Cancer Biol Med 2026. doi: 10.20892/j.issn.2095-3941.2026.0018

EDITORIAL

Artificial intelligence empowering precision diagnosis and treatment of breast cancer: advancing global clinical practice with regional insights

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Professor Zefei Jiang is a distinguished expert in breast oncology at the Chinese PLA General Hospital. He is dedicated to the clinical and translational research of breast cancer precision diagnosis and treatment with a focus on integrating artificial intelligence, precision medicine, and clinical research to optimize breast cancer care strategies. His research interests cover the development of individualized treatment regimens for breast cancer, the clinical application of targeted therapy and immunotherapy, and exploration of artificial intelligence (AI)-driven medical technologies in oncology. Professor Jiang has led numerous national and international clinical research projects that have been published in a large number of high-impact academic papers and made important contributions to the advancement of breast cancer diagnosis and treatment in China and the global arena. He is committed to promoting the integration of global advanced standards and regional clinical practices, and accelerating the translation of innovative medical technologies into clinical benefits for breast cancer patients.

Breast cancer stands as the most prevalent malignancy among women worldwide and a leading cause of cancer-related mortality, posing a persistent challenge to global public health[1]. In recent decades, the landscape of breast cancer care has been profoundly reshaped by the rapid development of precision medicine, targeted therapy, immunotherapy, and clinical translational research. Notably, AI has emerged as a transformative force, bridging the gap between big medical data and clinical decision-making, and opening new frontiers for early detection, accurate diagnosis, personalized treatment, and prognostic assessment of breast cancer[2]. Despite these remarkable advances, disparities in healthcare resources, regional differences in disease characteristics, and the need for more efficient translation of technological innovations into clinical practice remain key hurdles to achieving equitable and high-quality breast cancer care across the globe. Against this backdrop, *Cancer Biology & Medicine* is proud to present this special issue, which is dedicated to exploring the cutting-edge applications of AI in breast cancer and integrating global advanced standards with regional clinical nuances to advance precision diagnosis and treatment for breast cancer patients worldwide.

This special issue brings together outstanding contributions from renowned domestic and international experts in breast oncology, clinical research, data science, and AI technology *via* Editorials, Perspectives, Critical Reviews, and Original Research Articles that collectively depict the latest progress and future directions of AI-empowered breast cancer care. The content of this issue is closely integrated with clinical practice with a focus on the theoretical exploration of technological innovation and the translational application of research findings, aiming to provide valuable insights for clinicians, researchers, and medical innovators engaged in breast cancer-related work.

The current issue opens with three insightful Editorials that lay a foundational framework for the integration of global standards and regional practice in breast cancer care. The first Editorial, authored by Professor Michael Gnant, delves into "Balancing Global Standards and Regional Nuances in Breast Cancer Care: The Role of Guidelines, Clinical Research, Precision Medicine, and Artificial Intelligence in Advancing Quality Care for Patients Worldwide." This work comprehensively elaborates the pivotal role of clinical practice guidelines, evidence-based clinical research, precision medicine, and AI in elevating global breast cancer care quality, while emphasizing the importance of adapting global consensus to regional healthcare contexts, disease spectra, and resource availability.

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Received March 25, 2026; accepted March 26, 2026.
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The Editorial written by Professor Yongmei Yin explores precision immunotherapy for breast cancer by systematically sorting out the development of breast cancer immunotherapy, clarifying the value of biomarker detection in patient stratification and efficacy prediction, and providing practical guidance for the translation of immunotherapy research advances into clinical practice. The third Editorial, written by Professor Shusen Wang, focuses on advances in TROP2-targeted antibody-drug conjugates for breast cancer therapy, highlighting the latest clinical advances and translational potential of TROP2-targeted antibody-drug conjugates, a key area of targeted therapy for breast cancer, and providing forward-looking perspectives for clinical application and further development.

A thought-provoking Perspective written by Professor Yingjian He follows, entitled "Protocol and statistical Designs in Classic Clinical Research—Toripalimab Series Trials Analysis." Taking the toripalimab series clinical trials as a typical case, this in-depth work analyzes the key design principles and statistical methods of clinical research in breast cancer and other malignancies, providing important reference for improving the scientific and translational value of clinical trial design, which is the cornerstone of advancing breast cancer research and clinical practice.

Two comprehensive Reviews then synthesize the latest progress of AI and related technologies in breast cancer research and clinical application. Professor Kun Wang systematically reviews the application of radiomics, a core AI-driven technology, in evaluating and predicting the response of breast cancer patients to neoadjuvant therapy, elaborating on the technical principles, research progress, and clinical challenges, and pointing out the direction for optimizing individualized neoadjuvant therapy regimens. The Review written by Dr. Jianbin Li offers a panoramic overview of the multi-dimensional applications of AI in breast cancer, including early screening, pathologic diagnosis, treatment decision-making, and prognostic assessment, summarizes the technological advances and clinical value of AI in this field, and discusses the existing bottlenecks and future development trends of AI translation into clinical practice.

The special issue is further enriched by four high-quality Original Articles that report cutting-edge translational research findings, showcasing the innovative application of AI and multi-omics technology in breast cancer precision diagnosis and treatment. Professor Yueping Liu's team presents a multicenter study on prediction of *PIK3CA* mutations in breast cancer based on digital pathology, which constructs a multimodal AI model integrating digital pathologic images and clinical data, realizing accurate prediction of *PIK3CA* gene mutations in breast cancer and providing a non-invasive, efficient auxiliary diagnostic tool for guiding targeted therapy. The research focus of Professor Shu Wang involves virtual histology imaging of lymph nodes to differentiate metastasis based on dynamic full-field optical coherence tomography and deep learning, developing a deep learning-based virtual histology imaging technology for lymph nodes, which achieves accurate identification of breast cancer lymph node metastasis and provides a novel non-invasive detection method for clinical staging. Professor Shicheng Su explores metabolic engineering of SLC38A2 and reprograms glutamine utilization to enhance CAR-macrophage anti-tumor function in solid tumors, revealing the regulatory mechanism of SLC38A2 on glutamine metabolism of CAR-macrophages and providing a new metabolic engineering strategy to enhance the anti-tumor efficacy of CAR-macrophages for breast cancer and other solid tumors. Finally, Professor Zhimin Shao and Professor Yizhou Jiang's team conducts an integrative multi-omic analysis in triple-negative breast cancer, identifying *ERBB2* mutations and senescence-driven immune suppression as dual therapeutic targets for luminal androgen receptor (LAR)-type triple-negative breast cancer, and providing new molecular targets and therapeutic ideas for this difficult-to-treat subtype of breast cancer. Collectively, these interrelated and complementary contributions in this special issue highlight the core value of AI in empowering breast cancer precision diagnosis and treatment, and emphasize the importance of integrating global advanced research advances with regional clinical practice characteristics.

We believe that the evidence, insights, and technological advances presented in this issue will not only reflect the latest research frontier of AI in breast cancer but also provide practical clinical guidance and research inspiration for global oncology workers. More importantly, we hope this special issue can promote deeper interdisciplinary collaboration between oncology, data science, AI technology, and clinical research, and accelerate the translation of innovative technologies into equitable and high-quality breast cancer care, ultimately bringing more clinical benefits to patients worldwide.

We extend our sincere gratitude to all the authors for their rigorous and innovative research contributions to this special issue and to the reviewers for their professional and thoughtful comments that have greatly improved the quality of the articles. We also express our heartfelt thanks to the editorial board and editorial team of *Cancer Biology & Medicine* for their strong support and meticulous work in the organization and publication of this special issue.

Conflict of interest statement

No potential conflicts of interest are disclosed.

References

1. Allemani C, Minicozzi P, Morawski B, et al. Global variation in patterns of care and time to initial treatment for breast, cervical, and ovarian cancer from 2015 to 2018 (VENUSCANCER): a secondary analysis of individual records for 275 792 women from 103 population-based cancer registries in 39 countries and territories. Lancet 2025; 406: 2325-48.
2. Ingman WV, Britt KL, Stone J, et al. Artificial intelligence improves mammography-based breast cancer risk prediction. Trends Cancer 2025; 11: 188-91.

Cite this article as: Jiang Z. Artificial intelligence empowering precision diagnosis and treatment of breast cancer: advancing global clinical practice with regional insights. Cancer Biol Med. 2026; 23: 311-313. doi: 10.20892/j.issn.2095-3941.2026.0018