

Advancing with technology for a new era in spine care

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Spine-related diseases have become one of the leading causes of pain and disability worldwide. The global burden of spinal diseases is on the rise, reflecting a significant public health challenge. Current epidemiological data suggest that approximately 540 million individuals worldwide are affected by various spinal disorders, including back pain, which is one of the leading causes of disability globally. Among these conditions, lumbar disc disorders account for over 200 million cases, while cervical spondylosis affects around 60 million people.^[1] In addition, spinal stenosis and osteoarthritis of the spine contribute significantly to the overall burden, impacting millions.^[2] According to the Global Burden of Disease Study 2021, musculoskeletal disorders, including spinal diseases, are responsible for more than 20 million years lived with disability annually.^[1] According to a 5-year cohort study based on the Chinese urban population, the incidence of clinically diagnosed spinal fractures in the Chinese population aged 50 years and older increased by 1.79 times between 2013 and 2017.^[3] Projections indicate an alarming trend, with the incidence of spinal disorders expected to increase significantly due to an aging population and rising rates of obesity and physical inactivity.^[4] With the accelerating aging of the population, the incidence of these diseases is expected to rise further, imposing significant health and economic burdens on individuals and society. Therefore, it is crucial to enhance attention to spine health, by promoting early diagnosis, precision treatment, and effective rehabilitation plans to alleviate patients' suffering and reduce socioeconomic pressure. Meanwhile, researchers and



healthcare professionals should intensify efforts to study spinal diseases and explore more innovative and sustainable solutions to tackle this increasingly serious health challenge.

As the founding Editor-in-Chief of *Spine Research*, a newly established academic journal dedicated to advancing the field of spine science, I am honored to share our vision and commitment to the academic community. This inaugural issue is made possible through the collaborative efforts of Peking University Third Hospital, a leading institution with significant contributions to spine research, particularly in the domains of spinal surgery and rehabilitation, and Higher Education Press, one of China's foremost academic publishers.

Recent advancements in spine science have revolutionized the diagnosis, treatment, and rehabilitation of spinal disorders. Artificial intelligence and big data are transforming spinal disease diagnosis, particularly through automated imaging analysis for identifying degenerative

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diseases and tumors. Artificial intelligence is also driving the development of innovative biomaterials for spinal implants, enhancing their mechanical properties. Robotic surgery has made significant progress, with the first autonomous spinal lamina identification surgery demonstrating increased precision. The development of spinal endoscopic robots is expected to enhance minimally invasive surgeries and improve recovery outcomes. 3D printing is also reshaping orthopedics by enabling the design of personalized, biomechanically optimized implants and bone substitutes tailored to patients' unique anatomical needs. In addition, intelligent medical rehabilitation technologies, including neurostimulation, are showing promise in improving recovery for spinal cord injuries and stroke patients.

With a surge in high quality, impactful research output from China, *Spine Research* seeks to contribute to this momentum by showcasing the latest findings and breakthroughs in spinal medicine from both Chinese and international researchers. As the field evolves, our mission is to establish an open platform for global collaboration, where researchers, clinicians, and innovators can share their work and collectively drive the field forward.

Spine Research aims to publish pioneering studies, clinical reports, and insights into spinal physiology, pathology, surgery, and rehabilitation. Our journal provides a venue for original research articles, reviews, clinical investigations, and technological advancements in spine-related fields. In addition to traditional approaches, we are particularly excited about the transformative potential of interdisciplinary collaboration. As the field advances, *Spine Research* will emphasize innovative studies that bridge spine science with emerging research areas and techniques, accelerating the development of next-generation solutions to revolutionize clinical practices worldwide.

We look forward to *Spine Research* becoming a valuable and indispensable resource for researchers, clinicians, and educators in the spine field. Through collective efforts and global partnerships, we believe this journal will play a pivotal role in advancing spine science and improving patient outcomes around the world. We are committed to supporting the next wave of research and innovation, contributing to the progress of spinal health and medical practices globally.

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