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INVESTIGATION OF BIOCHEMICAL BLOOD ANALYSIS OF EXPERIMENTAL ANIMALS AFTER THE USE OF OSTEOPLASTIC MATERIAL Oss.uz

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Abstract: The data of biochemical analyses were obtained in experimental animals. The chronic toxicity of osteosuppressive material was studied in experimental animals Oss.uz . Mongrel male rats were used for the study. The studies were carried out on 4 groups of experimental animals. The obtained data proved the safety of the studied osteoplastic material Oss.uz
Keywords: osteosuppressive material, biochemical analyses, experimental studies, chronic toxicity

Purpose of the study: To study the effect of Oss.uz osteoplastic material on the biochemical parameters of experimental animals.
Research methods: Experimental studies of plastic composite material were carried out on the basis of the Interuniversity Research Laboratory of the Tashkent Medical Academy. The experiments were carried out in strict accordance with the International Ethical and Scientific Quality Standards for Planning and Conducting Animal Research TPK 125-2008. Blood sampling for the study was carried out at the same time, on an empty stomach.
Experimental animals were divided into 4 gr
As a norm, we used the norms for experimental animals given in the reference book by Abrashova T.V. Physiological, biochemical and biometric indicators of the norm of experimental animals, St. Petersburg.
To study chronic toxicity, male rats with an initial body weight of 130.0 - 160.0 were used. All animals were kept under the same conditions and on a normal diet. They were divided by

randomization into four groups (six heads in each), daily intraperitoneally for 90 days before feeding, a freshly prepared aqueous suspension of Oss.uz was administered at doses of 60, 600 and 1200 mg/kg, the control group received distilled water at the indicated time . During the study period, the general condition, behavior and dynamics of the body weight of the animals were monitored. A day after the last injection of the Oss.uz osteoplastic material, blood was collected from the tip of the tail for biochemical studies in animals of all groups.

Research results. In table. 1 presents the results of a biochemical study of the study of chronic toxicity of domestic osteoplastic material in outbred rats.

Tab. 1 - Results of a biochemical study of the study of chronic toxicity of domestic osteoplastic material in outbred rats

	ALT	AST	ALP	γGT	Tbil	Dbil	InDBil	Chol	Glu	TP	ALB	UREA	creatinine
Intact	68,48	107,50	320,33	2,50	20,73	7,57	13,17	60,32	5,19	89,45	46,32	2,64	78,83
±	7,18	10,68	32,56	0,56	1,41	0,55	1,11	4,21	0,38	5,40	4,10	0,31	4,78
60 mg/kg	67,48	99,33	313,87	2,17	23,42	8,50	15,42	64,60	5,79	90,72	47,12	2,59	79,00
±	6,26	9,00	25,02	0,58	1,54	0,43	0,81	3,63	0,35	6,43	4,51	0,26	4,80
600 mg/kg	71,45	92,83	321,22	3,17	19,68	6,87	12,32	60,68	5,09	85,60	38,57	3,31	90,50
±	4,14	10,54	31,86	0,54	1,56	0,82	1,16	3,94	0,40	5,65	3,42	0,27	3,74
1200 mg/kg	66,32	99,33	395,15	2,83	19,52	6,32	13,20	58,00	6,09	90,85	46,42	3,04	92,17
±	3,99	9,08	28,47	0,60	1,63	0,87	0,85	4,12	0,52	6,43	4,16	0,29	3,18

Serum ALT activity is the most commonly used indicator of the hepatotoxic effect of a material. An increase in ALT activity can be observed during enzyme induction in rats and dogs [4].

On Fig. 1 shows the change in blood serum ALT in the study of chronic toxicity of domestic osteoplastic material in outbred rats at various concentrations of this material (60 mg/kg; 600 mg/kg; 1200 mg/kg). As can be seen from Fig. 1 ALT value increases insignificantly (4.3%) at the content of osteoplastic material – 600 mg/kg. At the other two concentrations, ALT values do not change, that is, ALT does not show the presence of hepatotoxicity. In human clinical trials, it is acceptable and recommended practice to interpret an increase in ALT levels greater than 3 times the upper limit of normal (ULN) as an indication of severe injury without any other evidence.

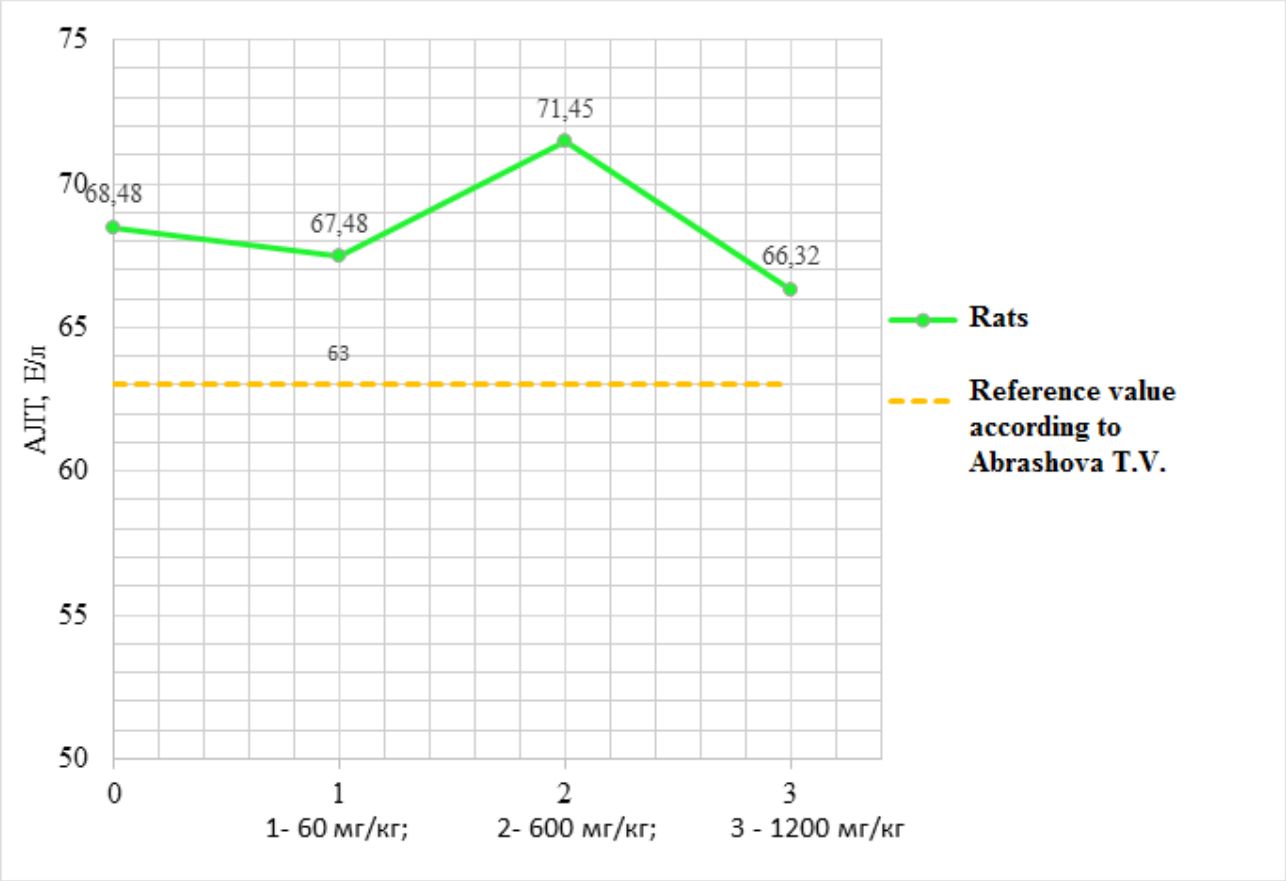


Fig. 1 - Results of changes in ALT in the study of chronic varying concentrations of toxicity of domestic osteoplastic material in outbred rats

This systematic study evaluated the activity of aspartate aminotransferase (AST) in serum. On Fig. 2 shows the change in blood serum AST in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats. From Fig. 2 it follows that the value of AST in intact rats went beyond the boundaries of the reference interval (44-68 U/l) and amounted to 107.5 U/l. Compared with the AST value in intact rats, in the group of rats containing various concentrations of domestic osteoplastic material in tissues, the AST value does not increase, but slightly decreases (~10%).

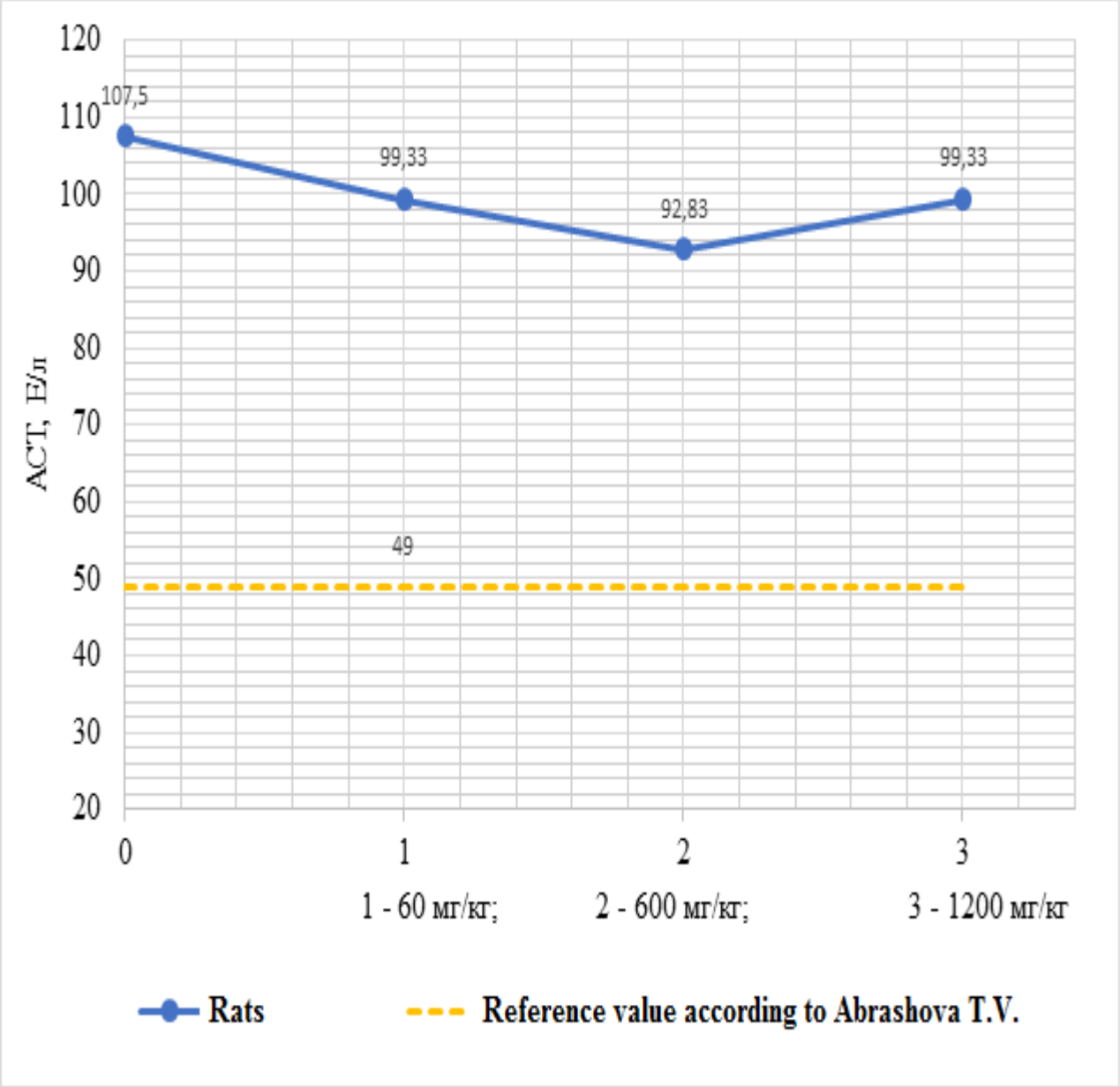


Fig. 2 - Results of changes in AST in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats

Further, changes in such indicators of blood biochemistry as alkaline phosphatase (ALP) and γ-glutamyl transferase (GGT), which changes with cholestatic damage, (the latter is also sensitive to induction by drugs) and total protein (TP) were considered.

On Fig. 3 shows the change in alkaline phosphatase (ALP) of blood serum in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats.

Serum alkaline phosphatase (ALP) activity is a well-known marker of the clinical chemistry of hepatobiliary damage in humans and animals. In toxicity studies of chemicals, including pesticides, elevated serum ALP levels have also been used as an indicator of hepatobiliary damage in rodents and dogs.

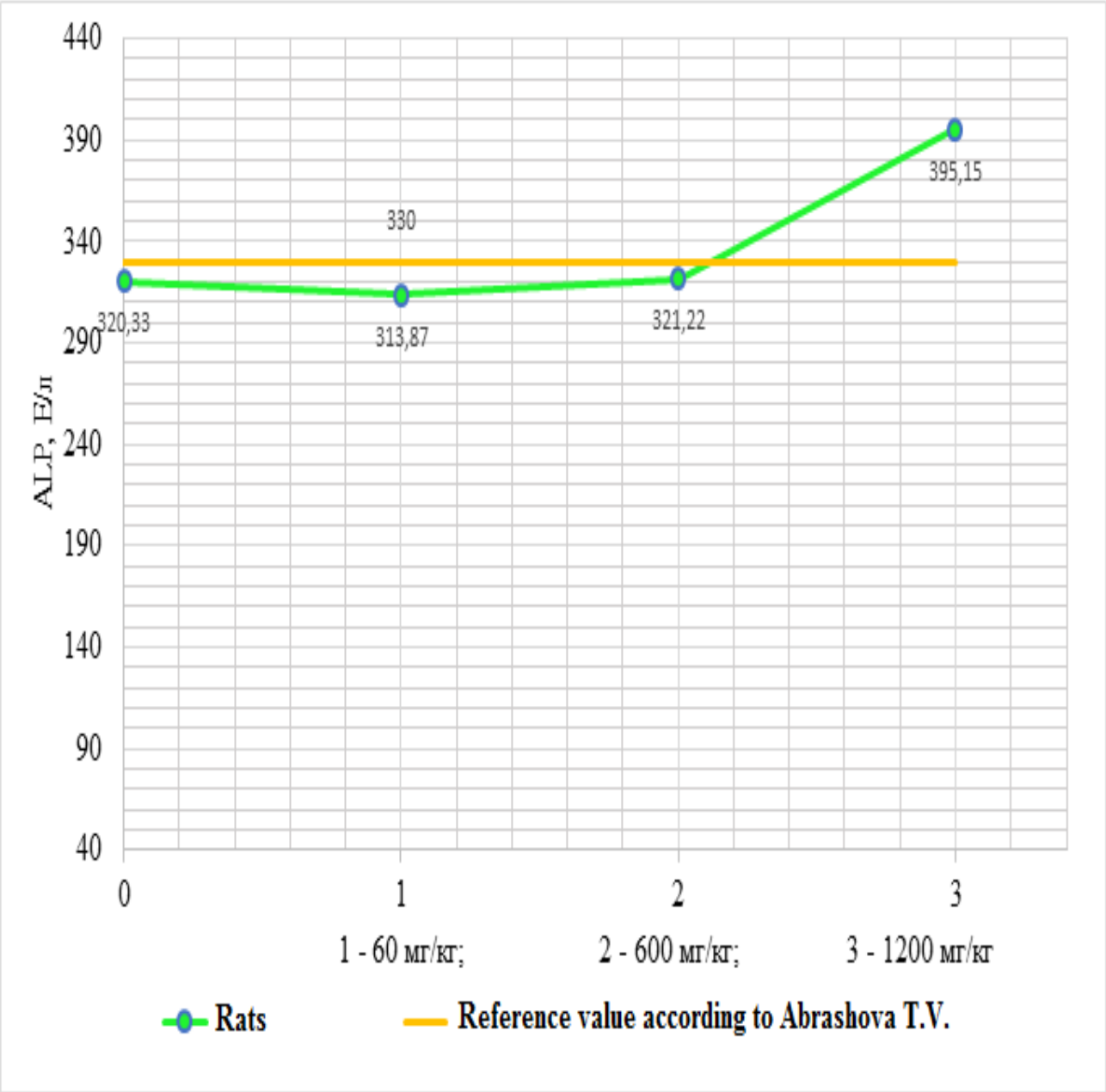


Fig. 3 - Results of ALP changes in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats

From Fig. 3 it follows that there is a slight increase in ALP in the blood serum when the content of osteoplastic material in the body of rats at a concentration of 1200 mg/kg. The increase is 23%. It is not considered significant.

On Fig. 4 shows the change in gamma-glutamyltransferase (γGT) of blood serum in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats. From

Fig. 4 it follows that this indicator practically does not change, remains below the reference value for rats. Pathologies in which there is an increase in the level of GGT in the blood: obstructive liver damage, no intoxication.

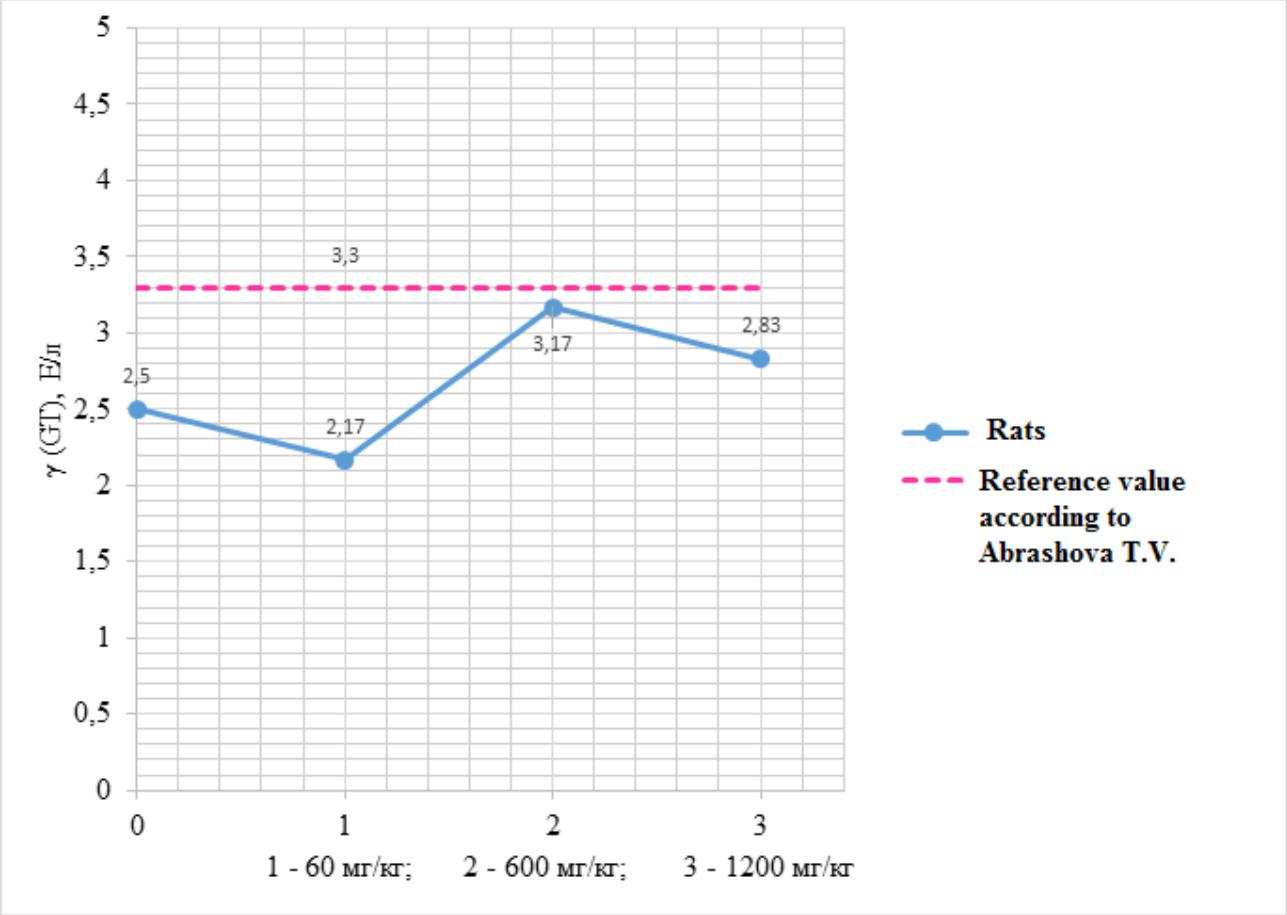
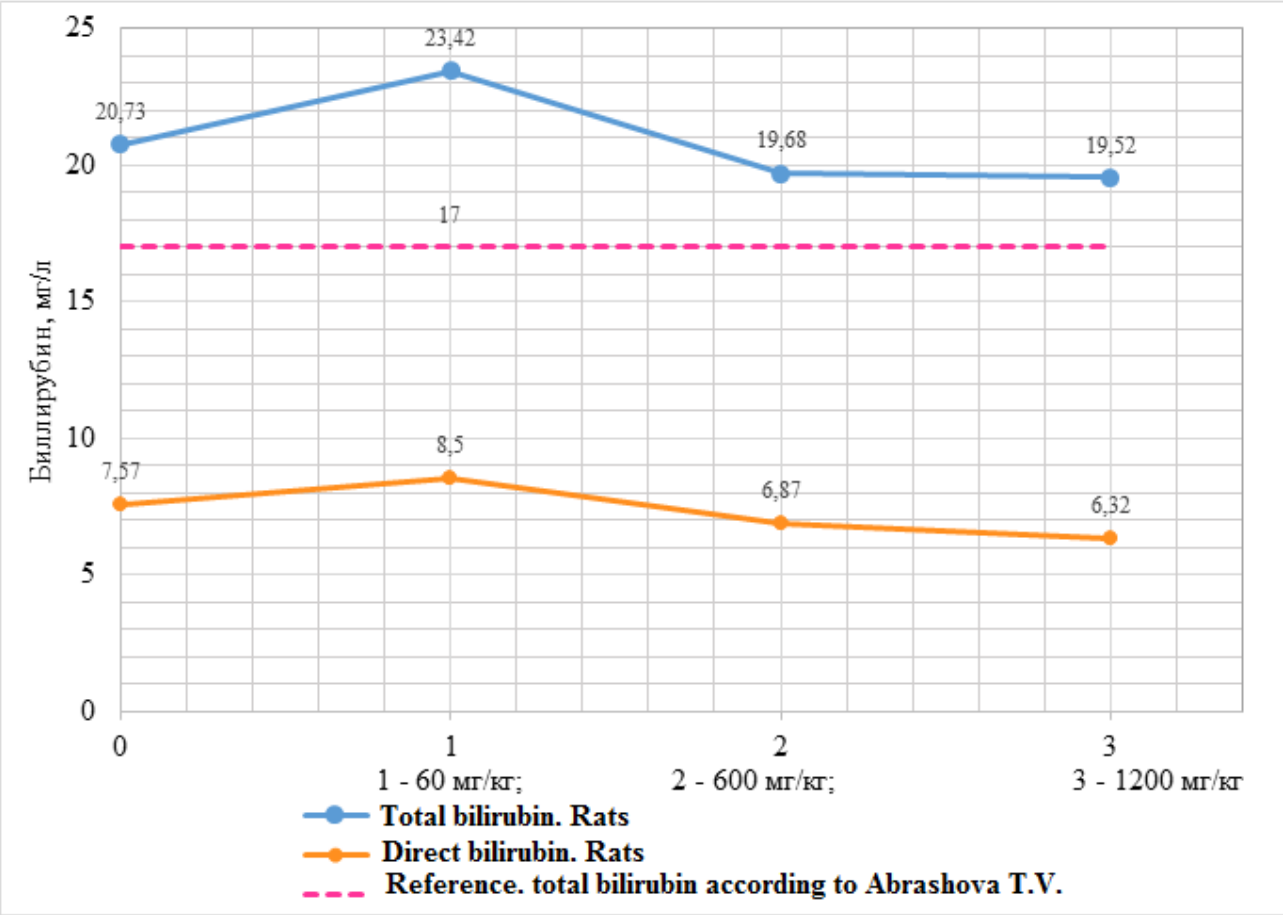


Fig. 4 - Changes in blood serum gamma-glutamyl transferase (γGT) in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats

On Fig. Figure 5 shows the change in total and direct serum bilirubin in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats. Total bilirubin is the sum of the intermediate products of hemoglobin metabolism contained in the blood serum: indirect and direct bilirubin. The reference values of total bilirubin indicated in the work of Abrashova [1] in rats are 17 mg/l, direct bilirubin - 7.8 mg/l. From Fig. 5 it follows that the presented values of total and direct bilirubin fit into the reference interval, total and direct bilirubin practically does not change during the experiment.



Rice. 5 - Changes in total and direct bilirubin in blood serum in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats

On Fig. 6 shows the change in total cholesterol in blood serum in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats. All mammalian cells require cholesterol, with the highest concentration in the plasma membrane and the lowest in the endoplasmic reticulum (ER) membrane. The amount of free cholesterol is maintained within a relatively narrow range, making cellular cholesterol homeostasis essential for normal cell function. Based on early evidence from many laboratories, reverse cholesterol transport has been described as the process by which HDL acts as a specific cholesterol acceptor that transports excess cholesterol stores in peripheral tissues to the plasma and then delivers it to the liver, where it can be directly excreted. with bile or metabolized to bile acids/salts before excretion.

In this study, when studying the chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats, the level of cholesterol in the blood plasma practically does not change.

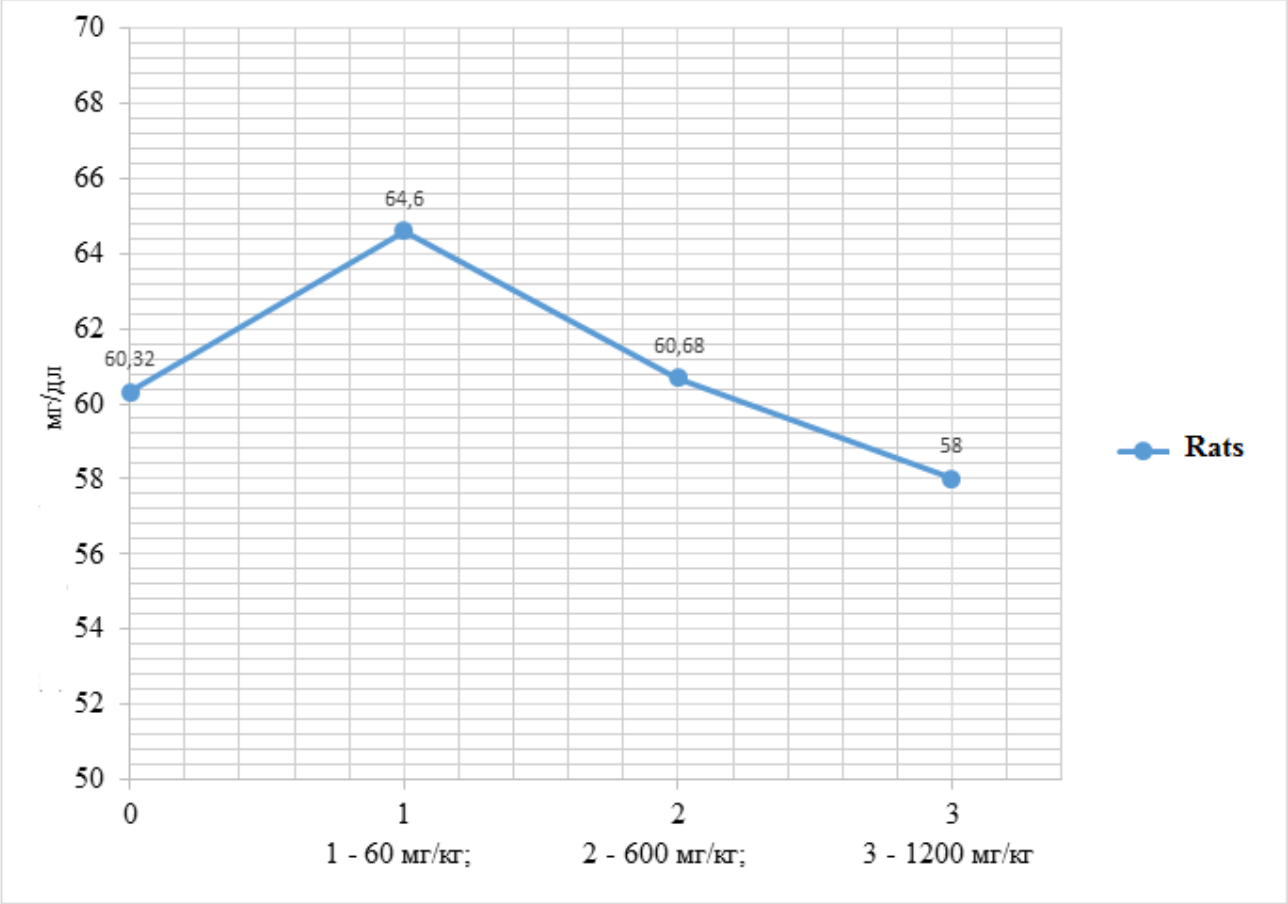


Fig. 6 - Changes in total cholesterol in blood serum in the study of chronic toxicity of various concentrations of domestic osteoplastic material in outbred rats

Conclusions: The results of the study prove the non-toxicity of the studied osteoplastic material on the body of experimental animals.

References

1. Абрашова Т. В. и др. Справочник. Физиологические, биохимические и биометрические показатели нормы экспериментальных животных //СПБ.: ЛЕМА. – 2013.
2. Акбаров А.Н., Зиядуллаева Н.С., Хабилов Б.Н. Использование костнопластических материалов для восстановления полостных дефектов челюстно-лицевых костей // “Stomatologiya” научно-практический журнал Узбекистана, 2019, №2-С.107-110.
3. Иванова Д. А., Григорьев Д. А. Изменение уровня печеночных трансаминаз у лабораторных животных при введении флуконазола //Молодёжь XXI века: шаг в будущее. – 2021. – С. 501-502.
4. Войтенко Н. Г., Макарова М. Н. Вариабельность биохимических показателей крови и установление референсных интервалов в доклинических исследованиях. Сообщение 2: кролики //Лабораторные животные для научных исследований. – 2020. – №. 2. – С. 7-15. https://doi.org/10.29296/2618723X-2020-02-01

5. Хабилов Б.Н. Технологические параметры получения пастообразного остеопластического материала // Eurasian journal of academic research Volume 2 Issue 5, May 2022, p 457-460

6. Akhbarov A.N., Khabilov N.L., Khabilov B.N., Tulyaganov D., Ziyadullayeva N.S.Morphological Characteristics of the Process of Regeneration of rabbit bone tissue defect using paste-like composite in the experiment. // "International Journal of pharmaceutical research" Apr-Jun 2020 Vol-12, Issue 2, P 725-728

7. Dilshat Tulyaganov., Avzal Akbarov., Nigora Ziyadullaeva., Bekhzod Khabilov., Francesco Baino. Injectable bioactive glass-based pastes for potential use in bone tissue repair // Biomed. Glasses 2020; 6:23–33

8. Rasool A. et al. In vitro effects of cobalt nanoparticles on aspartate aminotransferase and alanine aminotransferase activities of wistar rats //Biotechnology reports. – 2020. – Т. 26. – С. e00453.

9. Yokoyama Y. et al. Refinement of decision tree to assess the consequences of increased serum ALP in dogs: Additional analysis on toxicity studies of pesticides evaluated recently in Japan //Regulatory Toxicology and Pharmacology. – 2021. – Т. 124. – С. 104963.

10. Hu X. et al. Declined serum high density lipoprotein cholesterol is associated with the severity of COVID-19 infection //Clinica Chimica Acta. – 2020. – Т. 510. – С. 105-110.

11. Хабилов Б.Н. Технологические параметры получения пастообразного остеопластического материала. Eurasian journal of academic research Volume 2 Issue 5, May 2022, p 457-460

12. ПРЕИМУЩЕСТВА ВРЕМЕННЫХ НЕСЪЕМНЫХ ФРЕЗЕРОВАННЫХ И ПОЛИМЕРИЗОВАННЫХ ПЛАСТМАССОВЫХ ПРОТЕЗОВ НА ИМПЛАНТАТАХ АН Акбаров, ХБ Нигманович, ХД Нигманович… - БАРҚАРОРЛИК ВА ЕТАКЧИ ТАДҚИҚОТЛАР …, 2021