**COMPUTER-AIDED ANALYSIS OF THE CONTACT AND MOTION FOR THE LUMBAR ARTIFICIAL DISCS**

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OBJECTIVE: The back-out and subsidence of the intervertebral device(s) and junctional problem at the parafixed levels were the common complications of spinal fusion. As an alternative, the artificial disc is an innovative technique and the related research is quite active. MATERIALS AND METHODS: The current study was aimed to evaluate the difference in motion pattern of three artificial discs: FreeDisc, ProDisc, and SB Charite. The L4-L5 motion unit was three-dimensionally reconstructed from the CT-scanning images by the SolidWorks and Amira software. One intact and three instrumented motion units were simulated by the COSMOSMotion software. The motion locus of vertebral body and contact of the facet joints were chosen as the comparison index in the flexion/extension, lateral bending, and axial rotation. RESULTS AND DISCUSSION: During flexion/extension and lateral bending, the motion patterns of vertebral body and facet joint were sensitive to the prosthesis design and quite different between the instrumented and intact discs. The prosthesis design has the minor influence on axial rotation of the instrumented motion unit. Comparatively, the FreeDisc shows the similar motion locus of intervertebral flexion/extension with the normal disc. However, the SB Charite behaves more pathologically alike in lateral bending. For the FreeDisc model, the interference of the facet surfaces was the most sever among the prostheses. The modified FreeDisc demonstrated the optimal kinematic behaviour and vanishment of facet interference in comparison with the others. The current model provides a new method to evaluate the kinetic and load-transferring behaviour of the artificial disc.