

MORPHOLOGICAL CHANGES IN THE ADRENAL GLANDS MEDULLA UNDER THE ACTION OF A FOOD SUPPLEMENT COMPLEX

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Abstract: nowadays, food supplements are in great demand. They give food different taste properties and help extend its shelf life. The consumer often does not think about what dangerous substances enter the body, albeit in small quantities, and how food supplements (sodium nitrite, monosodium glutamate, and Ponceau 4R) affect the endocrine system and adrenal glands in particular, at this time still not known. Today, there are several thousand food additives that the consumer is unaware of in foods and that can affect human organs, in our case the adrenal glands. Sodium glutamate (E 621), sodium nitrite (E 250), and Ponceau 4R (E 124) are some of the most common dietary supplements we are studying. The main consequences of taking many supplements are the following symptoms: chest and abdominal pain, migraine, nausea, tachycardia, obesity, weakness, and allergies. We should pay particular attention to the effect of these supplements on the adrenal glands, which can cause organ dysfunction and lead to cancer

The aim: to determine the morphological and metric changes in the structural components of the medulla of the adrenal glands of rats under the conditions of long-term action of the food supplement complex.

Materials and methods: The study was performed on white outbred rats. A control group of rats consumed drinking water and saline orally. Rats from the experimental group were orally administered 10% sodium nitrite solution (E 250).

Monosodium glutamate (E621) was administered at a dose of 20 mg/kg in 0.5 ml of distilled water, Ponceau 4R - at a dose of 5 mg/kg in 0.5 ml of distilled water once a day. Dosages of food additives were twice lower than the permissible norm in food products. Rats were removed from the experiment at 1, 4, 8, 12, and 16 weeks by thiopental anesthesia overdose. Subsequently, adrenal fragments fixed in neutral formalin solution were sealed in paraffin. Histological sections made of paraffin blocks, stained with hematoxylin and eosin, were studied using a Biorex light microscope with a digital microphoto attachment DSM 900. To obtain semi-thin sections, the test material was fixed in glutaraldehyde and compacted in epon-8. The finished sections were stained with toluidine blue. The morphometric method determined the thickness of the capsule, cortical substance (glomerular, fascicular, reticular zone) and medulla. Data processing was performed using Excel.

Results: As a result of a morphometric study of the control group of animals, it was found that the average values of the total diameter of the medulla were (382.22 ± 3.61) μm . After 1 week of taking a complex of food supplements, the diameter of the medulla was 598.06 ± 12.58 μm , ie increased by 56.47%. This phenomenon may be due to cell hypertrophy and perivascular edema of the adrenal medulla. At 4 weeks of follow-up, the figure was 515.64 ± 4.79 μm , 34.91% more than the control value. At 8 weeks of the study, the total diameter of the brain substance was 416.83 ± 1.92 μm , increased by 9.05% from the control value. At 12 and 16 weeks, the values corresponded to 585.29 ± 8.43 μm and 512.81 ± 5.55 μm , 53.15% and 34.17% higher than the control values, respectively.

Conclusions: it was found that the use of dietary supplements (monosodium glutamate, sodium nitrite, and Ponceau 4R) directly affects the adrenal medulla, causing hypertrophy and perivascular edema in the early stages of the experimental study, reversibility between 8-10 weeks and food intake, irreversibility with pronounced cell alteration and destructive changes in endocrinocytes starting at 16 weeks of experimental studies.

Key words: food supplements, adrenal glands, cortex, medulla, endocrinocytes, monosodium glutamate, sodium nitrite, Ponceau 4R.