THE RESULTS OF A BIOCHEMICAL ANALYSIS OF THE BLOOD OF EXPERIMENTAL RABBITS AFTER THE USE OF OSTEOPLASTIC MATERIAL OSS.UZ

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Abstract: At present, an urgent and unresolved problem is to increase osteogenesis with the help of a bone growth stimulator and artificial bone in the plastic of limited bone defects after tooth-preserving operations, dental implantation, cystectomy, which was the goal of this study. The foregoing determined the relevance, purpose and objectives of the work performed.

Key words: Biochemical analyses, experimental studies, chronic toxicity, osteoreplacement material

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Research methods: Experimental studies of plastic composite material were carried out on the basis of MNIL TMA. 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. Analytical measurements were carried out in compliance with standardized procedures on approved factory reagents with mandatory quality control on automated instruments, which made it possible to minimize errors and eliminate the influence of the human factor.

For the study, venous blood was used, which was taken from a vein into a clean plastic tube. To obtain serum, blood was centrifuged for 15 min at 3000 rpm. To prepare plasma, an anticoagulant (heparin sodium salt, sodium citrate or 2% EDTA solution) was first added to the test tube. The resulting serum (or plasma) was transferred to secondary tubes, which were then loaded into the analyzer.

The following indicators were evaluated:

The concentration of ALT, AST, ALP, γGT, Tbil, Dbil, InDBil, Chol, Glu, TP, ALB, UREA, creatinine, Ca, Mg and P in the blood of the studied animals, to a certain extent,

reflects the physiological processes occurring in the jaw bones and, especially reparative resorption and regeneration. Thus, the analysis of the dynamics of these parameters in the blood at different periods of the study may indirectly indicate the stages and intensity of bone tissue regeneration in the area of the defect after surgical intervention.

Rabbits of the Chinchilla breed were divided into 3 gr:

1. Control group - an artificially created cavity defect was not filled with osteoplastic material.
2. The main group - an artificially created cavity defect was filled with domestic osteoplastic material
3. Control group - an artificially created cavity defect was filled with osteoplastic material (bioglass powder)

Analysis of the received data:

In Table. 1 shows the biochemical parameters of rabbits of the Chinchilla breed (Abrashova T.V. / Reference Physiological, biochemical and biometric indicators of the norm of experimental animals, St. Petersburg, 2013).

Table. 1 - Biochemical parameters of rabbits of the Chinchilla breed.

Таблица 41 - Биохимические показатели кроликов породы Советская шиншилла (M±m)

Показатель	Ед. измерения	N	Самцы	N	Самки
Аланинаминотрансфераза	Е/л	35	49±7	26	56±3
Аспартатаминотрансфераза	Е/л	35	30±5	29	19±1
Лактатдегидрогеназа	Е/л	35	234±21	29	211±20
Билирубин общий	мг/дл	29	1,1±0,13	29	0,2±0,02
Щелочная фосфатаза	Е/л	35	45±4	29	50±3
Креатинин	мг/дл	35	1,1±0,05	29	1,4±0,03
Мочевина	ммоль/л	35	10±0,5	29	8±0,2
Общий белок	г/л	35	63±1	29	62±1
Альбумин	г/л	35	41±1	29	42±1
Глобулины	г/л	35	23±1	29	20±1
Альбумин - глобулиновый коэффициент	-	35	1,9±0,1	29	2,2±0,1
Холестерин общий	ммоль/л	29	2,6±0,1	23	3,0±0,1
Триглицериды	ммоль/л	32	1,1±0,05	26	1,2±0,05
Общие липиды	г/л	35	3,4±0,3	38	4,0±0,4
Глюкоза	ммоль/л	36	3,2±0,4	38	3,4±0,4
Калий	ммоль/л	31	5,1±0,2	30	5,0±0,4
Натрий	ммоль/л	32	135±2	30	131±4

У кроликов породы Советская шиншилла снижена активность щелочной фосфатазы, повышен уровень мочевины.|

Serum alanine aminotransferase (ALT) activity was assessed in this systematic study. Alanine aminotransferase and aspartate aminotransferase are important enzymes found in serum and various body tissues. Alanine aminotransferase is an enzyme that catalyzes the conversion of

alanine and α-ketoglutarate to pyruvate and glutamate. Aspartate aminotransferases determine the reversible exchange of the amino group between glutamate and aspartate. The levels of these enzymes can be used as a predictive tool for diagnosing damage to the liver and other body tissues. Alanine aminotransferase is present in plasma and in cells. An increase in the activity of these enzymes in animals in plasma is associated with hepatocellular disorders. Acute liver diseases causing membrane damage or cell necrosis lead to a marked increase in plasma activity. Damaged hepatocytes leak their ALT into the extracellular space and ultimately into plasma, so that the activity and/or amount of ALT in animals with damaged hepatocytes will be increased compared to animals with normal hepatocytes [2, 3].

Little is known about the muscle role of ALT, but the parallel increase and subsequent recovery of ALT release into the bloodstream in response to muscle injury, seizures, and inflammation may reflect some underlying mechanisms [4]. There is an increase in the level of ALT and AST in the blood serum when tissues or organs of the body are damaged.

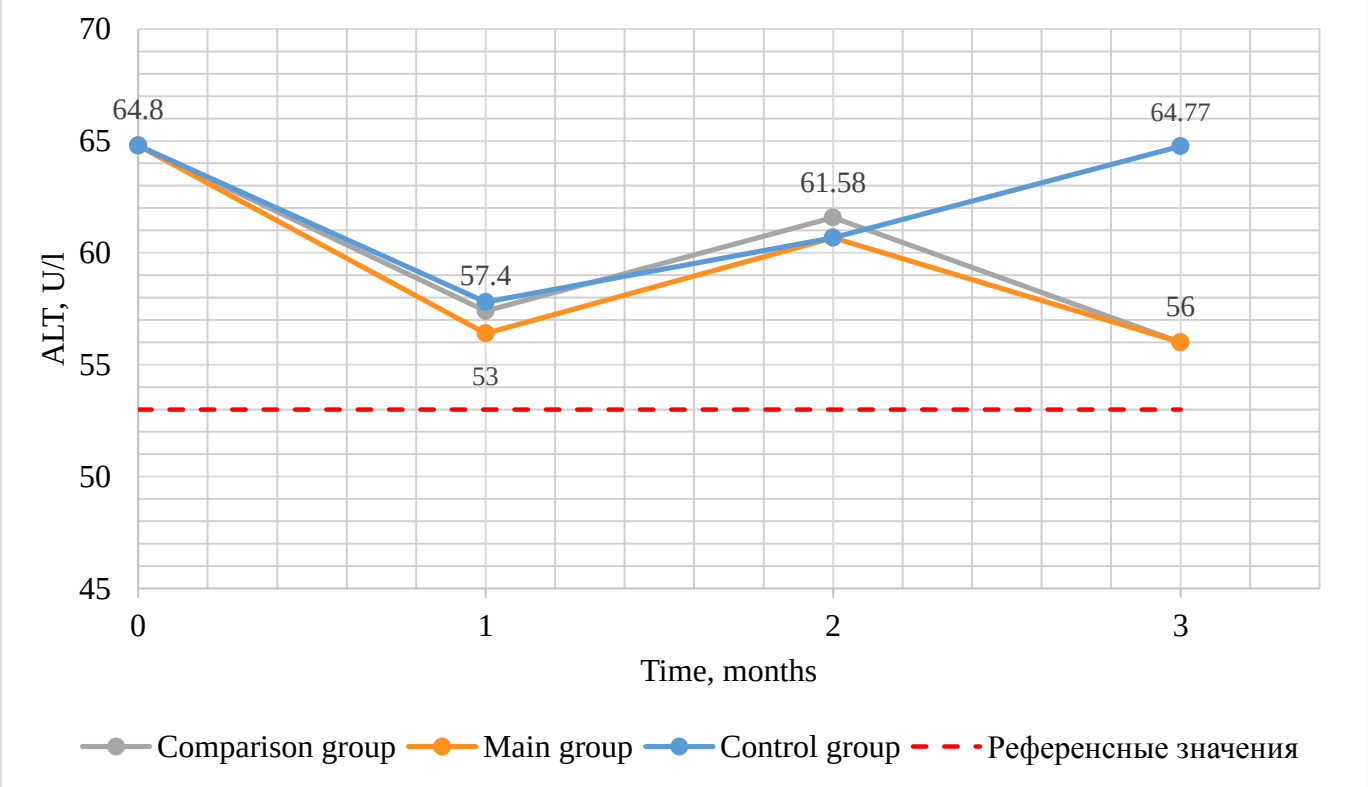

Figure. 1 - Change in blood serum ALT in three groups of chinchilla rabbits after 1, 2, 3 months.

From figure 1 it follows that the change in ALT is insignificant. Compared with the initial intact value of ALT after 1 month. ALT values decrease from 65 U/l by less than 10% to 56-57 U/l. An increase in ALT up to 3 times is considered small. ALT is considered moderately elevated, increased by 3-19 times against the norm. If ALT is increased by more than 20 times, such an increase is considered significant. Thus, tissue damage and inflammation, as well as the hepatotoxic effect of drugs on ALT changes, is not traced. ALT changes do not go beyond the reference interval of 21-78 U/l.

Serum aspartate aminotransferase (AST) activity was assessed in this systematic study. On Fig. 8 shows the change in serum AST in three groups of chinchilla rabbits after 1, 2, 3 months.

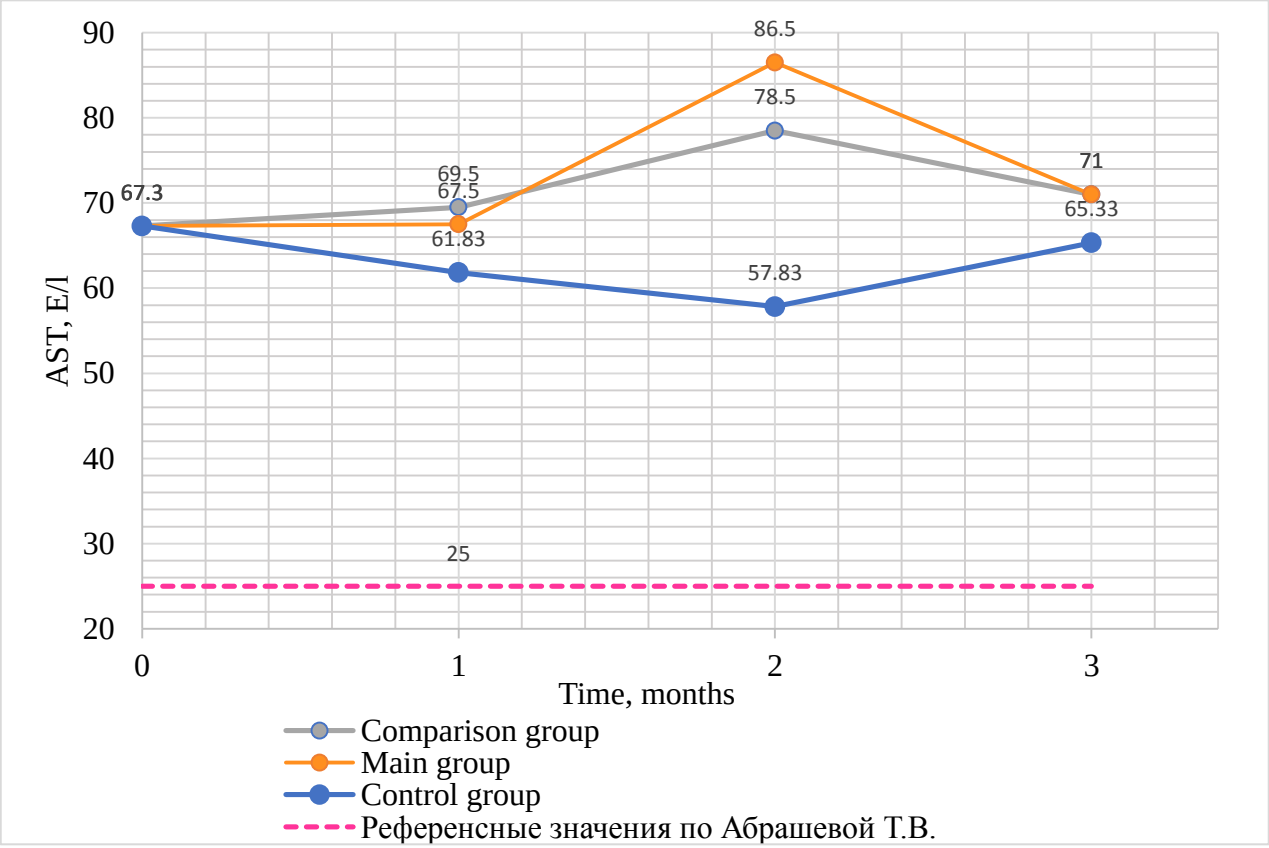

Figure. 2- Changes in blood serum AST in three groups of chinchilla rabbits after 1, 2, 3 months.

It is well known that AST is found not only in the liver, but also in the myocardium, and in skeletal muscles, and, in addition, in the kidneys, pancreas, and lungs [8]. Therefore, dysfunctions affecting these tissues may be the reason for the increase in the level of AST in the blood. Elevated levels of AST and ALT up to 300 units / l are considered non-specific.

From Fig. 8 it follows that the AST value in intact chinchilla rabbits went beyond the reference range (14-40 U/l) and amounted to 67.3 U/l. Compared with the AST value in intact chinchilla rabbits in the comparison group and the main group, there is an increase in AST by 28.5% to 86.5 U/l. after 2 months observations. This increase is considered insignificant. Rasool et al. [6] observed an increase in AST by 149% in the serum of Wistar rats when exposed to Co nanoparticles. AST increased in serum and simultaneously increased in tissues such as the liver and kidneys due to increased plasma membrane permeability. This indicates, according to the authors, an increase in AST synthesis as an adaptive mechanism due to chemical stress.

In our case, the increase was 28.5%, which is insignificant. In the control group after 2 months, observations, there is a decrease in AST by about 10%.

Next, changes in blood biochemistry parameters such as creatine kinase (CK), lactate dehydrogenase (LDH), alkaline phosphatase (ALP) and γ-glutamyl transferase (GGT) in cholestatic damage (the latter is also sensitive to drug induction) and total protein (TP) were considered.

On Figure. 3 shows the change in alkaline phosphatase (ALP) of blood serum in three groups of chinchilla rabbits after 1, 2, 3 months.

Serum alkaline phosphatase (ALP) activity is a well-known marker of the clinical chemistry of hepatobiliary damage in humans and animals. In chemical toxicity studies, including pesticides, elevated serum ALP levels have also been used as an indicator of hepatobiliary damage in rodents and dogs. This increase has been used as an indicator of cholestasis in dogs [7]. In our study, the ALP values in the control group and the comparison group lie within the average reference values

indicated for rabbits [1, 5]. Changes in the control group after 1 month. research is about +5% (Fig. 3).

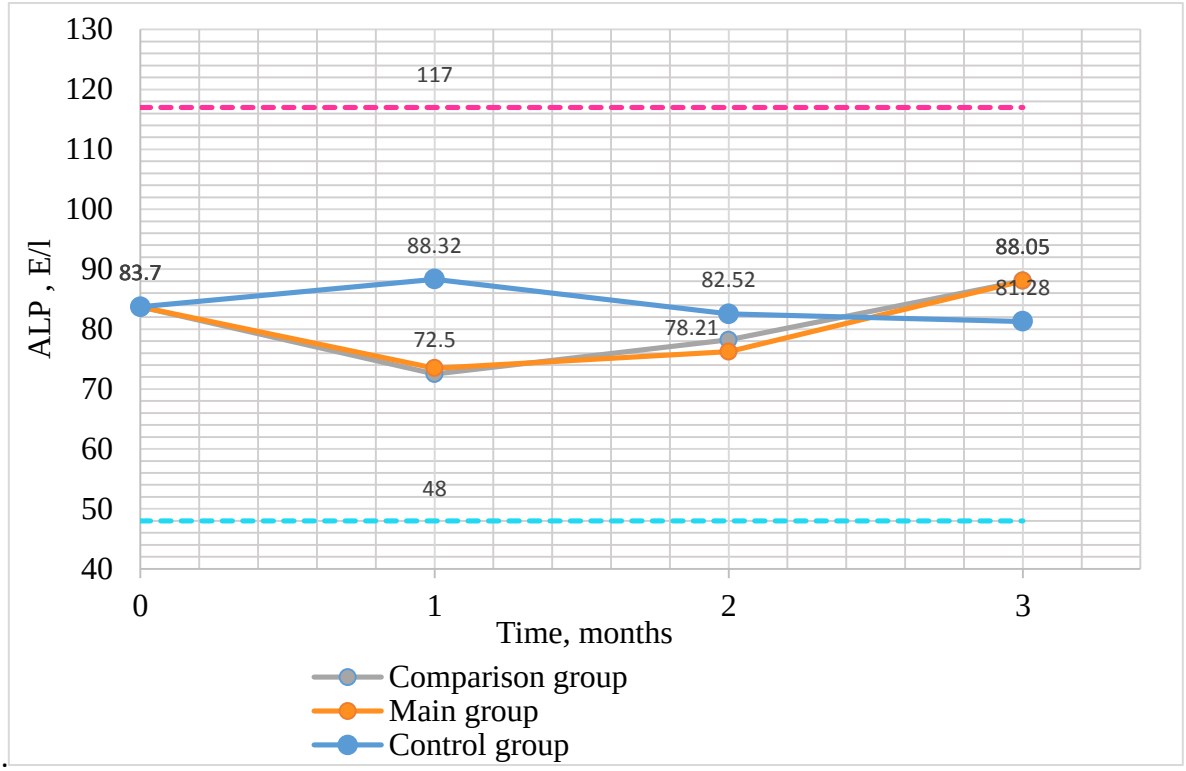

Figure. 3 - Change in alkaline phosphatase (ALP) of blood serum in three groups of chinchilla rabbits after 1, 2, 3 months.

The analysis of other indicators were also within the limits of statistically acceptable values.

Conclusion: Thus, according to the classification of substances according to the degree of toxicity, these materials can be classified as practically non-toxic substances (according to the results of in vivo administration to rabbits.

REFERENCES

1. Abrashova T. V. et al. Handbook. Physiological, biochemical and biometric indicators of the norm of experimental animals // St. Petersburg: LEMA. – 2013.

2. Akbarov A.N., Ziyadullaeva N.S., Khabilov B.N. The use of osteoplastic materials for the restoration of cavity defects of the maxillofacial bones // “Stomatology” scientific and practical journal of Uzbekistan, 2019, No. 2-C.107-110.

3. Akbarov, A. N., et al. "EXPERIMENTAL SUBSTANTIATION OF THE USE OF A NEW DESIGN OF A DOMESTIC DENTAL IMPLANT."

4. Akbarov, A. N., N. S. Ziyadullaeva, and B. N. Khabilov. "The using of osteoplastic materials

for restoration of cavity defects of the maxillofacial bones." Stomatologiya. Tashkent 2 (2019): 67-72.

5. Akhbarov AN, Khabilov NL, Khabilov BN, Tulyaganov D., Ziyadullayeva NSMorphological 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.

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. Dental Implant from Titanium Bt-1.00 Developed in Uzbekistan." *European Medical, Health and Pharmaceutical Journal* 8.1 (2015).

9. Habilov, N., et al. "Optimization of dental culture at school children and teachers residing prearal-region." *International Journal of Pharmaceutical Research* 12.2 (2020): 733-735.

10. Ivanova D. A., Grigoriev D. A. Changes in the level of hepatic transaminases in laboratory animals with the introduction of fluconazole // Youth of the XXI century: a step into the future. - 2021. - S. 501-502.

11. Irsaliev, H. I., et al. "Scanning electron microscopy of hard tissues of teeth with pathological erasability." Stomatoloaya-2002 (2002): 3-4.

12. Irsaliev, H. I., R. N. Nigmatov, and N. L. Khabilov. "Orthopedic dentistry." Toshkent: ILM/ZIYO, 2011.-304 b (2006).

13. Irsaliev, H., et al. "Features of working conditions of orthopedic dentists and measures to optimize working conditions and organization." Stomatologiya 1.1-2 (41-42) (2010): 11-16.

14. Inoyatov, A. S., et al. "Features of clinical manifestations of COVID-19 in the oral cavity." Integrative Dentistry and Maxillofacial Surgery 1.2 (2022): 37-39.

15. Khabilov B.N. Technological parameters for obtaining paste-like osteoplastic material // Eurasian journal of academic research Volume 2 Issue 5, May 2022, p 457-460

16. Khabilov, Bekzod. "TECHNOLOGICAL PARAMETERS OF OBTAINING A PASTE-LIKE OSTEOPLASTIC MATERIAL." Eurasian Journal of Academic Research 2.5 (2022): 457-460.

17. Khabilov, N. L., et al. "Ilyas Sh., Usmonov FK EXPERIENCE OF EXPERIMENTAL APPLICATION OF RATIONAL DESIGN OF DOMESTIC DENTAL IMPLANT." *Central Asian journal of medical and natural sciencesVolume* 2: 5-12.

18. Khabilov, Nigmon L., et al. "The Role of Biomimetic Incubation of Sandblasted Titanium Implants in the Process of Osseointegration: An Experimental Study in

Dogs." *International Journal of Biomedicine* 5.1 (2015): 38-40.

19. Khabilov, Nigman Lukmanovich, et al. "The Study of Structural Changes in Bone Tissue of Alveolar Process of Jaws in Experimental Animals after Implantation of a New Construction of Mun, Tatyana Olegovna, et al. "Experience of Experimental Application of Rational Design of Domestic Dental Implant." *CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES* 2.5 (2021): 5-11.

20. Khabilov, N. L., F. K. Usmonov, and T. O. Mun. "ASSESSMENT OF CHANGES IN THE QUALITY OF LIFE OF PATIENTS WITH DENTITION DEFECTS BEFORE AND AFTER PROSTHETICS AND DENTAL IMPLANTATION USING AN IMPLANT IMPLANT. UZ." *Eurasian Journal of Medical and Natural Sciences* 2.6 (2022): 509-513.

21. Khabilov, N. L. "CLINICAL AND FUNCTIONAL INDICATORS OF PERIODONTAL DISEASE IN PATIENTS WITH A DESTROYED CROWN PART AND WITH DISCONNECTED ROOTS IN THE AREA OF BIFURCATION OF MULTI-ROOT TEETH." Russian Dental Journal 1 (2004): 21-24.

22. Khabilov, N. L. "Clinical and experimental substantiation of the use of biositall for the restoration of defects of teeth and dentition with fixed structures: Dis.... Doctor of Medical Sciences." (2004).

23. Khabilov, N. L., and F. H. Irsalieva. "The state of microcirculation in periodontal tissues during prosthetics with artificial crowns made of various structural materials." Postgraduate doctor 39.2.2 (2010): 268-274

24. Khabilov, N., et al. "On the issue of the use of bioactive coatings for dental implants." Dentistry 1.1 (62) (2016): 88-95.

25. Khabilov, N., et al. "Zirconium dioxide is one of the modern dental materials." Dentistry 1.2 (67) (2017): 107-110.

26. Khabilov, T. D., et al. "Comparative analysis of biomaterials intended for osteoarthritis." Journal of Medicine Innovations 1 (2021): 72-77.

27. Khabilov, N. L., et al. "Comparative analysis of biomaterials intended for osteosampling." Journal of Medicine Innovations 1 (2021): 72-77.

28. Khabilov, N.L., F.K.Osmanov and TA Mon. "A hunter from prosthetics and dental implantation in the use of an IMPLANT IMPLANT and then a tooth blindness disorder patients change in quality of life BAHOLASH.UZ." Eurasian Journal of Medicine and Natural Sciences 2.6 (2022): 509-513.

29. Khabilov, N., et al. "Comparative analysis of biomaterials intended for osteosuppression." Medicine and Innovation 1.1 (2021): 52-56.

30. Khabilov, N., T. Moon, and F. Usmonov. "COMPARATIVE ANALYSIS OF THE EFFECT OF THE DENTAL IMPLANT SURFACE “IMPLANT. UZ” ON THE PROCESS OF OSSEOINTEGRATION." Stomatologiya 2 (83) (2021): 5-7.

31. Khabilov, Behzod, et al. "PARTIAL REMOVABLE DENTURES: THE CLINICAL NEED FOR INNOVATION." Medicine and Innovation 1.4 (2021): 385-388.

32. Salimov, O., et al. "EVALUATION OF the effectiveness of bioactive coating for A

domestic dental implant." Stomatologiya 1.2 (79) (2020): 15-19.

33. Lukmanovich, Habilov Nigman, Mun Tatyana Olegovna, and Usmonov Farkhod Komilzhonovich. "Densitometric study of degree of osteointegration of the dental implant “implant. Uz” in experimental conditions." *European science review* 3-4 (2016): 244-245.

34. Moon, Tatiana, Nigman Khabilov, and Farkhodjon Usmanov. "THE USE OF DENTAL IMPLANTS OF VARIOUS DESIGNS FOR THE RESTORATION OF DENTITION DEFECTS." Medicine and Innovation 1.4 (2021): 436-442.

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

36. Salimov, O. R., N. L. Khabilov, and A. S. Kasymov. "Microbiology of the oral cavity in patients suffering from pemphigus." Postgraduate Doctor 29.2 (2009):133-139.

37. Salimov, Odilkhon, et al. "THE JUSTIFICATION FOR A RATIONAL DESIGN OF A DENTAL IMPLANT WITH A LOCKABLE MOUNT-ATTACHMENT." *European Journal of Molecular & Clinical Medicine* 7.2 (2020): 2020.

38. Voitenko N. G., Makarova M. N. Variability of blood biochemical parameters and establishment of reference intervals in preclinical studies. Message 2: rabbits //Laboratory animals for scientific research. – 2020. – no. 2. - S. 7-15. https://doi.org/10.29296/2618723X-2020-02-01

39. Yarmukhamedov, B. H., et al. "STUDYING THE BIOCOMPATIBILITY OF A DENTAL IMPLANT "IMPLANT. UZ” IN VITRO." ACTUAL PROBLEMS OF PEDIATRIC DENTISTRY. 2016.

40. 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. – T. 124. – C. 104963.