously fixed in supine position animal. The

serum was determined by means of centrifugation. The ascorbic acid was determined in 1 cc after the method of I. Roen and C. Knether, whilst its quantitative recording was performed on the Iouan spectrophotometer. Killing and ascorbic acid quantity determination in the controls was carried out in the same manner.

### Results and Discussion

The mean arithmetic value of the serum ascorbic acid of the control animals is 0.16 mg %, whereas the value of those, contaminated a single time with  $\beta$  Streptococcus haemolyticus culture — 0.18 mg %. In the animals undergoing two-fold contamination it is 0.16 mg %, in the threefold — 0.13 mg %, in the four-fold — 0.20 mg % and in the five-fold contaminated animals — 0.08 mg %.

The results of the investigations are statistically elaborated after the St. Fischer method.

Table 1

*Mean Values of Ascorbic Acid Content in the Serum in mg %*

Groups	n	X	z
Control group	20	0.16	0.0049
First experimental group	9	0.18	0.0208
Second experimental group	9	0.16	0.0024
Third experimental group	9	0.13	0.0007
Fourth experimental group	10	0.02	0.0014
Fifth experimental group	9	0.08	0.0006

It is worth to note that the quantity of ascorbic acid in the first group of experimental animals, compared to the controls, was slightly increased. Regardless of the fact that this increase was not statistically reliable ( $P < 0.90$ ), it was assumed as the manifestation of a slight tendency towards rising, which might be related to the stimulation of the protective functions of the organism during single injection of haemolytic streptococcus.

Among the animals sacrificed at the second contamination the ascorbic acid quantity was reduced until reaching the control animals' level. After the third injection of streptococcus, its quantity exhibited a sudden fall from 0.16 to 0.13 ( $P > 0.90$ ). The fourth injection brought about a still stronger reduction of this value — 0.02 ( $P > 0.999$ ). A rise of the ascorbic acid content in the serum (0.08) was established after the fifth contamination, in comparison to preceding values.

The comparative study of these values (Fig. 1) demonstrates the presence of a dynamic alteration of the ascorbic acid content in the serum of animals with experimentally induced myocarditis.

The dynamic character referred to is manifested by a slight increase of the ascorbic acid quantity in the blood serum after the first contamination, followed by a significant reduction after the third and fourth contaminations of the animals. After the fifth contamination its quantity is augmented, although it fails to reach the normal value. The listed dynamic changes of

the ascorbic acid content in the serum, in all likelihood, are in compliance with the functional state of the resisting capabilities of the organism. The data reported in the present paper, compared to the investigations made by Semenova, 1959, Bessonova, 1959, Afanasyeva, 1959 and others on humans,

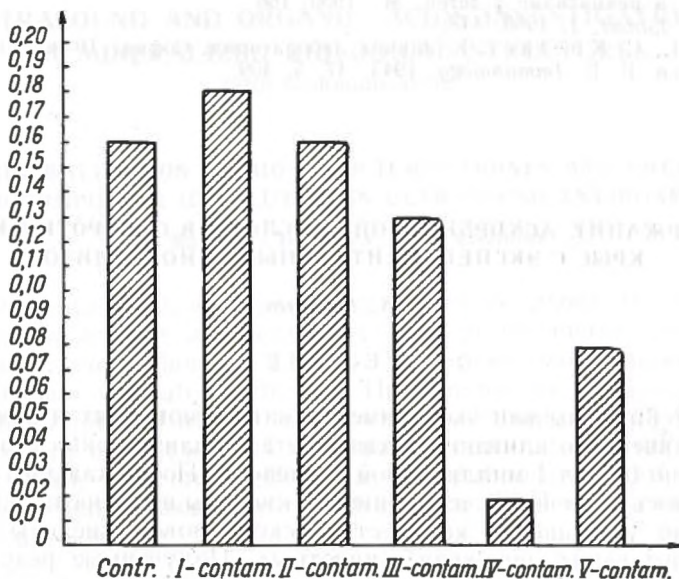


Fig. 1. Serum Ascorbic acid content in experimentally induced myocarditis.

affected by rheumatism, provide sufficient evidence for the one-way trend of the ascorbic acid changes in animals with experimentally induced myocarditis and in rheumatic patients. The reduction of the serum ascorbic acid level in animals with experimental myocarditis as well as in patients with rheumatism might serve as a further proof for the intimacy between the two processes.

#### REFERENCES

1. Афанасьева, К. Е. Новые материалы по сердечно-сосудистой патологии, М., 1959, 34.
2. Бессонова, М. Н. Труды Крымского медицинского института Симферополь, 1959, 23, 19.
3. Гервазиева, И. Д. Пробл. эндокр. и гормонотерапии, 1962, 1.
4. Збарский, Б. И., И. И. Иванов, С. Р. Мардашев. Биологическая химия, М., 1960.
5. Кемилева, З. Научни трудове на ВМИ—Варна, 1962, том I, св. I.
6. Кемилева, З., К. Попов, П. Панайотов, К. Георгиев, А. Дякова, Й. Василев, Д. Марков. Научни трудове на ВМИ—Варна, 1963, том II, св. I.
7. Кемилева, З., К. Георгиев. Научни трудове на ВМИ—Варна, том IV, св. I, 1965.
8. Мамиш, Р. М. Труды Казанского государственного медицинского института усовершенствования врачей, 1960, XIV, 171.

9. Мережинский, М. Ф. Механизм действия и биологическая роль витаминов, Минск, 1959.
10. Парийская, Т. В. Труды Семипалатинского медицинского института, 1959, 2, 137.
11. Семенова, В. Н. Сердечно-сосудистая патология при заболеваниях органов дыхания и ревматизме у детей, М., 1959, 166.
12. Ido, S. *Lancet*, 1, 1955, 443.
13. Roep, I., C. Knether. Клиническая лаборатория, София, 1959, 310.
14. Willson, F. E. *Immunology*, 1943, 47, 5, 409.

### СОДЕРЖАНИЕ АСКОРБИНОВОЙ КИСЛОТЫ В СЫВОРОТКЕ КРОВИ КРЫС С ЭКСПЕРИМЕНТАЛЬНЫМ МИОКАРДИТОМ

К. Георгиев

#### РЕЗЮМЕ

У белых крыс вызван экспериментальный миокардит путем пятикратного внутривенного вливания в хвост бета-гемолитических стрептококков группы А по 0,2 мл 1 миллиардной суспензии. После каждого заражения исследовалось количество аскорбиновой кислоты в сыворотке крови. Было установлено уменьшение количества аскорбиновой кислоты после третьего и следующих заражений животных. Полученные результаты являются статистически достоверными и аналогичны результатам, полученным при исследовании людей, больных ревматизмом.