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"Physics of Cancer:
Interdisciplinary Problems and Clinical Applications"

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to result

Institute of Strength Physics and Materials Science
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BONE ALLOGRAFTING IN CHILDREN

Sadovoy M.A. [1], Kirilova I.A. [1],
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A total of 522 patients with benign and intermediate bone tumors of various locations, aged 1 to 15 years, were operated in the period from 1996 to 2016.

To diagnose skeleton tumors, we used clinical observation, X-ray, and, if indicated, tomography and tumor site biopsy. In extensive bone resection, we performed bone reconstruction with replacement of a defect with an allograft (bone strips, deproteinized and spongy grafts), sometimes in a combination with bone autografting. After segmental resection, defects were filled with bone strips in the form of matchstick grafts; allografts were received from the Laboratory for Tissue Preparation and Preservation of the Novosibirsk Research Institute of Traumatology and Orthopedics. According to the X-ray data, complete reorganization of bone grafts occurred within 1.5 to 3 years. The long-term result was assessed as good.

STUDY OF THE DEFORMATION BEHAVIOR OF THE CERVICAL SPINE SEGMENT

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Oncology of the spine proves as an independent disease and in the form of metastases formations. The procedure for the removal of malignant neoplasms of the spine is associated with complete or partial resection of the spine segment, which requires replacement with an implant. The adequate development and individual selection of the implant plays a crucial role in the treatment of humans. Incorrect choice of materials and design of the implant may lead to a degradation of bone tissue and the whole functioning of the spine. Using the computer modeling methods creates the preconditions for better understanding of the laws of the human body functioning normally, in pathologies

and promotes to the development and selection of an appropriate prosthesis for a specific individual. The paper presents the model of the segment of the cervical spine (C3-C4) and the results of calculating its deformational behavior at a change in the height and elasticity modulus of the intervertebral disc.

STRUCTURE AND PROPERTIES OF ZTA CMPOSITES FOR JOINT REPLACEMENT

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Over the past decade the different approaches of the bone defects reconstruction using biological materials and artificial materials including ceramics, metals, polymers, composites have been developed. The gold standard for the creation of osteogenesis materials is autogenous cancellous bone. It has simultaneously all properties necessary for the formation of newly formed bone with osteoconductive, osteoinductive and osteogenic activity. The analysis of the current state of research of osteogenesis materials shows that the main attention of researchers is focused on materials related to the class of ceramics and ceramic composites. Ceramics are identical to the organic bone matrix by the type of chemical bond that put them in a priority position as materials for reconstruction of bone implants.

Despite some progress in the creation of new types osteogenesis materials, some fundamental problems remain unresolved. The main problem is the problem of osseointegration and functionally connected with it the problem of osteosynthesis. For the formation of structural and functional connection between living bone tissue and osteoplastica last, regardless of the structure of General biocompatibility must have: effective osteoconductivity; to provide a balanced activity of osteoblasts and osteoclasts, physico-chemical conditions of mineralization and the forming of volumetric anatomical structures of the bone; favorable biomechanical compatibility with bone tissue. To date, not achieved the optimal combination of these properties in modern osteogenesis materials. The presence of osteogenesis on the surface and inside the pores depends on numerous factors such as the volume of pore space, size, shape of pores, chemical composition, surface condition.

In this study, the results of studies of functional ceramic composites, shows the effects of the technological parameters on the structure and properties of the obtained composites.