

Study of the use of a surgical monofilament made of polydioxanone for 3D printing of absorbable orthopedic implants

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Abstract: Nowadays, additive manufacturing in the form of three-dimensional printing is an up-and-coming technology in regenerative medicine and tissue engineering. The growing popularity of this technology in the biomedical community is due to its versatility in terms of approach to processing, choice of materials and final design. Thanks to the possible control of structural and compositional features at the macro- and microscopic level and high reproducibility, three-dimensional printing is becoming a technological choice for producing biodegradable medical devices [1]. With the possibility of using a whole range of thermoplastic biodegradable polymers with various properties, the subject of current research is mainly the printing technology based on the deposition of extruded thermoplastic polymer - FDM / FFM. One of these thermoplastic polymers is polydioxanone, a biodegradable polyester with excellent mechanical properties, thanks to which it can be used as orthopaedic implants. Given the very limited availability of this polymer in a quality that enables its use in medicine, this work aims to use already commonly used polydioxanone surgical monofilament for additive production focused on the final stage of orthopaedic

plates. Within this work, tests of processability, mechanical-structural characterization, and biocompatibility of samples produced by the three-dimensional printing method were performed compared to the high-pressure injection molding method.

Keywords: 3D printing, Biodegradable polymers, Polydioxanone, Orthopedic implants

References:

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