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## COMPARATIVE EVALUATION OF THE BIOLOGICAL PROPERTIES OF BONE BIOIMPLANTS TUTOPLAST® AND BIOACTIVE CERAMIC MATERIAL "SYNTEKOST" WHEN IMPLANTED IN THE MIDDLE EAR IN THE EXPERIMENT

**ABSTRACT. Background.** Trepanation cavity formed during sanitizing operation subsequently leads to a recurrence of inflammation in the middle ear cavity. A special importance in mastoidoplastics is to eliminate the postoperative cavity. One of the current problems is to create an alternative plastic material that could be used for healing of the bone defect with the newly formed bone tissue without causing further injury to the patient. **Objective.** The purpose of this study was to investigate and compare the features of reparative processes of bone implant Tutoplast® and bioactive ceramic material "Sintekost" as well as to assess the reaction of the inner ear to the materials which were replanted into the tympanic bullae of guinea pigs while creating an experimental model of antromastoidotomy. **Methods.** Experimental studies were carried out on 72 male guinea pigs of 300-400 g. Depending on the used plastic material animals were divided into 3 groups. Studies were performed on the left ear of the animal, the right ear was used as a control. Animals were withdrawn from the experiment on the 14th, 30th, 90th, 120th, 330th day. To evaluate the results of the study common histological methods were used. **Results.** After implanting of bioactive ceramic material "Sintekost" into tympanic bullae of guinea pigs signs of resorption of the material were mild and these processes were not always accompanied by the formation of bone tissue. The newly formed bone trabeculae were not observed until 90 day. After implanting cancellous bone crumbs "Tutoplast" into tympanic bullae of guinea pigs the initiation of osteogenesis was observed on the one hand and the resorption of bone fragments on the other. This resulted in formation of newly formed bone tissue whose volume gradually grew, filling the cavity of the tympanic bullae in that area. Implant "Tutoplast" possessed osteoplastic properties, which contributed to the growth of bone, acting as a matrix on which bone islands were formed. In none of the experimental cases after implanting of this material into the tympanic bullae of guinea pigs inflammation was observed which may have led to suppuration or ototoxic effects on the structures of the inner ear. **Conclusion.** The experimental studies showed that the transformation of bone implant Tutoplast® occurred more actively and to a greater extent than that of bioactive ceramic material "Sintekost". In none of the experimental cases after implanting this material into the tympanic bullae of guinea pigs inflammation was observed.

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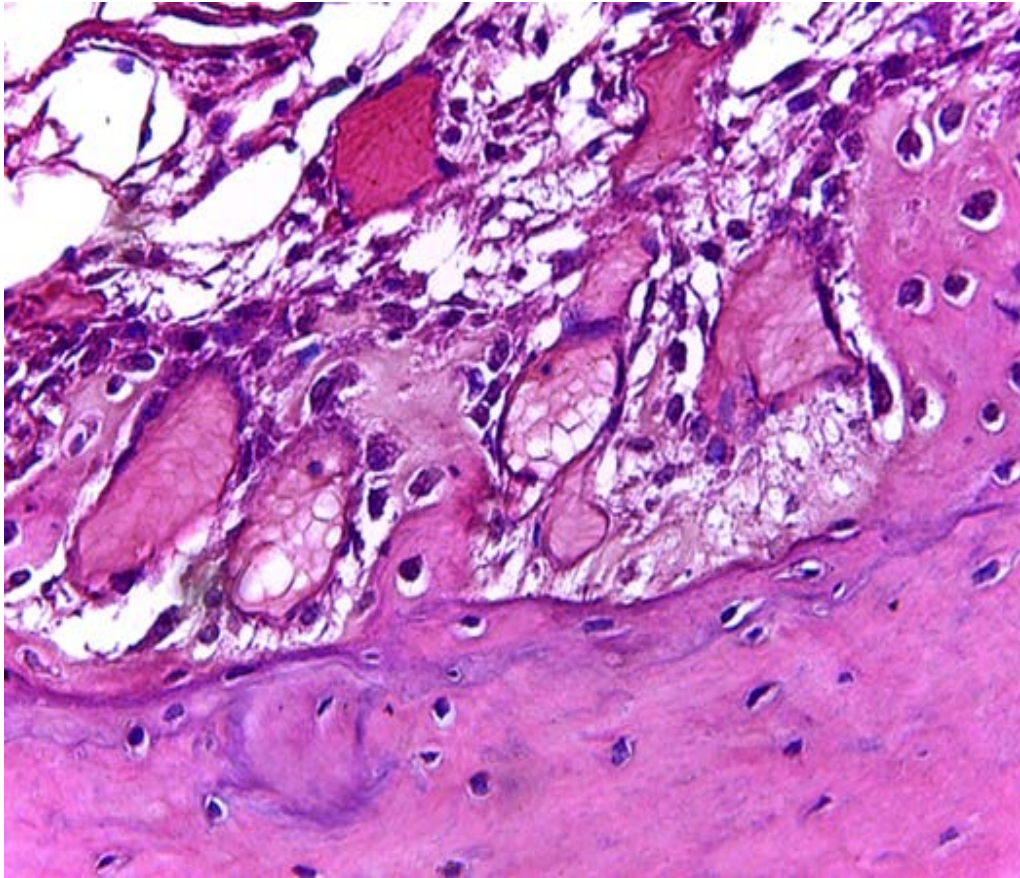


Fig. 1. Newly formed bone trabeculae on the inner surface of bulla, 14 days of observation. Hematoxylin&Eosin staining.  $\times 400$ .

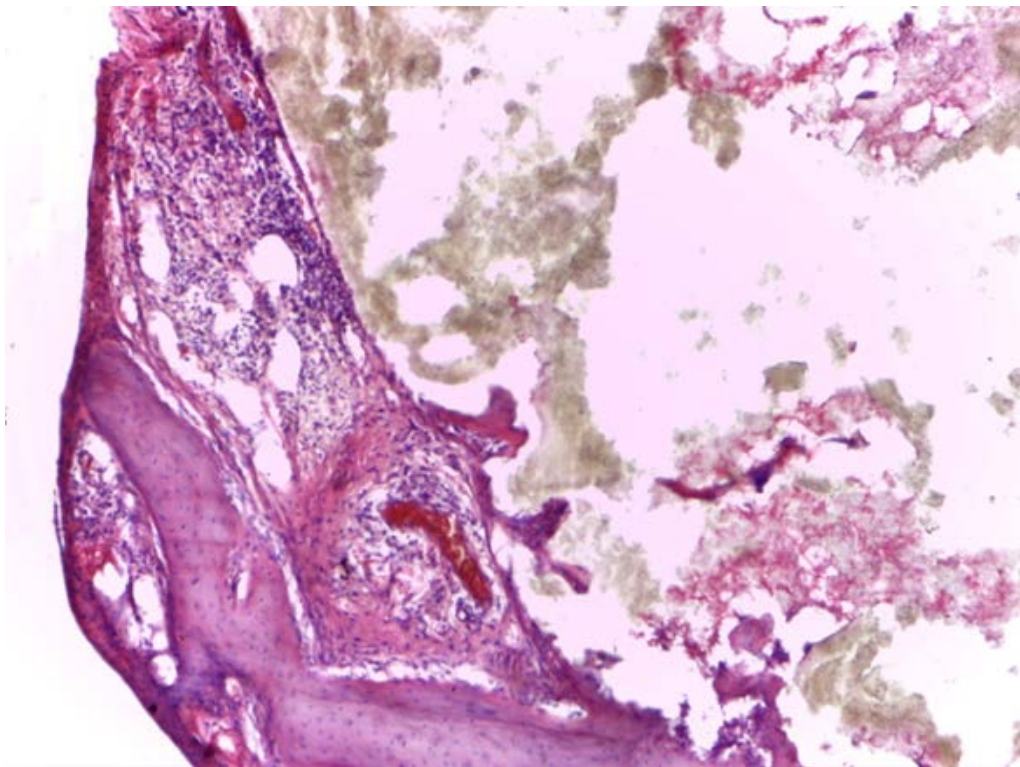


Fig. 2. Single bone trabeculae in the area of disposed granules of ceramic material "Syntekost". 30 days of observation. Hematoxylin&Eosin staining.  $\times 40$ .

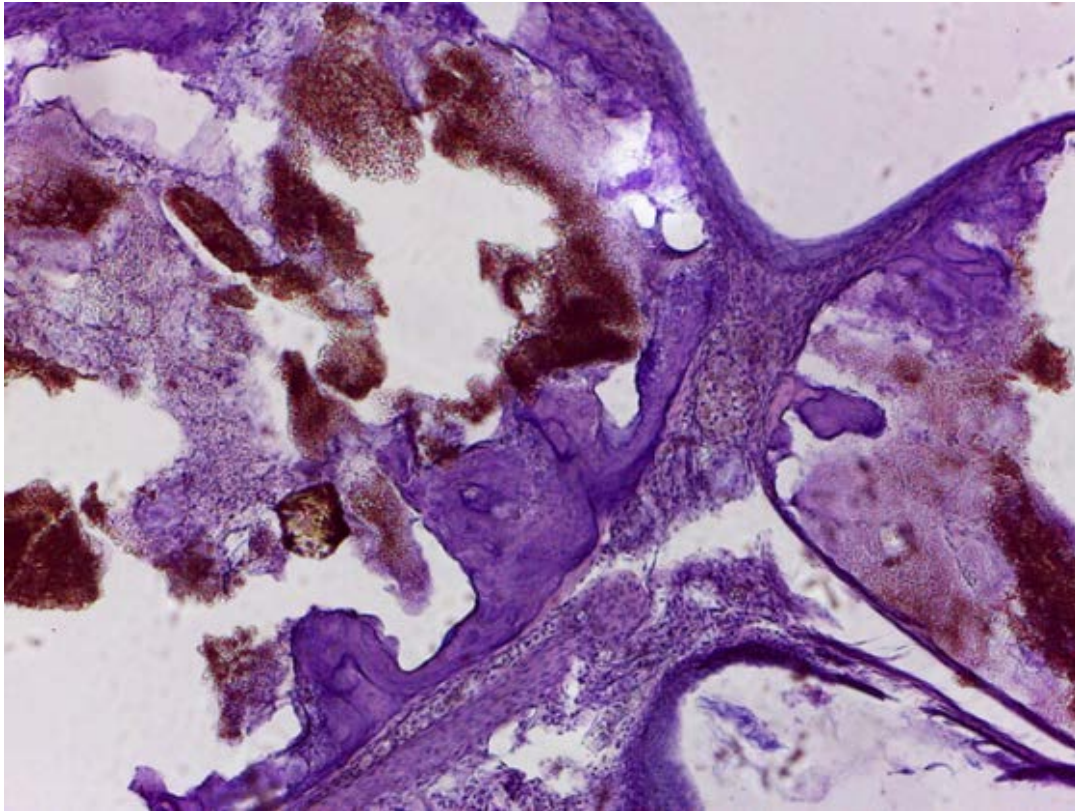


Fig. 3. Bone trabeculae formation on the inner surface of the tympanic bulla. Signs of integration of ceramic material into the bone matrix. 90 days of observation. Hematoxylin&Eosin staining.  $\times 100$ .

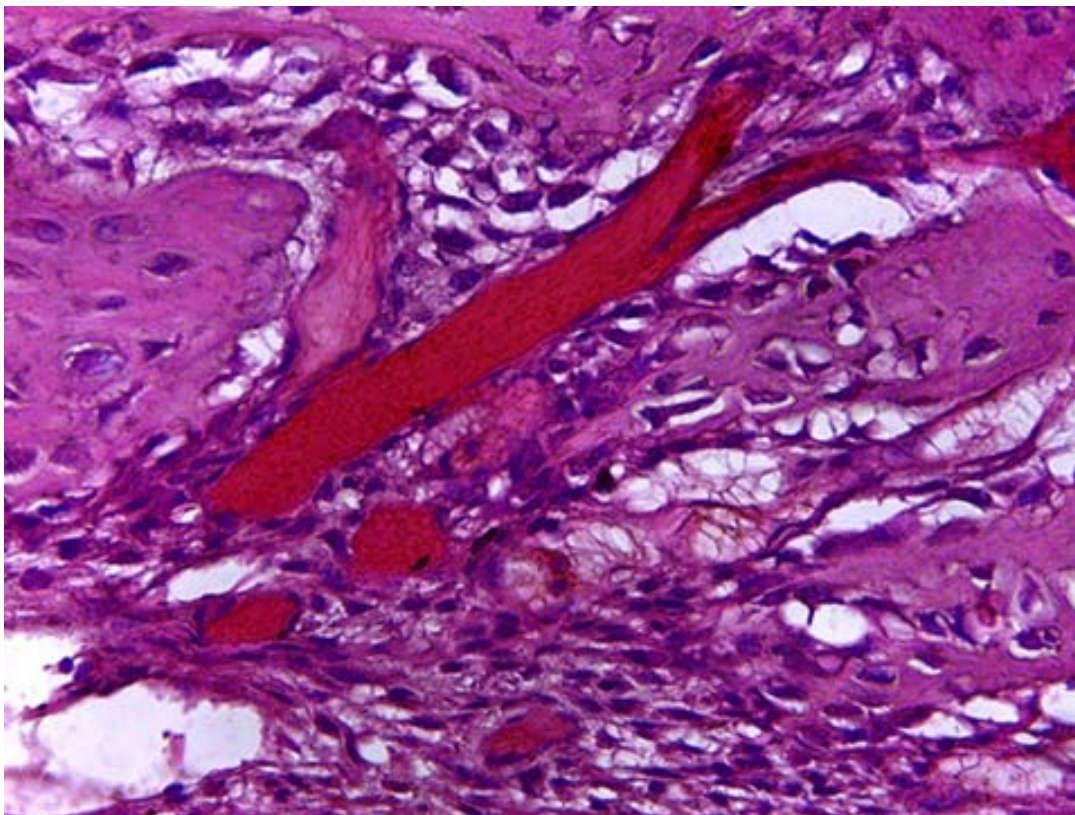


Fig. 4. Bulla composed of vascularized tissue. Formation of short trabeculae. 30 days of observation. Hematoxylin&Eosin staining.  $\times 400$ .

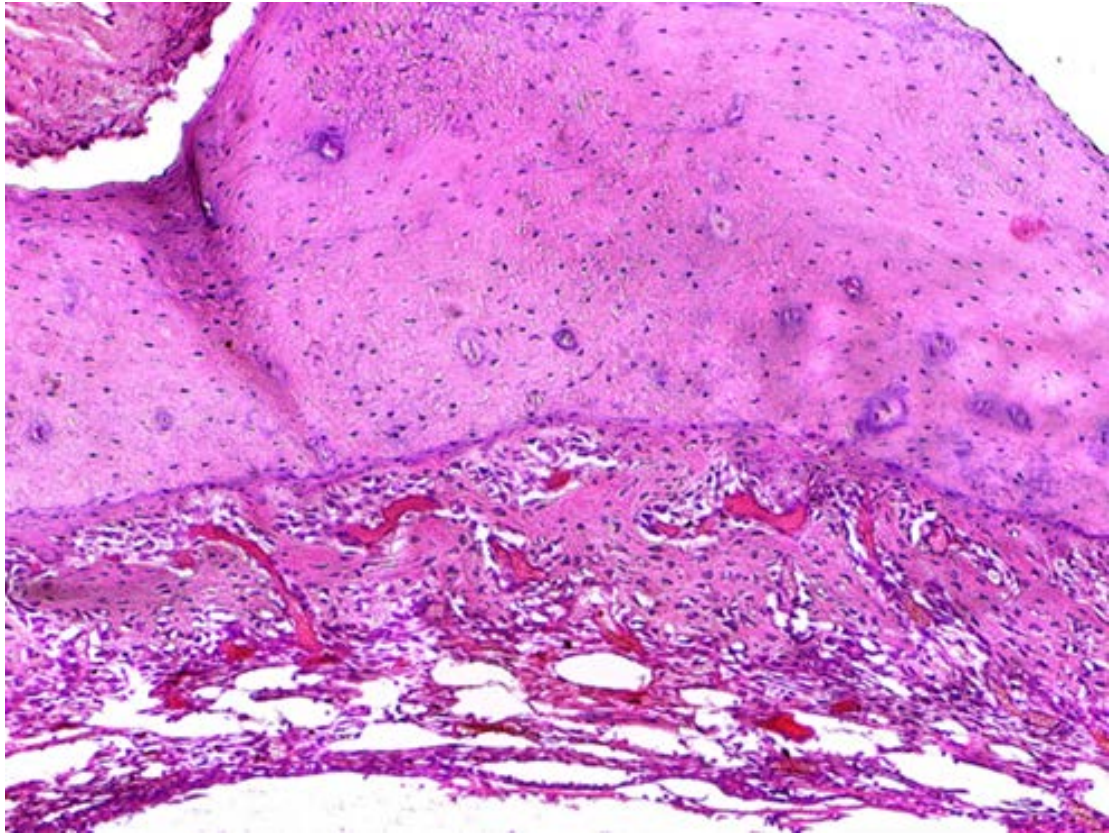


Fig. 5. Integrated fragments of the "Tutoplast" implant. 90 days of observation. Hematoxylin&Eosin staining. x100.

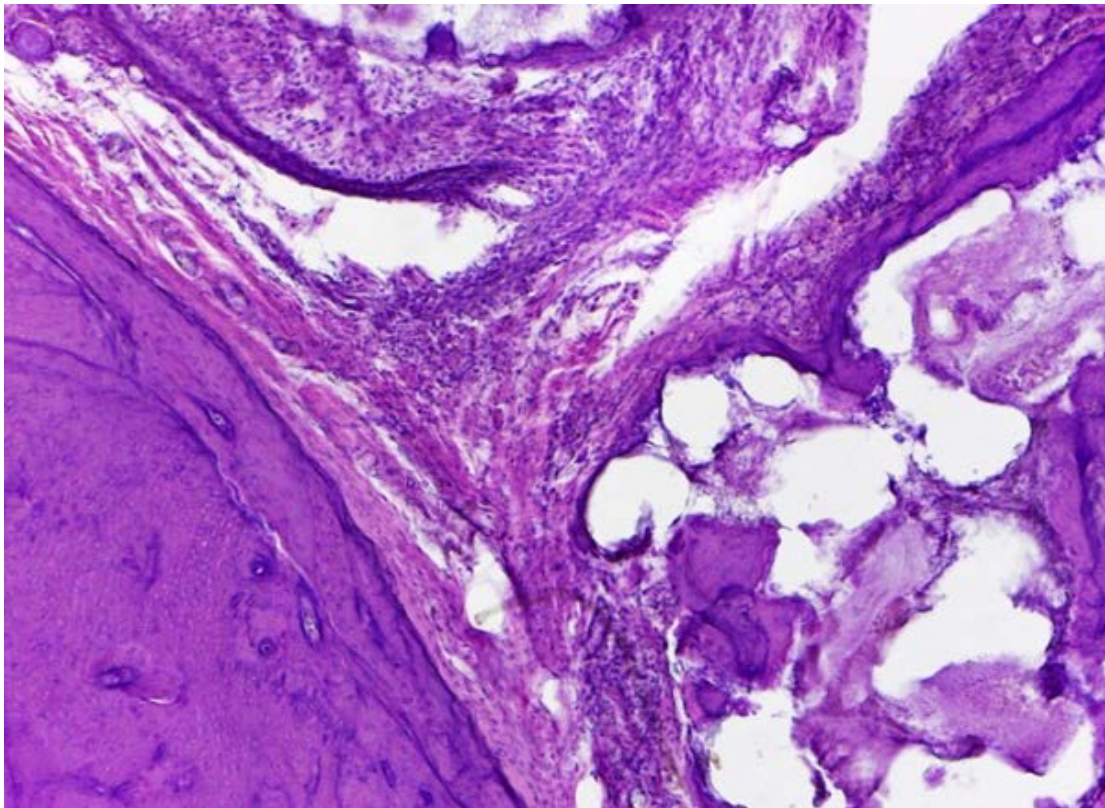


Fig. 6. Formation of connective tissue bundles and bone trabeculae in the bulla cavity. Notable destruction of the ceramic material "Syntekost". 330 days of observation. Hematoxylin&Eosin staining. x100.

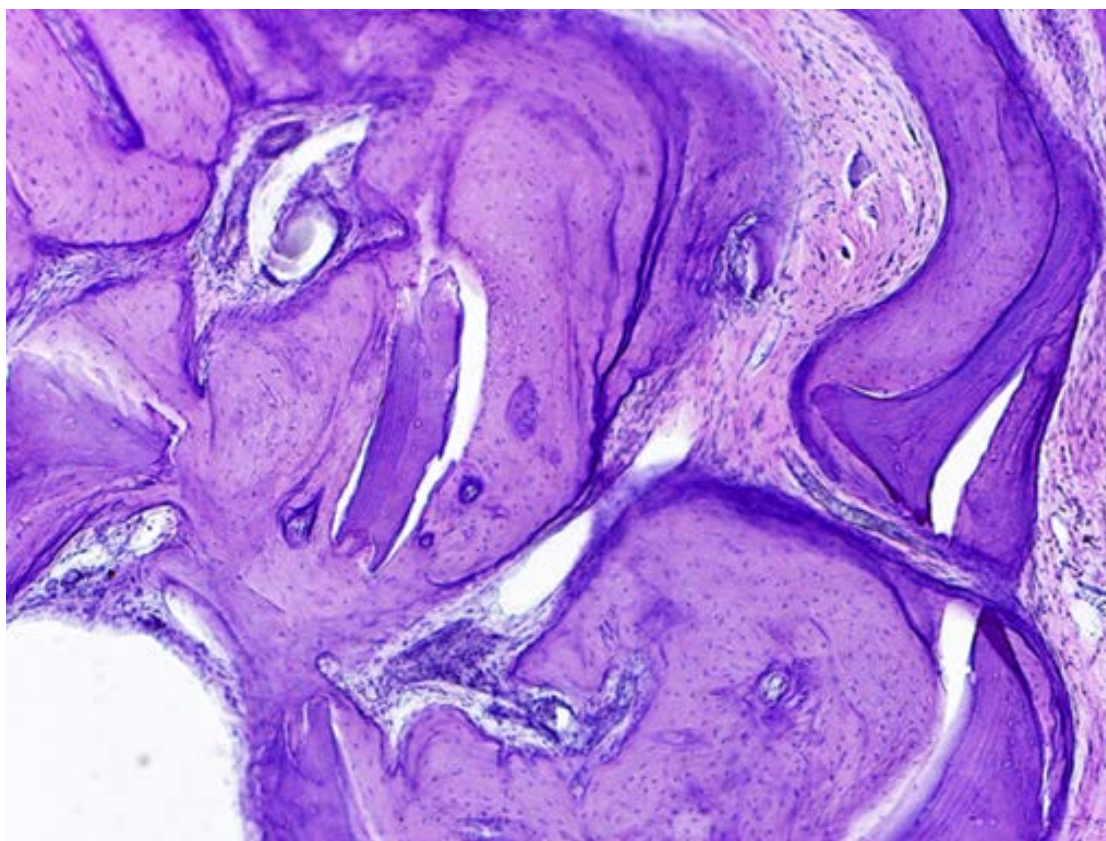


Fig. 7. Bone tissue growth in the area of implantation of the "Tutoplast" material. 120 days of observation. Hematoxylin&Eosin staining.  $\times 100$ .

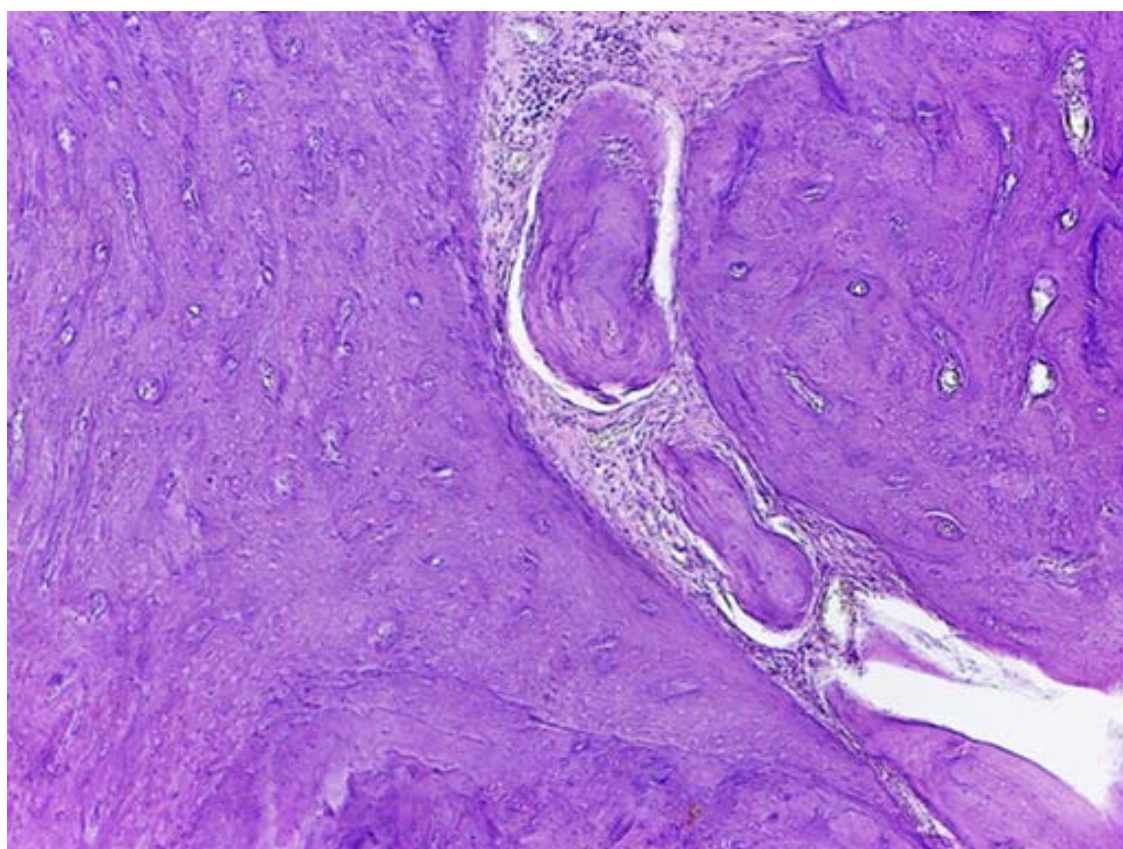


Fig. 8. Formation of large trabeculae in the peripheral implantation zone. 330 days of observation. Hematoxylin&Eosin staining.  $\times 100$ .

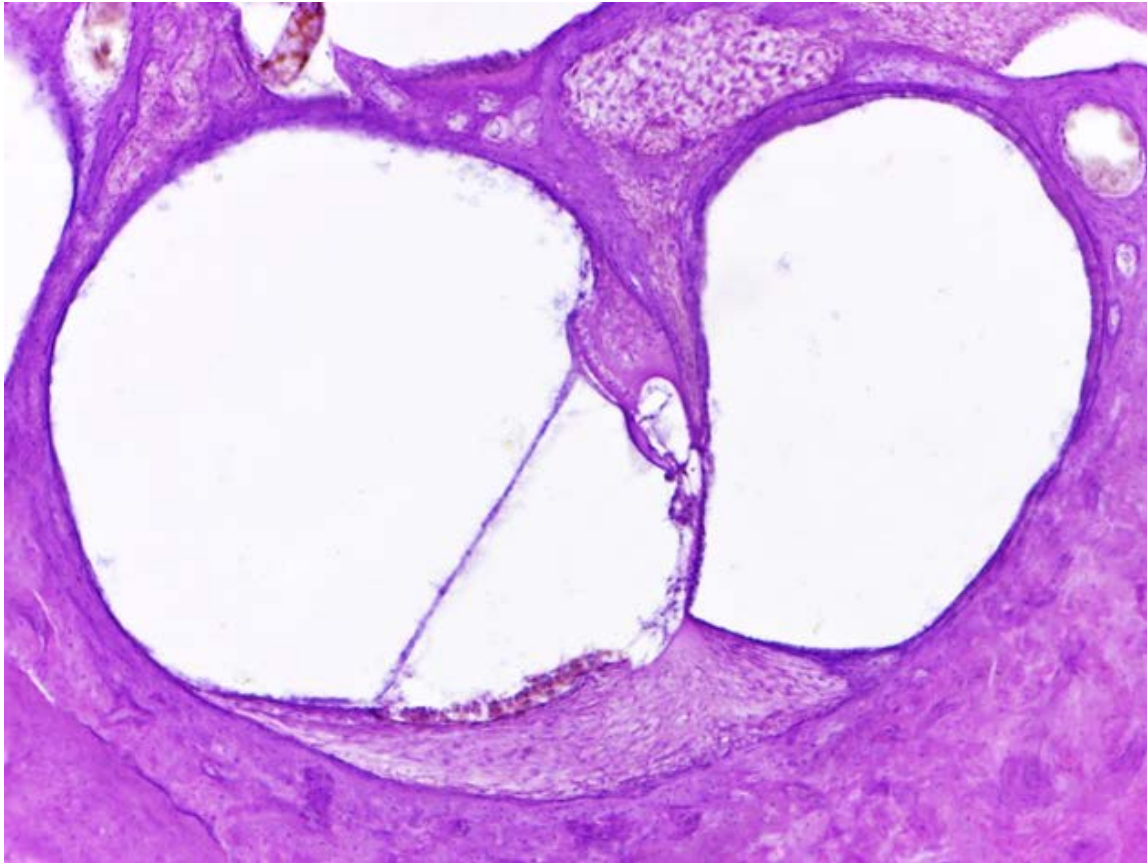


Fig. 9. Section through the cochlear canal with the spiral organ after the implantation of the “Syntekost” and “Tutoplast” mix. 120 days of observation. Hematoxylin&Eosin staining. x100.

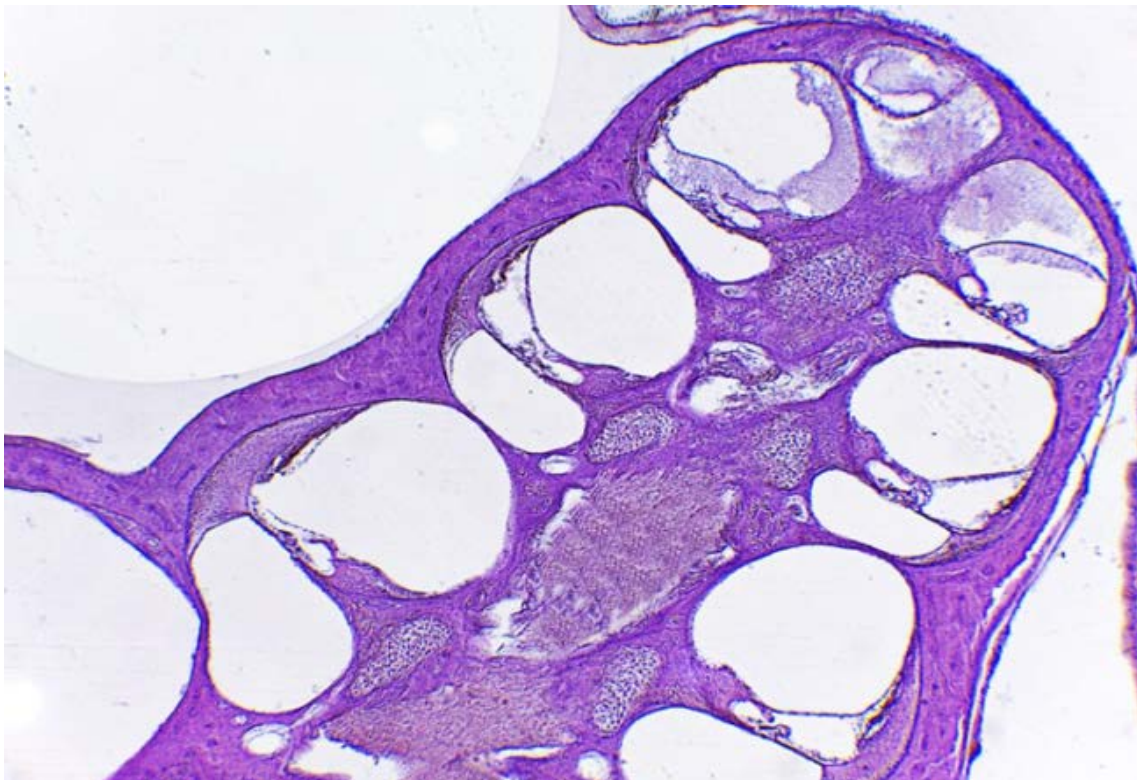


Fig. 10. Axial section through the cochlea of guinea pig after the implantation of “Tutoplast”. 120 days of observation. Hematoxylin&Eosin staining. x40.

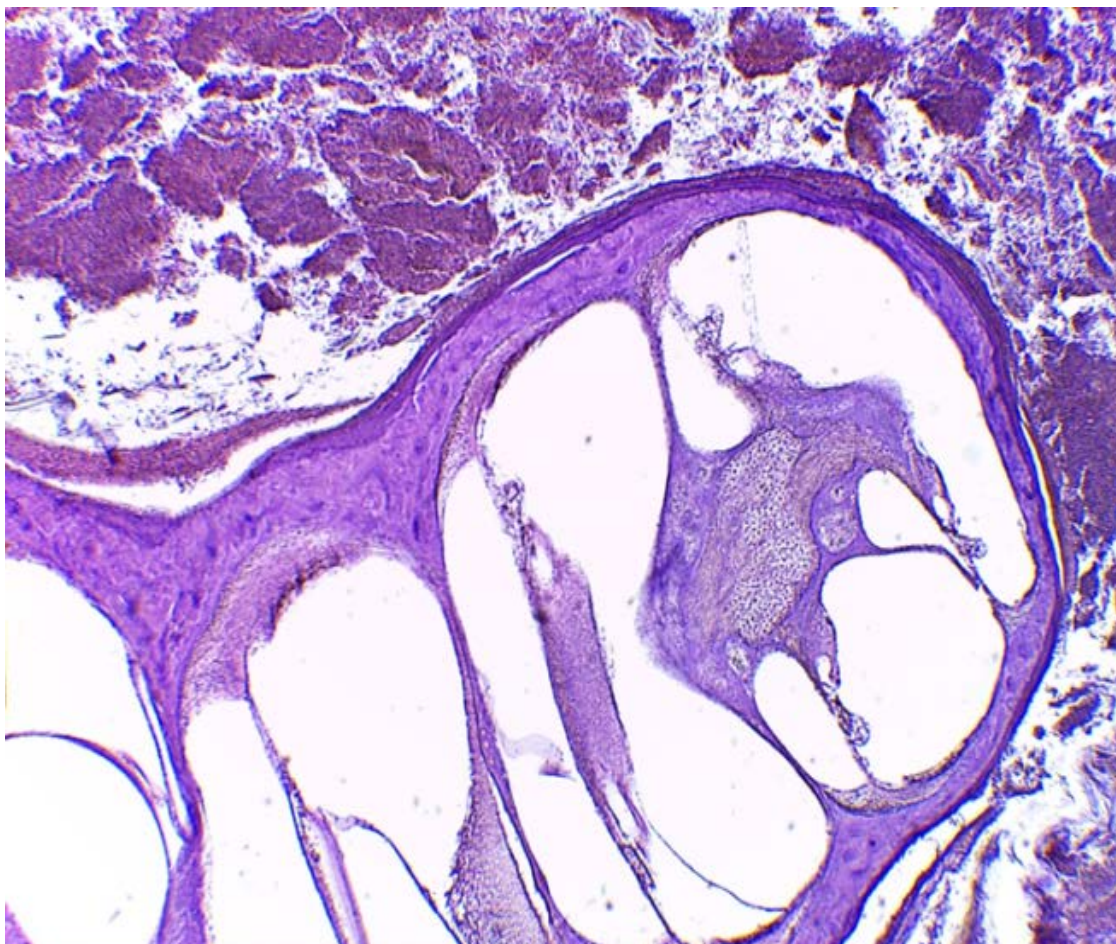


Fig. 11. Axial section through the cochlea of guinea pig after the implantation of "Syntekost". 30 days of observation. Masses of granular implant around the bony wall are seen. Hematoxylin&Eosin staining. x40.

### *References:*

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