

Special Issue

Advances in Spinal Biomechanics: Integrating In Vivo, In Vitro, and Computational Approaches in the Era of Evolving Spine Technologies

Message from the Guest Editor

As spinal disorders and surgical interventions become increasingly complex, biomechanical insights are essential to optimize treatment strategies and implant designs. This Special Issue therefore aims to present innovative research on artificial disc replacement, long spinal fusion constructs, regional fixation methods, and the biomechanical relevance of sagittal alignment. We welcome original contributions that explore spine biomechanics through finite element modeling, mechanical testing, or clinical evaluation, as well as studies that address the biomechanical performance of surgical techniques and materials in spinal fixation. The scope of this Special Issue includes novel device development, implant validation, the influence of aging, degeneration, and trauma on spinal stability, and the design of innovative research methodologies. It will also serve as a platform for interdisciplinary collaboration among spine surgeons, biomedical engineers, and researchers, with the ultimate goal of enhancing clinical outcomes through biomechanical research.

Guest Editor

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