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Joint effects of vitamin D and nanobiomaterial in the jaw bone regeneration

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Systems for targeted delivery of drugs with high affinity for specific organs, tissues, and cells were introduced at the beginning of the twentieth century. Recently, this concept is attracting much attention. These systems have shown most affective in reducing adverse effects of drugs. In recent years, scientists have created a system of nanoparticles for delivery of vitamin D. Special attention is paid to the role of vitamin D in the division and differentiation of osteoblasts and thus, in its role in osteogenesis. In this regard it was interesting to observe the local effects of the active form of vitamin D₃ in osteogenesis, as a part of the system for local delivery. These effects were observed on an experimental model. Three types of nanobiomaterial were implanted in the artificially made defects in rats' mandibular bone. Six weeks after implantation of hydroxyapatite, hydroxyapatite-coated vitamin D₃ and hydroxyapatite nanoparticles coated with vitamin D₃ mixed with the polymer, the animals were sacrificed, and the samples of mandibular alveolar bone were taken. The samples were adequately prepared and subjected to histopathological analysis. The best results in regeneration of osteoporotic jaw bone were obtained in the experimental group of animals where the implant was hydroxyapatite-coated vitamin D₃ mixed with the polymer. The results show that nanobiomaterials with local delivery of active form of vitamin D₃, used in this study, may be materials of the future in the area of weakened jaw bone tissue regeneration.