Editorial

CARDIAC RESEARCH

OPEN

Strategic transformation and future prospects of cardiovascular medicine

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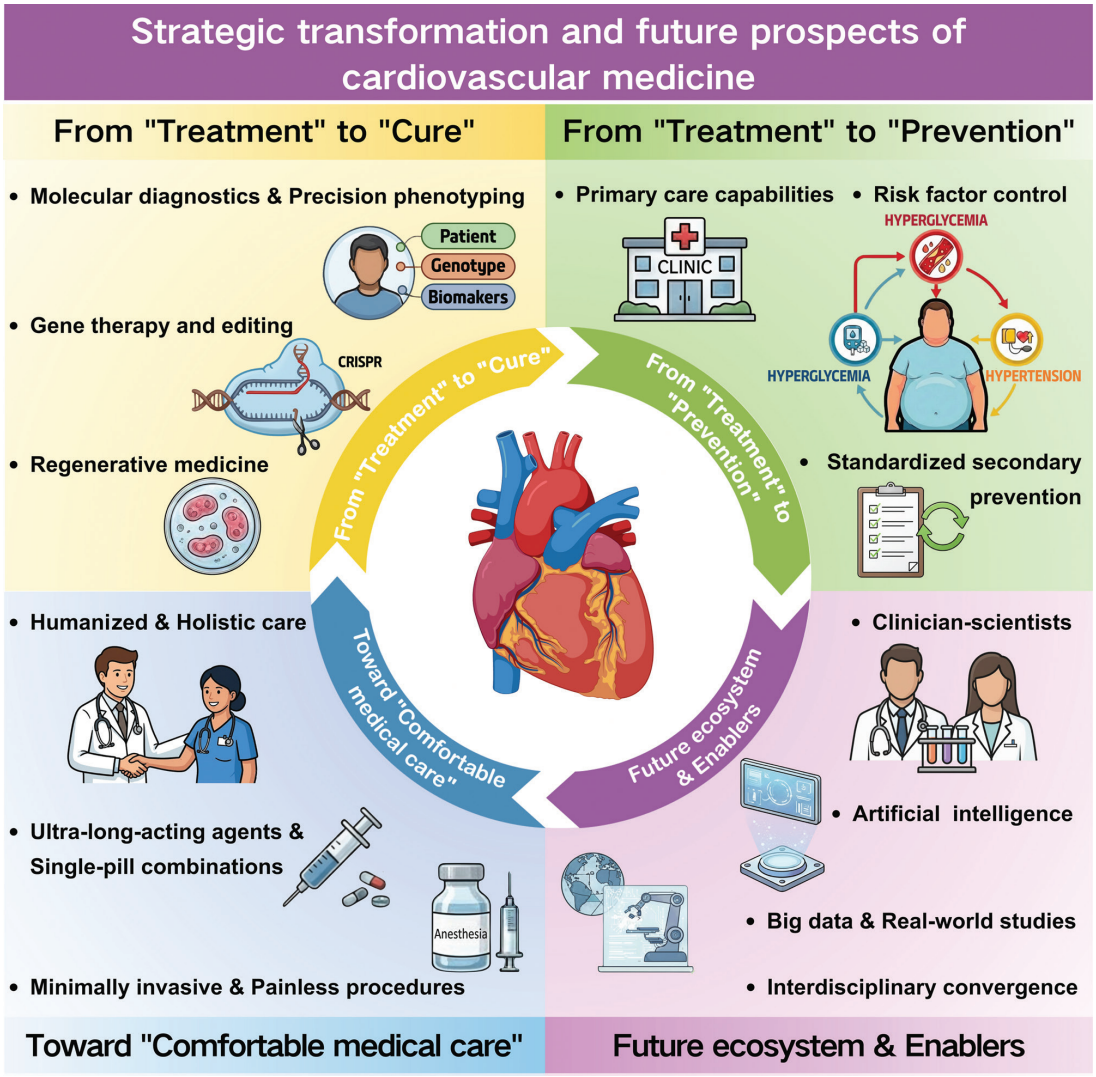
Graphical abstract



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Cardiac Research (2026) 2:1

Received: 11 February 2026 / Accepted: 13 February 2026

http://dx.doi.org/10.1097/re9.0000000000000011

Cardiovascular disease (CVD) remains the leading cause of death worldwide. Despite significant progress in interventional and minimally invasive therapies, the burden remains severe, causing 19.2 million deaths in 2023—nearly one-third of the global total.[1] This paradox of "high technological investment" coexisting with "high disease burden" underscores the limitations of relying solely on late-stage clinical interventions. In an era of aging populations, prevalent metabolic risks, and rapid advances in digital and biotechnology, the cardiovascular discipline stands at a historic turning point of systemic transformation. To address the growing disease burden and complex clinical needs, the field is undergoing 3 major strategic shifts: moving from "treatment" to "cure," from "treatment" to "prevention," and evolving toward "comfortable medical care." These shifts involve not only updates in clinical technology but also a systemic revolution in prevention strategies, treatment goals, service models, and research paradigms.

1. Transition from "treatment" to "cure"

Traditionally, most CVDs, including hypertension and heart failure, were viewed as chronic conditions requiring lifelong management. However, breakthroughs in molecular diagnostics, gene therapy, precision medicine, and regenerative medicine have made "functional cures" and even "biological cures" possible.[2] For instance, gene therapy offers a direction for curing monogenic CVDs. Furthermore, through precise disease phenotyping, diseases traditionally viewed as "homogeneous" can be further stratified into subtypes with distinct molecular bases, such as proprotein convertase subtilisin/kexin type 9-related familial hypercholesterolemia or transthyretin-related amyloidosis, directly guiding targeted interventions.[3] Interventional techniques, such as catheter ablation and renal denervation, allow for long-term control of certain arrhythmias and hypertension. Tissue engineering and regeneration are making progress in reconstructing vascular structures and repairing myocardium. For example, the newly Food and Drug Administration-approved bioengineered vessel, Symvess, has overcome these limits through successful re-endothelialization, achieving 30-day patency rates exceeding 90%.[4] Xenotransplantation and artificial hearts bring hope for curing end-stage heart failure. This transformation pushes clinical goals from "controlling the condition" to "eliminating the cause," redefining the therapeutic boundaries of CVD.[5]

2. Transition from "treatment" to "prevention"

Nearly 80% of the CVD burden is preventable. Alleviating this burden fundamentally depends on effective prevention strategies. Primary prevention can reduce cardiovascular mortality by 40% to 70% and offers significant health economic benefits;[6] as the World Health Organization (WHO) notes, every $1 invested in cardiovascular prevention saves approximately $8.5 in treatment-related costs. Future prevention systems must cover the entire life cycle. Specifically, drawing on international models like Canada's Hypertension Education Program and the World Health Organization "HEARTS" package,[7] we should adopt a comprehensive, multidisciplinary model supported by government policy and implemented at the grassroots level. By popularizing health education and strengthening early risk factor identification, we can gradually reduce the disease burden. It is particularly crucial to focus on children and adolescents to curb the trend of obesity and diabetes from a young age, as high body mass index and high fasting plasma glucose are the fastest-growing risk factors for CVD. We must strengthen the healthcare system, specifically improving capabilities at the primary care level, including medication accessibility and a robust medical workforce. Finally, we must standardize secondary prevention, normalize medication use, and promote the use of polypills and long-acting medications. Only by shifting resources and focus upstream can we curb the epidemic of CVD at its source.

3. Evolution toward "comfortable medical care"

As the medical model shifts to a biopsychosocial approach, cardiovascular medicine is increasingly focusing on patient experience and quality of life through the evolution of "comfortable care." A critical component of this shift is the development of convenient and long-acting treatments, as complex medication regimens are a major factor reducing adherence in chronic disease patients. Ultra-long-acting agents, such as small interfering RNA (siRNA) drugs and single-pill combinations, represent core directions for future development.[8] Simultaneously, clinical procedures are becoming increasingly minimally invasive and painless; catheter-based interventions are replacing traditional surgeries in some areas, while the widespread use of comfortable anesthesia in invasive examinations significantly reduces trauma, pain, and recovery time. These humanized service processes promote a move toward patient-centered, holistic care that seeks to restore physical, mental, and social functions concurrently.

4. Other future development directions

The future of the discipline demands a forward-looking ecosystem. First, as data serves as the cornerstone of the intelligent medicine era, we must establish cross-institutional and cross-regional big data platforms to drive real-world studies and evidence-based decision-making. Simultaneously, high-quality clinical research must continue to ensure that practice remains scientific and advanced. Second, the long-term vitality of the discipline depends on workforce optimization. Medical education must evolve to train clinician-scientists capable of bridging clinical practice and research. Innovations in training models are essential, such as strengthening interdisciplinary cultivation across

medicine, bioinformatics, engineering, and materials science, and fostering these dual-skilled scholars through pathways like joint mentorship programs. Moreover, future breakthroughs hinge on interdisciplinary convergence. Artificial Intelligence holds vast potential in image analysis, risk prediction, assisted diagnosis, and target screening, enhancing both efficiency and the standardization of care. However, realizing its clinical value strictly depends on high-quality data, seamless integration into clinical scenarios, and rigorous regulation. Simultaneously, the fusion of medicine and engineering drives the rapid iteration of new materials and devices—including biodegradable materials, nano-drug delivery systems, flexible electronics, and surgical robots—laying the foundation for precise, minimally invasive, and intelligent treatments.[9] Furthermore, the discipline must expand its horizons beyond the arterial system, prioritizing the roles of venous and lymphatic systems in myocardial edema, inflammatory regulation, and atherosclerosis as new intervention targets. Additionally, we must optimize management models for the elderly, systematically investigate gender differences in cardiovascular health, and deeply explore the "second genome"—the gut and oral microbiome—to uncover new mechanisms in cardiovascular metabolic diseases.

Acknowledgements

Not applicable.

Ethical statements

Not applicable.

Conflicts of interest

Jun Cai serves as the Editor-in-Chief of *Cardiac Research*. He was not involved in the editorial review or decision-making process for this manuscript. All editorial decisions were made independently by other members of the Editorial Board who have no conflicts of interest.

Funding source

Not applicable.

Data availability statement

Not applicable.

Author contributions

Jun Cai contributed in writing of this article.

References

[1] Global Burden of Cardiovascular Diseases and Risks 2023 Collaborators. Global, regional, and national burden of cardiovascular diseases and risk factors in 204 countries and territories, 1990–2023. J Am Coll Cardiol. 2025;86:2167–243.
[2] Antman EM, Loscalzo J. Precision medicine in cardiology. Nat Rev Cardiol. 2016;13:591–602.
[3] Dimmeler S, Ferri L, Nioi P, et al. Translation of genomics into routine cardiological practice: insights from a European Society of Cardiology Cardiovascular Round Table. Eur Heart J. 2025;46:1384–93.
[4] Moore EE, Curi M, Namias N, et al.; CLN-PRO-V005 Investigators and the CLN-PRO-V017 Investigators. Bioengineered human arteries for the repair of vascular injuries. JAMA Surg. 2025;160:181–9.
[5] Wang X, Zhou X, Chen H, et al. Long-term outcomes of a novel fully magnetically levitated ventricular assist device for the treatment of advanced heart failure in China. J Heart Lung Transplant. 2024;43:1806–15.
[6] Ford ES, Ajani UA, Croft JB, et al. Explaining the decrease in U.S. deaths from coronary disease, 1980-2000. N Engl J Med. 2007;356:2388–98.
[7] Banigbe BF, Moran AE, Gupta R, et al. Lessons learned from treating 34 million people with hypertension: the global HEARTS initiative. J Am Coll Cardiol. 2025;86:2374–87.
[8] Desai AS, Webb DJ, Taubel J, et al. Zilebesiran, an RNA interference therapeutic agent for hypertension. N Engl J Med. 2023;389:228–38.
[9] Mao YA, Shi X, Sun P, et al. Nanomedicines for cardiovascular diseases: lessons learned and pathways forward. Biomaterials. 2025;320:123271.