Implant-bone boundary, management with coordinative of zinc and vanadium compounds.

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***Abstract* — Theoretical concept about description of the implant integration into the bone on a microscopic view remains to be a wide studied subject. The study of the morphological samples with sections on the border implant-bone had been done on different depths and sides of the implant using hematoxylin-eosin stain. Remarkable result had been observed on comparative analysis of studied groups on administrating TS-2Z and TS-1Z,TS-9V that did stimulate bone regeneration. Histological studies confirm the results of improvement of biochemical and blood indexes after implant surgery at the laboratory animals that had received coordinative compounds of Zn(L-H)2; Zn(L-H)etazol; [Vo(L- H)etazol]2SO4.**

I. INTRODUCTION

One of the most important problems of modern implantology is the bone integration of dental implants and by default management of its process. The essential stage is the surgical one; the insertion of the implant in the alveolar socket and obtaining the adherence of the bone to the implant and achieve a direct bone implant surface without involving connective tissue layer. Branemarks concepts of bone integration of the implants are based on clinical and experimental studies, describing the complexity of the process of bone integration of the implants. His postulates confirm that until now the research assures clinical efficacy of implant use, but nevertheless require continued research. Hystomorpholigical data of ossteointegration process of dental implants are in continuous research, this way studies of the microscopic structure of the implant-bone contact surfaces are required for a fine examination.

II. MATERIAL AND METHODS

The animals were sacrificed at intervals of 2 weeks and 1 month with light anesthesia overdose. The surgery had been performed and the samples of resected mandibles and bones of rats within which remains the implants. Hemi-mandibular samples were kept 10 days in 10% formalin solution and then 2 days in 70% alcohol, 90% ethyl alcohol 2 days, 2 days 96% alcohol, absolute alcohol one week, 24 hours a mixture of ethanol + acetone (1:1) 100% acetone and finally one week with daily changes of acetone. After these procedures, the portion of jaw bone where the implant had been inserted had been placed into a propylene resin solution. Solidification of the preparations lasted one week. The slice cuts of the preparations on the limit bone-implant had been performed at different depths and parts of the implant and haematoxylin-eosin staining had been performed.

Purpose of the research

Comparative hystological examination of potential of osseointegrated implants in different groups of rats which had been given coordinative compounds Zn (LH) 2, Zn (LH) etazol, [VO (L-H) etazol] 2SO4 respectively with indices TS-1Z, 2Z-TS, TS-9V,this way getting the opportunity to study the contact area between the outlayer of the titanium implant with surrounding tissue structures, including the dynamics of their formation.

III. RESULTS

Groups of control. It had been made a film of mandibular bone with inserterted implant in 15 days .There in (Fig. 1a, b) had been noticed areas of tissue regeneration.

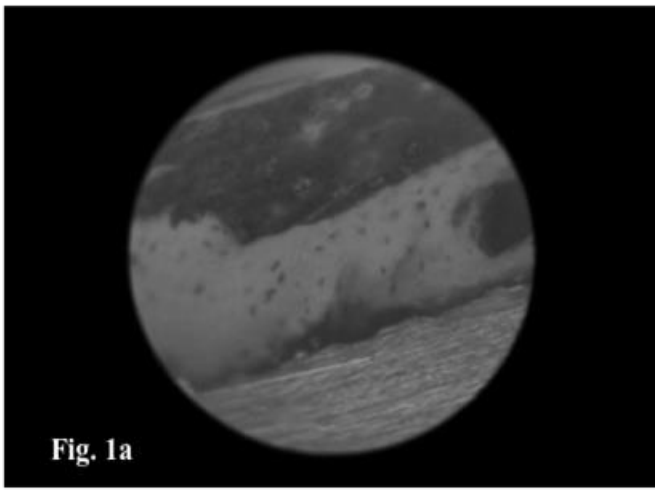


Fig. 1a

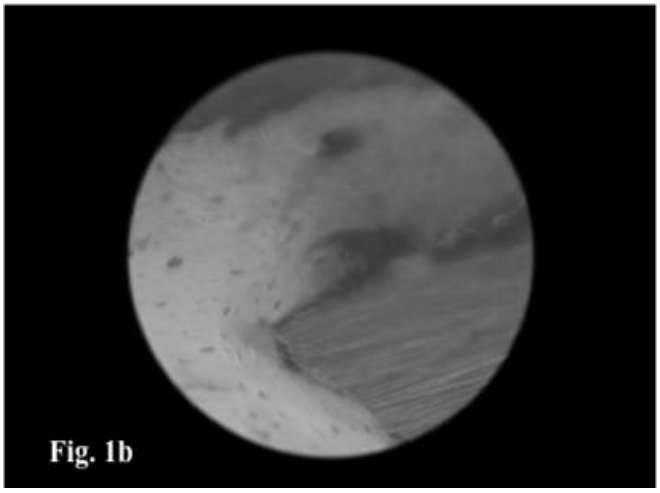
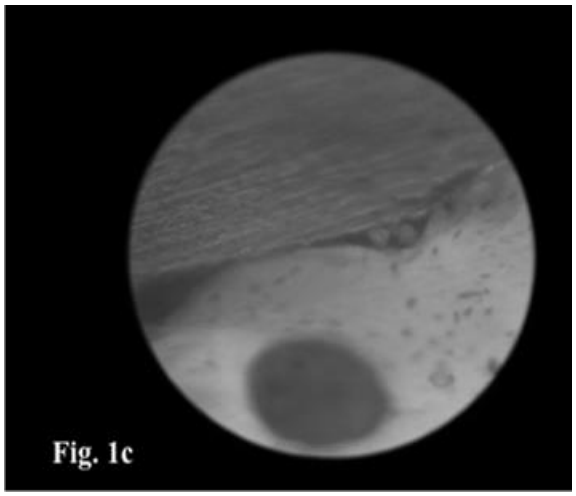
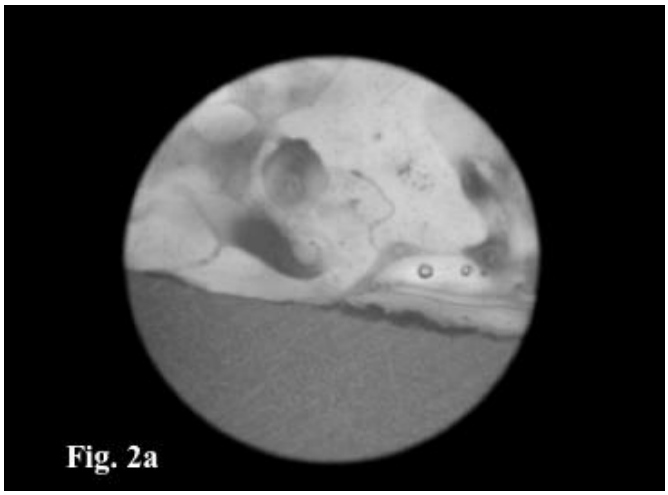
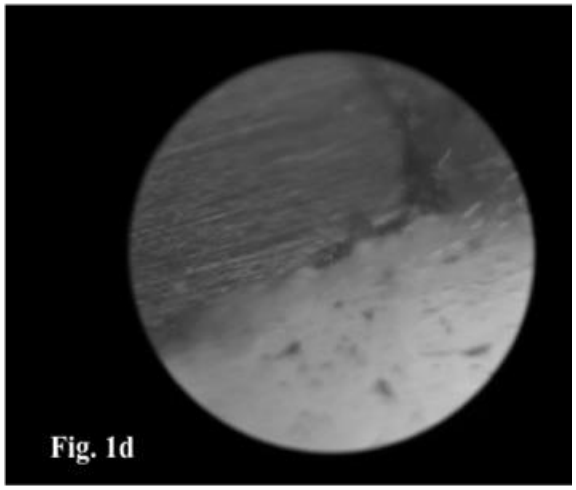
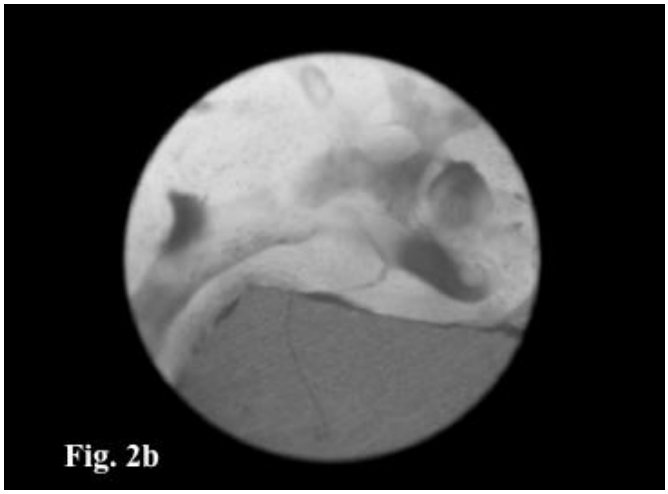


Fig. 1b









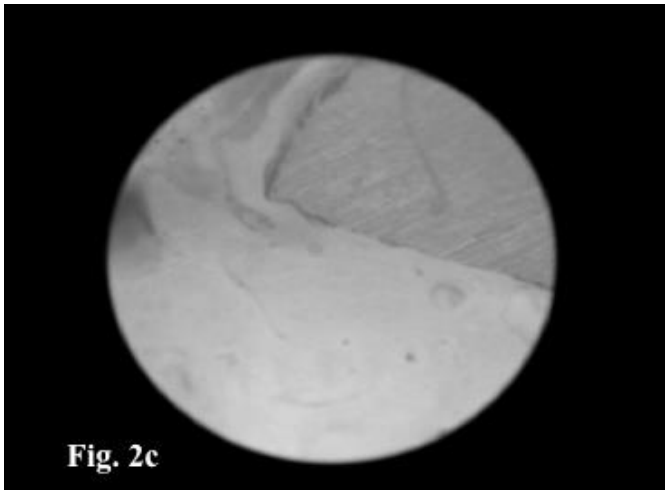


Fig. 1 (a, b, c, d). Microphotographs (haematoxylin eosin staining). Images of implants with surrounding tissue in the control group after 2 weeks (a, b) since the surgery of inserting the implant had been performed. The formation of new bone tissue covered the area directly bordering the implant. The tissue maturation is a continous process, fibrous tissue is noticed on the bordering of the implant (a), bone only rarely adhere to the implant surface (a, b).
Histology images (c, d)-images had been taken after 1 month after surgery.

The structure of newly regenerated trabecular bone surrounds the whole surface of the implant. The tissue is partially separated from the implant surface by a few elongated cells like fibroblasts (fig.1b). The samples and photos made after 30 days do not show any big changes than after 15 days, the process of tissue maturation has not progressed further. The development and maturation of essential components of fibroblast cells is observed at the edge of the implant surface and new bone formation, but rarely the last more compact adhere to the implant surface (Fig. 1c, d). There are incomplete spaces between implant and bone is more limited, which highlights rich blood vascularity.

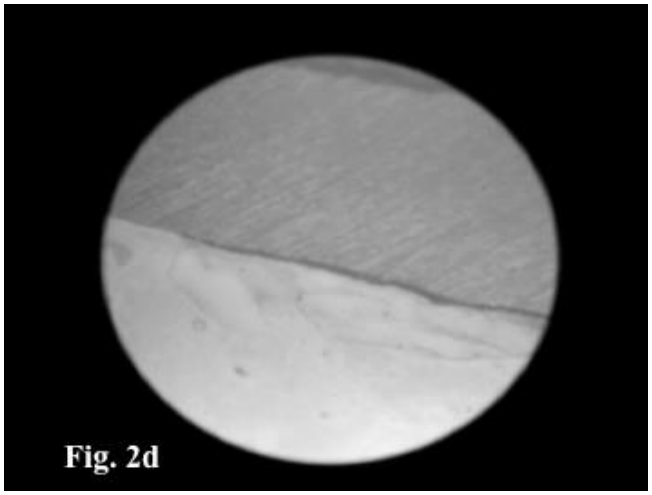
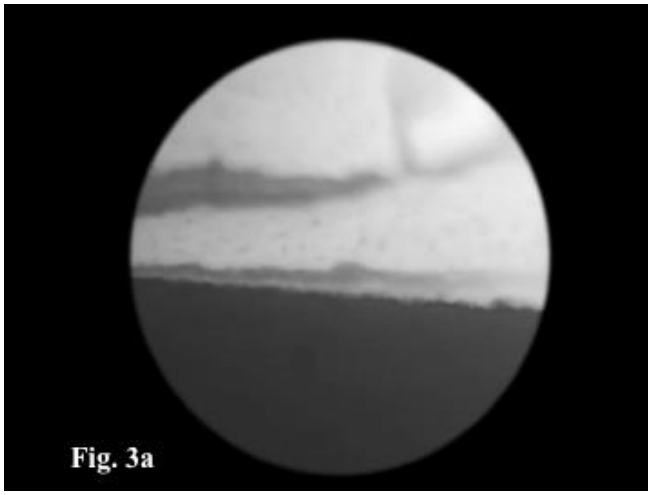
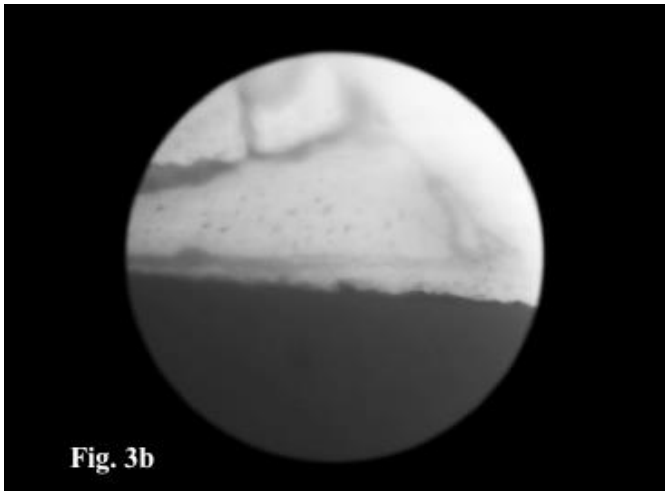


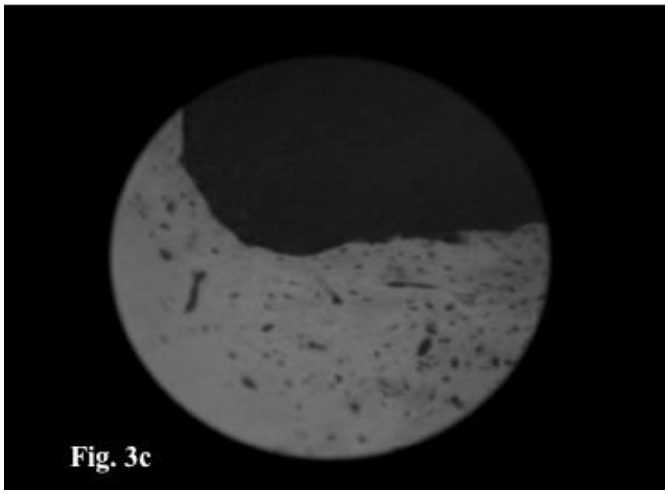
Fig.2 (a, b, c, d). Microphotographs (hematoxylin eosin stain) The group which were given TS-1Z.. Results after 2 weeks (a, b) after surgery. Bone implant is surrounded by fibrous tissue which may be substituted by bone tissue (c, d) - histology results after 1 month after surgery.

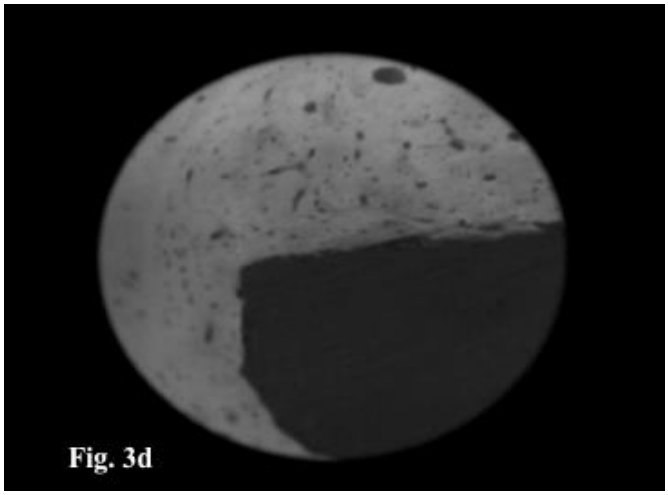
*Groups of vertebrates with implants inserted into the bone which were given TS-1Z.*Hystological examination at 2 weeks after surgery (2a, b) there can be noticed a bone imperfection, the periphery of which is occupied by granulation tissue rich in cells and blood vessels. Mandible bone is traumatized by trepanation of the bone when cavity for insertion of the implant had been performed (Fig2a), but no inflammatory phenomenon had been observed. Also, the microscope image (Fig. 2, b) highlights the implant-bone postsurgical area with bone trabeculae since implant insertion and that image show precursors of tissue cells transformed into cells recruited osteoblastic bone formation process - osteoinduction.

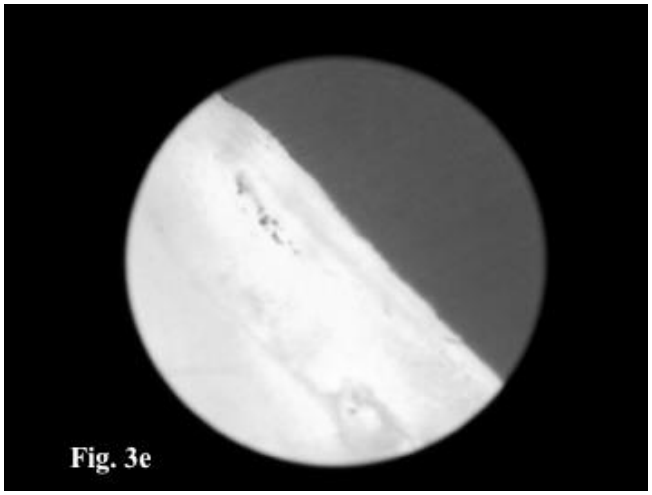
After 1 month of surgical intervention (Fig.2c, d) the mandible bone defect caused by insertion of the implant was regenerated with bone structure, which replaced fibrous tissue. The junction between implant and adjacent bone is completely renewed and implant is completely anchored into the bone. We can notice the thin structure of bone trabeculae and newly formed bone, with a network which is mostly fibrous tissue.











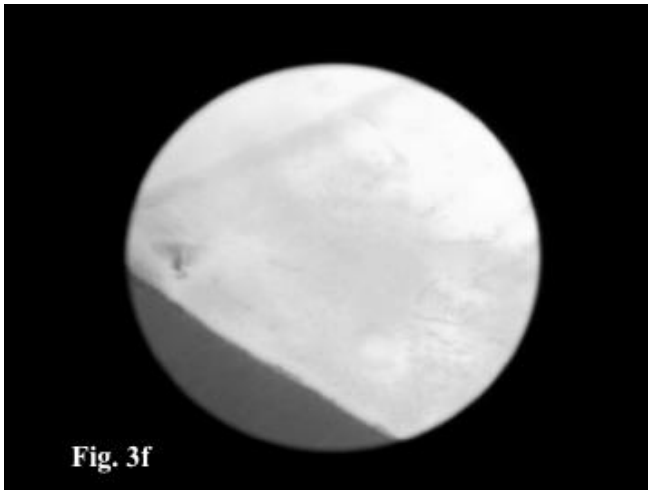


Fig. 3 (a, b, c, d, e, f) Microphotographs (haematoxylin-eosin stain). Hystological implant-bone samples from rats that received the TS-2Z for 2 weeks (a, b) after implant insertion. On the implant surface we can notice roughness which is due to sandblasting. The tissue is rich in blood vascularity. The implant is surrounded by a capsule mostly fibrocellular (a, b) in image (b) the right to see the regeneration of new bone. Image (c, d) of samples implant + bone after 1 month since implant insertion. (e,f) - another sample from the same group - image after 1 month-final stage of bone integration.

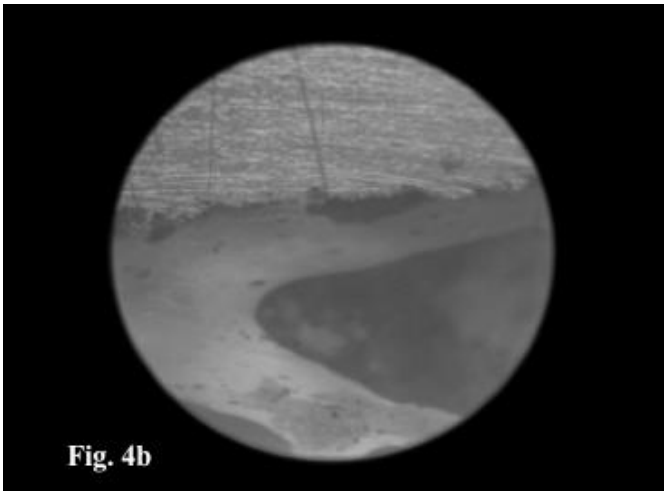
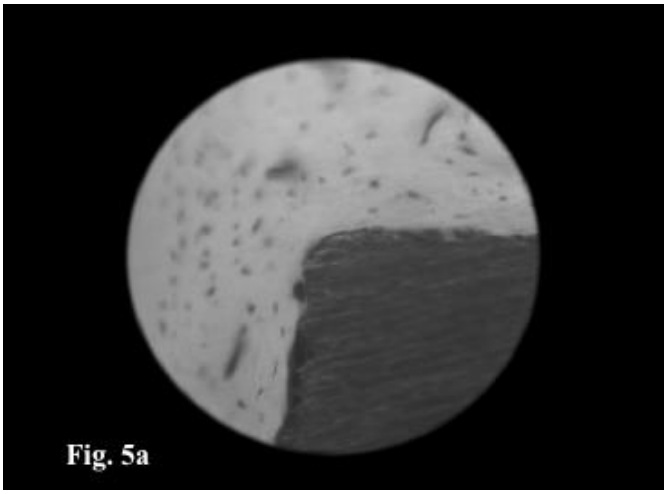
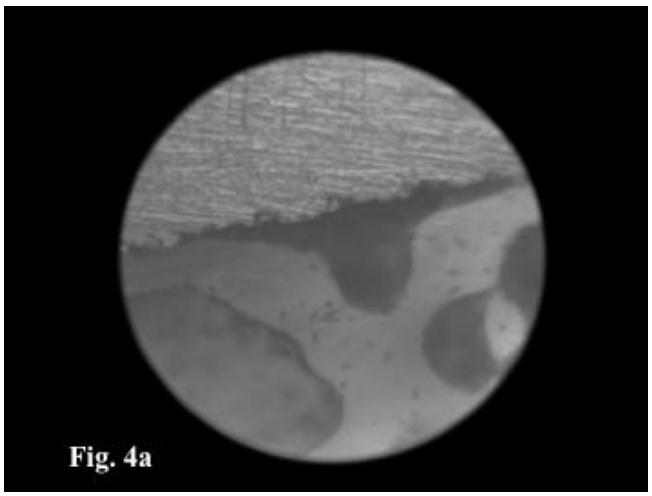
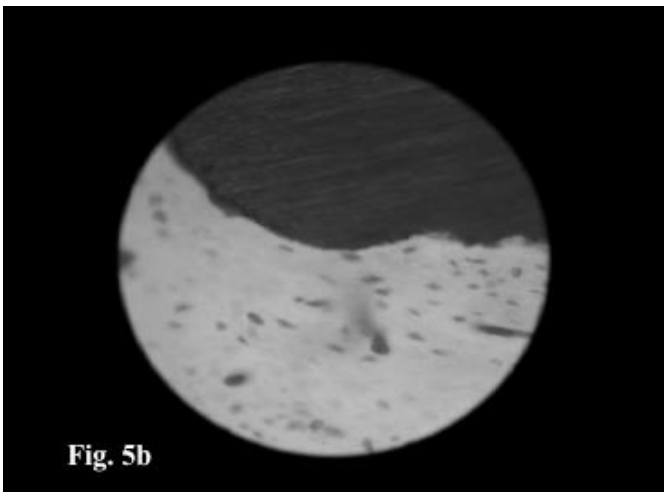
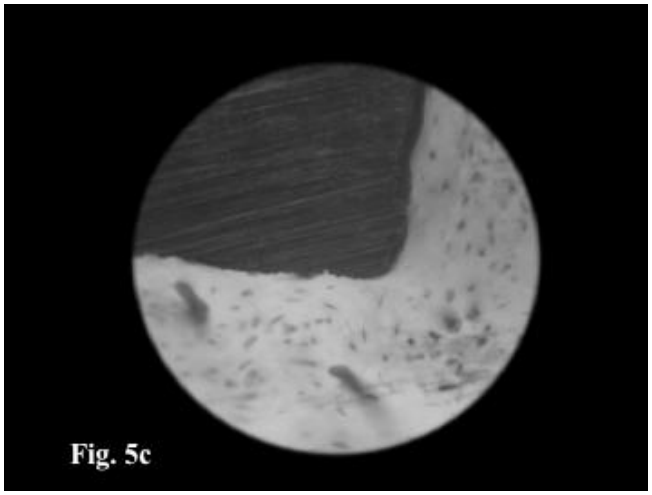


Fig.4 (a, b). Microphotographs 2 weeks since implant insertion. Group that was administered TS-9V. At the implant-bone boundary is revealed reduced bone tissue regeneration (a) on the implant surface there are bone trabeculae with irregular outline (b).









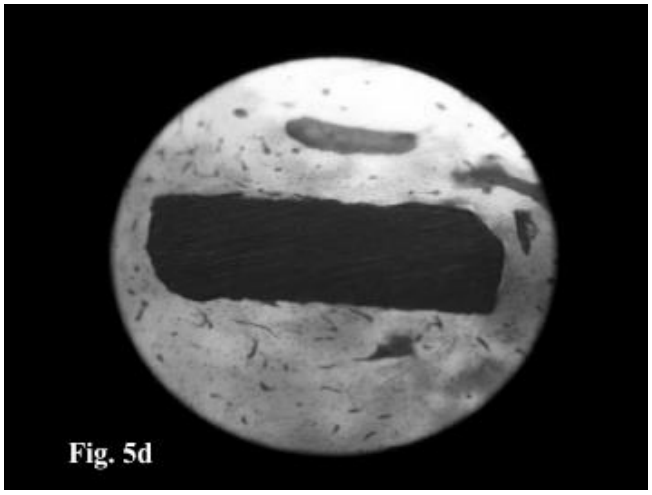


Fig.5 (a, b, c, d). Microphotographs. Implant-bone group samples on mandible, which has been administered TS-9V.Haematoxylin eosin stain. Osseogenesis after 1 month since implantion. The bone which is anchoring the implant surface flowing uniformly throughout the perimeter area of the implant. Osteoconduction of osteoblastic cells prevail.

Groups of samples: laboratory animals with implant inserted into the mandibular bone which were given TS-2Z.

Administration of coordinative compounds TS-2Z showed that the defect is replaced by spongy bone, newly formed bone trabeculae and presence of osteoblasts (Fig. 3, b). In none of the hystological preparations were observed inflammatory processes, changes in the prevalence of destructive or fibrous tissue. Analysis of the junction - surface bone to implant after 1 month of implant insertion (Fig.3c, d) and (Fig.3d, e) shows that there are areas where the trabeculaes grow in size and regenerate bone in a lamellar structure in comparison to ossteointegration processes after 15 days (Fig. 2, b). Formation of direct contact between bone and implant with connective tissue layer is considered low as a morphological manifestation process of ossteointegration. The bone appeared directly on the surface of the implant,there could be noticed also fibrous tissue.

Groups of samples:laboratory animals with implant inserted into mandibular bone of animals which were administered TS-9V.

Hystological analysis of samples of this studied group demonstrated that TS-9V preparation stimulates the regeneration of bone tissue comparing to experiment with compounds administered in previous groups, but the process starts later. The images (Fig. 4 a, b) - in 15 days on implant surface there is newly formed bone present, continuing maturation, areas of connective tissue, as consequences of posttraumatic cavity formation in the stage insertion of the implant. After 1 month implant insertion (Fig. 5, b, c, d) - ossteogenesis in evolution. The area around postsurgical implant insertion into the bone are restored with a new bone structure instead, the ossteointegrated implant is formed.

IV. CONCLUSIONS

Analyzing the hystological examination with the results we conclude that the best indicators of ossteointegration process are found in all groups which have been given coordinative compounds Zn (LH) 2, Zn (LH) etazol, [VO (L-H) etazol] 2SO4.

The results of this study also come up with arguments of guidance on the use of dental implants with administering of coordinative compounds of Zn. There are coordinative compounds that can be used in implantology ant there is a necessity to make direct studies of implant-bone interface involving molecular medicine studies. Hystological analysis of the samples from laboratory animals which had bee administeres the compounds mentioned abov in comparison with control group, demonstrated success of guided tissue and bone formation in intimate contact with implant surface but also its penetration into the microstructure of the implant. Bone integration of the implants were observed in most unique comparative analysis between group of study and the administration of TS-2Z compound, TD-1Z compounds, TS-9V that stimulated significant bone regeneration. Hystological results confirm the benefic results with biochemical an hematological indexes which had been improved after implant application at the animals that had been administered coordinative compounds Zn (LH) 2, Zn (LH) etazol, [VO (L-H) etazol] 2SO4.

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