

Development of a laser technology for modifying the structure and properties of the jaw membrane surface using machine learning

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Abstract

The report is dedicated to research and development of the individual jaw membrane for dental osteoplasty. Such surgery is in great demand to restore the missing bone tissue of the jaw, especially in elderly patients. In this report, we present the results of software development using artificial neural networks for processing computed tomography images. The result of this software is a 3D model of the membrane. The need to develop this software is due to the fact that it will significantly reduce the human factor in the design of a personalized product and significantly increase productivity. In addition, we present the results of the development of a non-antibiotic method for the creation of bactericidal coating on the membrane surface. The method consists in laser modification of the physicochemical properties of the titanium alloy surface from which the membrane is made. Due to the formation of a semiconductor structure on the surface of the titanium alloy, it becomes possible to activate it with ultraviolet light. UV activation, in turn, leads to the formation of singlet oxygen on the surface, which has a detrimental effect on microorganisms.

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