

Technology-driven breakthroughs in bone oncology

Redefining spinal metastasis care

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As the global population ages at an unprecedented rate—with the proportion of individuals aged ≥ 65 projected to double by 2050—bone-related malignancies, particularly spinal metastases, have emerged as a critical public health crisis with cascading socioeconomic consequences. Epidemiological data from the International Agency for Research on Cancer reveal that metastatic spinal tumors affect about 30% to 70% of cancer patients with breast (16.5%), lung (15.6%), and prostate (9.2%) cancers, which are the primary origins.^[1] In China, a country undergoing rapid demographic transition, the incidence of spinal metastases has surged by 2.3-fold in the past decade, driven by a dual trend of aging (median age at diagnosis: 58.6 years) and improved cancer survival rates (5-year survival: 43.7% vs. 40.5% in 2015).^[2] The clinical burden of these lesions is staggering: 23% to 35% of patients report severe pain, while 55.69% develop motor weakness and 19% progress to paraplegia due to bone destruction, epidural spinal cord compression, and pathological fractures.^[2–4] These complications impose substantial economic strain, with global annual healthcare expenditures exceeding \$15 billion—a figure projected to double by 2035.^[5] Critically, current treatment paradigms remain fragmented: surgical stabilization reduces fracture risk but fails to address micrometastases and recurrence; radiotherapy is limited by spinal cord tolerance; and systemic therapies exhibit poor bone penetration. Consequently, patients with advanced

spinal metastases face a median overall survival of just 12 to 20 months,^[6,7] highlighting an urgent need for multidisciplinary innovation that integrates oncology, orthopedics, and palliative care. This journal, *Bone and Bone Related Cancer Research* (BBRCR), is committed to addressing this unmet need by fostering global collaboration, disseminating high-impact evidence, and advocating for policy reforms to prioritize bone metastasis research.

As founding Editor-in-Chief of this new international journal, copublished by Zhongshan Hospital, Fudan University (a leading institution in spinal tumor research, as the Chinese National Medical Center, with spinal tumor being the National Key Clinical Specialty and Fudan University Spinal Tumor Institute) and Higher Education Press (distributing to 198 countries), I am honored to advance multidisciplinary bone malignancy research worldwide. Our team's work spans the full innovation spectrum from developing smart nanomaterials for targeted drug delivery and biodegradable 3D scaffolds for bone regeneration, to pioneering minimally invasive surgical techniques and AI-powered prognostic tools. By connecting global researchers through Higher Education Press's multilingual publishing network, we aim to create an open collaboration ecosystem that accelerates the translation of breakthroughs—from any corner of the world—into improved clinical outcomes for bone tumor patients globally.

The past 5 years have witnessed transformative breakthroughs in bone tumor and spinal tumor management. AI-powered radiomics now enable noninvasive differentiation of benign from malignant vertebral lesions with high accuracy, reducing unnecessary biopsies.^[8] Intraoperative navigation systems integrating magnetic resonance imaging-computed tomography fusion have improved en bloc resection rates for spinal chondrosarcoma. Meanwhile, CAR-T cell therapies targeting GD2 antigens show promise in treating refractory neuroblastoma metastases.^[9] For primary bone tumors, zoledronic acid inhibits 40% to 80% of osteosarcoma cell growth.^[10] However, these advances also reveal new challenges: How can we optimize immunotherapy for immunocompromised patients? What role does the spinal microenvironment play in treatment resistance? BBRCR will prioritize studies addressing these questions, bridging the gap between technological potential and clinical reality.

China has emerged as a global leader in bone and spinal oncology research, driving groundbreaking innovations

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Bone and Bone Related Cancer Research (2026) 1:1;1–2

Received: 17 September 2025 / Received in final form: 17 September 2025 / Accepted: 24 September 2025

<http://dx.doi.org/10.1097/bc9.0000000000000001>

in clinical diagnostics, minimally invasive therapies, and precision medicine for metastatic spine disease. *BBRCR* is committed to spotlighting these transformative advancements while fostering an open international network that unites researchers, clinicians, and innovators across borders. By bridging cutting-edge discoveries with global clinical practice, our mission is to accelerate collaborative progress toward eradicating bone-related malignancies worldwide.

BBRCR will publish original research, reviews, and case reports spanning the entire spectrum of skeletal disorders, covering not just primary bone tumors and metastases, but also trauma, degenerative diseases, congenital diseases, inflammatory diseases, and metabolic diseases. We especially welcome submissions on:

- Molecular mechanisms of bone primary tumor and metastasis
- Surgical innovations for spinal tumor resection
- Molecular mechanisms and target therapy of degenerative diseases
- Surgical and biological engineering repair of the musculoskeletal system
- Radiomics and AI in diagnosis and prognosis

A key priority will be promoting interdisciplinary work, such as collaborations between oncologists, bioengineers, and palliative care specialists. Our editorial board, comprising international experts, ensures rigorous peer review while maintaining an inclusive, constructive review process.

The launch of this journal marks a pivotal moment in our fight against bone cancers and related skeletal diseases. By uniting clinicians, scientists, and innovators worldwide, we aim to accelerate the development of curative therapies while improving palliative care for patients with advanced disease. We invite you to join this mission—submit your research, challenge paradigms, and help us transform skeletal diseases. Together, we can turn the “backbone of research” into the backbone of hope for millions of patients globally.

Acknowledgments

Not applicable.

Ethical statement

Not applicable.

Conflicts of interest

The authors have no conflicts of interest to disclose.

Funding source

This work was supported by National Natural Science Foundation of China (Nos. 81972508, 82172738, 82272457, 82472396).

Data availability statement

No data were generated or analyzed in this article.

Author contributions

Jian Dong and Libo Jiang participated in the writing and revision of the paper.

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