PROSPECTS FOR THE APPLICATION OF BIODEGRADABLE MAGNESIUM ALLOYS IN MODERN REGENERATIVE MEDICINE

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Objective. To evaluate the clinical potential and biomechanical advantages of using bioresorbable magnesium alloys in modern surgery and osteosynthesis based on a systematic analysis of relevant scientific literature.

Material and Methods. An analytical review of publications and dissertations from international databases, including PubMed, Scopus, and eLibrary, was conducted. The physicochemical properties of magnesium were investigated in comparison with traditional bioinert metals (titanium, stainless steel). Additionally, the results of recent trials of magnesium systems for maxillofacial surgery and traumatology were analyzed.

Results. It was established that magnesium alloys possess a modulus of elasticity (45 GPa) that is remarkably close to the parameters of bone tissue, which effectively prevents the "stress shielding" effect. The biodegradation of magnesium occurs with the formation of a phosphate layer that actively stimulates osteoblast proliferation and accelerates osteogenesis. It was revealed that, unlike titanium constructs, magnesium implants completely dissolve in the body, eliminating the need for secondary surgeries for their removal. This method is of particular importance for pediatrics (as it does not impede bone growth) and oncostomatology (due to the absence of secondary radiation during radiotherapy).

Conclusions. Bioresorbable magnesium alloys represent a promising alternative to traditional metal constructs. Their implementation reduces the invasiveness of treatment by eliminating the hardware removal stage and enhances the quality of patient

rehabilitation. A key condition for clinical success is the development of alloys with a controlled resorption rate that is tightly synchronized with the pace of bone tissue regeneration.

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