

# CONTENT OF ADENINE NUCLEOTIDES IN CERTAIN ORGANS OF ALBINO RATS

G. V. Voskoboinikov

UDC 599.323.4-11.05:547.963.32

Many investigations of the content and metabolism of adenine nucleotides in animal tissues have been made. However, no comparative systematic studies of the content of these compounds in different tissues have been undertaken. Moreover, the results obtained by different authors for the content of ribonucleotides in the organs of animals of the same species differ considerably, even though they were determined by the same methods.

Another fact to be noted is that in some investigations a relatively low content of nucleoside triphosphates was found in the tissues although the content of ADP and AMP was fairly high [2-5, etc.]. On the other hand, convincing evidence has been obtained that the ATP concentration is equal to about 80% of the total content of adenine nucleotides [6, 8].

The object of the present investigation was to study the content of adenine nucleotides in various tissues of albino rats.

## EXPERIMENTAL METHOD AND RESULTS

Experiments were carried out on Wistar rats weighing 200-300 g. The extraction and separation of the nucleotides were carried out by the method described previously [1].

The free ribonucleotides of the acid-soluble tissue extract were separated in accordance with their degree of phosphorylation. Analysis of the experimental results showed that the rat tissues could be arranged in the following diminishing order of nucleotide content: myocardium, liver, testes, kidneys, spleen, small intestine (see Table 1).

The myocardium and liver tissues were richest in ribonucleotides, containing 6.33 and 5  $\mu$ moles/g fresh tissue respectively, whereas the other tissues differed only very slightly from each other in their content of adenine derivatives (about 4  $\mu$ moles/g). In all the investigated organs the absolute and relative ATP content was much higher than the corresponding content of mono- and diphosphates. Nevertheless, their relative content varied from one tissue to another. The ATP concentration in the rats' testes was more than 80% of the total content of adenine nucleotides, while in the myocardium and spleen it was about 67-68%, and in the small intestine and kidneys it was only 45-53%. However, as the relative content of ATP in the tissues fell, their ADP and AMP contents showed a clear increase. The concentration of ADP

TABLE 1. Content of Nucleotides in Tissues of Healthy Rats  
(in  $\mu$ moles/g fresh tissue;  $M \pm m$ )

Tissue	No. of rats	ATP	ADP	AMP	Total
Myocardium	8	4,20 $\pm$ 0,10	1,08 $\pm$ 0,06	1,05 $\pm$ 0,05	6,33 $\pm$ 0,21
Liver	8	2,98 $\pm$ 0,10	0,87 $\pm$ 0,03	1,10 $\pm$ 0,04	4,95 $\pm$ 0,13
Spleen	10	2,53 $\pm$ 0,03	0,52 $\pm$ 0,06	0,65 $\pm$ 0,09	3,70 $\pm$ 0,22
Testes	8	3,22 $\pm$ 0,09	0,42 $\pm$ 0,02	0,39 $\pm$ 0,02	4,04 $\pm$ 0,13
Kidneys	8	1,72 $\pm$ 0,08	1,02 $\pm$ 0,04	1,25 $\pm$ 0,06	3,99 $\pm$ 0,18
Small intestine	8	1,83 $\pm$ 0,10	0,83 $\pm$ 0,11	0,85 $\pm$ 0,13	3,51 $\pm$ 0,34

Biochemical Laboratory, Central Roentgeno-Radiological Research Institute, Ministry of Health of the USSR, Leningrad (Presented by Academician V. N. Chernigovskii). Translated from Byulleten' Ėksperimental'noi Biologii i Meditsiny, Vol. 64, No. 7, pp. 54-55, July, Original article submitted January 25, 1966.

and also of AMP in the testes, for instance, was only about 9-10% of the total content of adenine nucleotides, in the myocardium and spleen it was 16-17%, whereas in the small intestine and kidneys it reached 25-30%.

The considerable difference in AMP and ADP concentrations in the various organs is considered by the author to be the result of differences in the intensity of hydrolysis of the nucleoside triphosphates determined by the accessibility of the tissue during its removal from the cadaver and, consequently, by the speed with which it was immersed in liquid nitrogen. The values obtained for the concentration of the nucleotides in the myocardium and liver of the rats in these experiments were in good agreement with the results described by other investigators [7, 8]. No information regarding the ATP concentration in the other tissues studied by the author could be found in the literature.

The results are not in accord with information given in the literature for the relatively low content of nucleoside triphosphates in the tissues, but they confirm the observations that their ATP content is much higher than their content of ADP and AMP.

#### LITERATURE CITED

1. G. V. Voskoboinikov, *Biokhimiya*, No. 5, 1041 (1966).
2. A. I. Kolotilova, B. F. Korobkin, S. N. Lyzlova, et al., *Biokhimiya*, No. 1, 113 (1963).
3. A. V. Kotel'nikov and V. V. Solomatina, *Biokhimiya*, No. 6, 954 (1957).
4. N. P. Odushko, *Vopr. Med. Khimii*, No. 1, 48 (1966).
5. I. A. Tseveleva and R. E. Libinon, *Biokhimiya*, No. 2, 305 (1962).
6. A. C. Fox, N. S. Wikler, and G. E. Reed, *J. Clin. Invest.*, 44 (1965), p. 202.
7. H. Maass and M. Timm, *Strahlentherapie*, Bd 123, S. 64 (1964).
8. O. Visioli, M. Rinetti, et al., *Cardiologia (Basel)*, 45 (1964), p. 167.