škola: UNIVERZITA KARLOVA V PRAZE, Fakulta tělesné výchovy a sportu

disertační práce: **„Trends and forecasts in the technology of artificial disc replacement“**

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datum: prosinec 2023

Abstract:

The aim of the work was the study of current and new directions and trends in intervertebral disc replacement technology, a critical evaluation of current methods using implants for the treatment of degenerative disc disease, as well as a forecast of further development. The work also contains the related results of the collaboration on the optimization of the total "ball and socket" lumbar disc replacement within the project TA01010860 "Solving the problem of intervertebral disc replacement using modern knowledge, engineering methods and progressive technologies". In the part of the dissertation, focused on theoretical starting points, the attention is paid first to the intervertebral disc itself and its various aspects, from anatomy, through biomechanics and degenerative diseases, to the issue of implants for its partial or even total replacement. Subsequently, current trends and progressive methods of treatment are processed. The results section begins with a description of the methods used and then presents the results themselves, both from literature research and experimental work. Within their framework, an experimental disc replacement with improved kinematics was designed, optimized (the shape of the articulation surfaces, optimized using mathematical simulations), manufactured, and then tested (mechanical tests, kinematics tests) and evaluated. The information obtained then enabled the creation of a qualified assignment for the design of a spinal implant in company ProSpon s. r. o., which would effectively serve as a functional replacement of the intervertebral disc within the limits of the current state of technology and knowledge.

Keywords

degeneration disease, intervertebral disc, total disc replacement, spinal fusion, implants