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A REVIEWтOF BIODEGRADABLE MATERIALS USED FOR OSTEOSYNTHESIS

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In the structure of the overall morbidity, third place is occupied by injuries, 10% of which are fractures. Implants, which are used for the treatment of fractures, undergo static and dynamic stress during operation, as well as the influence of biocorrosion. In this regard, the materials for the implants must be biologically inert and must have sufficient mechanical characteristics.

Nowadays, various metallic (stainless steels, titanium and cobalt alloys, zirconium and tantalum) and nonmetallic materials (polymers, ceramics) are used for the manufacture of implants. However, recently special attention is paid to biodegradable materials, which have a number of advantages over insoluble materials. Implants made from such materials do not need to be removed after consolidation of the fracture, which leads to a reduction in the cost and time of treatment.

Among the most common biodegradable materials 2 groups can be identified: 1. Biodegradable polymers based on polyglycolic and polylactic acid, as well as composites based on them; 2. Magnesium alloys.

Polymer materials have good biocompatibility, but their application is complicated due to the low level of mechanical properties and high cost. The mechanical strength of magnesium alloys is much higher. At the same time, they are not inferior to polymers by biocompatibility characteristics. Moreover, magnesium is an element involved in the metabolism and its main stores are contained in bone tissue. These advantages make magnesium alloys promising for use as biodegradable materials. At the same time, their level of mechanical characteristics should correspond to the properties of the bone.

The structure and properties of bone material were studied. To this end, standard tensile test specimens were manufactured in accordance with GOST 1497-84. The tests were carried out with "INSTRUN" 2801 Tensile Test Machine.

In the process of testing, the following results were obtained: $\sigma_в$ = 78…116 MPa, E = 29…48 GPa, δ = 0,1…0,3%.

Comparative analysis of the characteristics of bone material, casting magnesium alloy and polymers showed that the physical and mechanical properties of the magnesium alloy are the closest to the properties of bone material, which makes magnesium alloys the most suitable for the manufacture of implants.

Table 1 – Average mechanical properties of biodegradable materials and bone material

Material	$\sigma_в$, MPa	E, GPa	δ, %
Cast magnesium alloys	230…260	45…48	2…6
Polymers	20…160	1…25	2…6
Bone tissue	78…116	29…48	0,1…0,3

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