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The Influence of Monoparel-Selenium on the Body Temperature, Haematopoietic System, and Functional State of the Liver in Rabbits

Wpływ Monoparel-selenium na ciepłotę ciała, układ krwiotwórczy i stan czynnościowy wątroby u królików

In the human and animal organisms many elements occur only in very small concentrations. According to biological activity trace elements can be divided into necessary for life, neutral, and harmful. Selenium is a component of glutathione peroxidase enzyme found in the erythrocytes, which protects unsaturated lipids of the membrane against oxygen particles (3). Thus, selenium belongs to indispensable elements. In adults daily demand for selenium is 50—300 μg . Selenium deficiency in the human body is rare, and can be manifested as young endemic myocardial degeneration, diseases of the nervous system, and neoplasms. The excess of selenium in the soil in some regions leads to its cumulation in plants, thus often leading to the diseases and poisoning of animals. Its manifestations are inflammatory states of the limbs, loss of fur, and epidermal and dermal necroses. The quantity of 5 mg/kg of plant mass is toxic for animals. The quantity of 0.05 mg/kg of fodder plants may cause the symptoms of deficiency in animals. Synergism of selenium with vitamins E, zinc, copper, cobalt, and iron was found as well as its protective function in cases of lead poisoning, cadmium and mercury poisoning (4).

The research was commissioned by "Polfa" Pharmaceutical Plant in Kutno. The purpose of the research was to find the influence of preparation s. 10,788 on the production of pyretogenic bodies, possible changes in the blood picture, and possible changes in the functional state of the liver in rabbits.

MATERIALS AND METHODS

The solution of Monoparel-selenium, s. 10788, for injections produced by "Polfa" Pharmaceutical Plant in Kutno was tested. The contents of selenium — 40.9 $\mu\text{g}/\text{cm}^3$.

The research was carried out on 25 rabbits of New Zealand race, body weight 2.5—3.0 kg. The animals were kept in standard conditions, fed on LSK granulate and water *ad libitum*. The norms of The Polish Pharmacopea were applied in the research. Monoparel-selenium was given intravenously in three doses: 5, 10, and 15 $\mu\text{g}/\text{kg}$ of body weight, twice at seven-day interval. It was ordered to take the following parameters: Hb, RBC, WBC, AlAT, AspAT, total protein and gammaglobulines prior to, and twice after the administration of the preparation.

Methods applied in the tests:

1. Haemoglobin concentration in the blood was evaluated by cyanmethaemoglobin method (5).
 2. Red Blood Count (RBC) and White Blood Count (WBC) were done by camera Thoma method (2).
 3. Alanine aminotransferase AlAT and aspartate aminotransferase AspAT activities were measured by Reitman and Frankel's method (1).
 4. The protein content in the blood serum was measured by refractometric method (5).
 5. The gammaglobuline content in the blood serum was measured by ammonium sulphate test (7).
- The body temperature was taken prior to and after the administration of the preparation. The animals were weighed five times during the experiment. The statistic evaluation was done by *t*-Student test (6).

RESULTS

Body temperature. After the doses of 5, 10, and 15 $\mu\text{g}/\text{kg}$ of the body weight had been injected the temperature was taken after 1.0, 1.5, 2.0, 2.5, and 3.0 hrs; totally 45 measurements were performed in the test animals. The mean increase in temperature after all administered doses was 0.20—0.35°C and was within the range of physiological changes of the body temperature.

Haematopoietic system. To test the influence of the preparation on the haematopoietic system the concentration of haemoglobin, red blood cells and white blood cells counts were performed twice on the first and seventh day after the administration of Monoparel-selenium. After the next seven days the same animals were given the preparation and the same tests were repeated. No statistically significant changes were found in any of the evaluated parameters. Only a decreasing tendency in haemoglobin concentration and the number of erythrocytes, especially on the seventh day after the second administration of the preparation were observed. The number of leukocytes increased insignificantly (Table 1).

Functional state of the liver. The evaluation of alanine transaminase and asparaginiane transaminase activity proved the preparation doses used in the experiment did not cause statistically significant changes (2). The contents of proteins and gammaglobulins in the blood serum did not undergo statistically significant changes after administering doses of the preparation (Table 1). No weight loss and no changes in the appearance and behaviour of the animals were found.

Conclusions

Monoparel-selenium in the doses of 5, 10, and 15 $\mu\text{g}/\text{kg}$ of the body weight does not:

1. Cause the production of pyretogenic bodies in rabbits.

Table 1. The influence of Monoparel-selenium on the tested parameters

Parameters	Selenium dose in $\mu\text{g}/\text{kg}$	1 day prior to administration	I administration		II administration	
			1 day after	7 days after	1 day after	7 days after
Hbc in g%	5	13.50 ± 2.98	12.70 ± 0.79	13.70 ± 1.84	14.63 ± 0.91	12.90 ± 1.39
	10	13.57 ± 0.64	12.97 ± 1.12	14.67 ± 0.95	13.77 ± 1.56	12.27 ± 0.42
	15	12.57 ± 1.36	13.83 ± 1.20	14.03 ± 1.27	13.20 ± 1.22	12.00 ± 1.04
RBC in mln/mm ³	5	4.100 ± 0.473	4.235 ± 0.242	4.410 ± 0.378	4.415 ± 0.243	4.165 ± 0.061
	10	4.548 ± 0.061	4.375 ± 0.121	4.758 ± 0.214	4.758 ± 0.214	4.025 ± 0.161
	15	4.130 ± 0.337	4.445 ± 0.218	4.515 ± 0.315	4.410 ± 0.481	4.165 ± 0.335
WBC in thous/mm ³	5	6033 ± 2003	8433 ± 3701	7233 ± 568	8067 ± 2558	6400 ± 300
	10	4667 ± 1069	6000 ± 200	6066 ± 1234	7067 ± 2081	4333 ± 1234
	15	4533 ± 1114	6066 ± 208	6466 ± 1101	7233 ± 1040	6300 ± 2151
AspAT activity in IU	5	30.0 ± 12.00	18.0 ± 0.00	32.0 ± 6.92	20.0 ± 6.92	16.0 ± 6.92
	10	24.0 ± 6.00	18.0 ± 6.00	24.0 ± 0.00	12.0 ± 0.00	18.0 ± 10.39
	15	24.0 ± 6.00	12.0 ± 0.00	30.0 ± 0.00	18.0 ± 6.00	20.0 ± 6.92
AIAT in IU	5	44.0 ± 22.70	44.0 ± 22.70	18.0 ± 6.00	24.0 ± 0.00	16.0 ± 2.83
	10	46.0 ± 24.20	42.0 ± 13.90	34.0 ± 9.16	16.0 ± 6.92	20.0 ± 6.92
	15	66.0 ± 21.63	46.0 ± 27.20	42.0 ± 27.50	24.0 ± 10.40	28.0 ± 6.92
Protein content in g/100 ml	5	5.99 ± 0.10	5.89 ± 0.09	5.80 ± 0.08	6.16 ± 0.29	6.13 ± 0.23
	10	6.13 ± 0.49	5.96 ± 0.61	6.24 ± 0.55	6.69 ± 0.59	6.58 ± 0.28
	15	6.39 ± 0.19	6.48 ± 0.32	6.24 ± 0.06	6.91 ± 0.17	6.77 ± 0.16
Content of γ -globulin in %	5	0.62 ± 0.05	0.63 ± 0.06	0.58 ± 0.04	0.65 ± 0.04	0.63 ± 0.04
	10	0.57 ± 0.06	0.57 ± 0.04	0.56 ± 0.05	0.65 ± 0.06	0.63 ± 0.07
	15	0.63 ± 0.03	0.65 ± 0.03	0.61 ± 0.03	0.70 ± 0.02	0.64 ± 0.04

2. Cause statistically significant changes in the blood picture in rabbits.

3. Affect the activity of alanine and aspartate transaminase.

4. Change the contents of total protein and gammaglobulin in the blood serum.

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STRESZCZENIE

Badanie preparatu Monoparel-selenium przeprowadzono na zlecenie Kutnowskich Zakładów Farmaceutycznych „Polfa”. Celem pracy było ustalenie wpływu preparatu na powstawanie ciał gorączkotwórczych, zmian w obrazie krwi i stanie czynnościowym wątroby u królików. Preparat podawano zwierzętom 2-krotnie, dożylnie w 3 dawkach: 5, 10 i 15 $\mu\text{g}/\text{kg}$ masy ciała. W tych dawkach preparat nie powodował powstawania ciał gorączkotwórczych u królików, nie zmieniał w sposób istotny statystycznie obrazu krwi, nie wpływał na aktywność transaminazy alaninowej i asparaginianowej, nie zmieniał zawartości białka całkowitego i gamma-globulin w surowicy krwi.