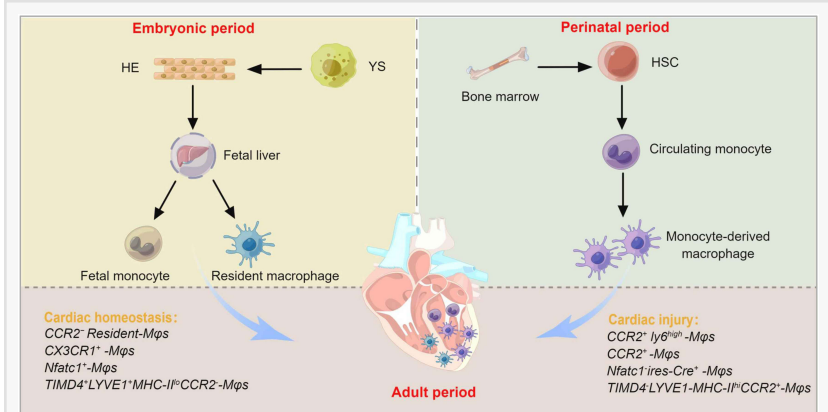


Cardiomyocyte Proliferation: A New Era for Myocardial Repair

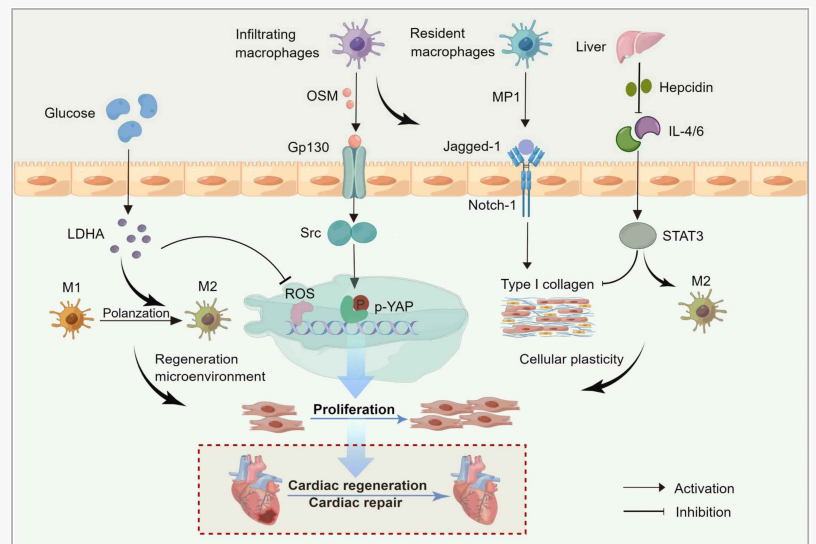
SHANNON, CLARE, IRELAND, March 4, 2025 /EINPresswire.com/ -- A new review published in *Genes & Diseases* highlights macrophage-targeted therapy as a promising frontier in cardiac regeneration and myocardial repair. The findings underscore the critical role of heterogeneous macrophages in promoting cardiomyocyte proliferation after myocardial infarction, offering a novel avenue for potential therapeutic interventions.

Heart disease remains the leading cause of mortality worldwide, with myocardial infarction often leading to irreversible cardiomyocyte loss and subsequent heart failure. Unlike other regenerative tissues, the adult human heart has limited capacity for self-repair, making cardiac regeneration a pivotal focus in modern medicine. This review emphasizes the significant impact of immune modulation, particularly through macrophage plasticity, in enhancing tissue repair mechanisms.

The article highlights the dual role of macrophages, with certain subtypes facilitating inflammation while others contribute to cardiac healing. Resident cardiac macrophages, originating from the embryonic endothelium, play an essential role in modulating the immune response, clearing apoptotic cells, and releasing key cytokines to promote



Developmental origin and subtype function of cardiac macrophages. Embryonic development (E7.5-E12.5) revolves around the hematopoietic endothelium (HE) of the yolk sac (YS), which undergoes three waves of hematopoiesis.



Schematic representation of cardiac macrophages initiating cardiomyocyte proliferation and repair.

cardiomyocyte proliferation. These findings open new doors for macrophage-based therapies, which could enhance myocardial repair without relying on exogenous stem cell transplantation.

A point to note is the role of CX3CR1+ macrophages, which initiate cardiomyocyte proliferation via the Jagged-1/Notch1 signaling pathway. This pathway, largely active in neonatal hearts, holds promise for unlocking regenerative potential in adult patients. Additionally, metabolic factors such as lactate dehydrogenase A (LDHA) have been identified as crucial mediators in creating a pro-regenerative microenvironment, further enhancing myocardial repair mechanisms.

As cardiovascular research advances, the review suggests that targeting macrophage subsets could lead to tailored therapeutic strategies aimed at reducing fibrosis, promoting angiogenesis, and ultimately restoring cardiac function. The potential of immune cell reprogramming to stimulate cardiomyocyte proliferation marks a shift in how scientists and clinicians approach heart failure treatment.

Funding Information:

National Key Research and Development Program of China 2021YFA1301100

National Key Research and Development Program of China 2021YFA1301101

Shandong Provincial Natural Science Foundation of China SYS202202

Research Project of Jinan Microecological Biomedicine Shandong Laboratory (China) JNL-2023009Q

Research Project of Jinan Microecological Biomedicine Shandong Laboratory (China) JNL-2022012B

#####

Genes & Diseases publishes rigorously peer-reviewed and high quality original articles and authoritative reviews that focus on the molecular bases of human diseases. Emphasis is placed on hypothesis-driven, mechanistic studies relevant to pathogenesis and/or experimental therapeutics of human diseases. The journal has worldwide authorship, and a broad scope in basic and translational biomedical research of molecular biology, molecular genetics, and cell biology, including but not limited to cell proliferation and apoptosis, signal transduction, stem cell biology, developmental biology, gene regulation and epigenetics, cancer biology, immunity and infection, neuroscience, disease-specific animal models, gene and cell-based therapies, and regenerative medicine.

Scopus CiteScore: 7.3

Impact Factor: 6.9

#####

More information: <https://www.keaipublishing.com/en/journals/genes-and-diseases/>

Editorial Board: <https://www.keaipublishing.com/en/journals/genes-and-diseases/editorial-board/>

All issues and articles in press are available online in ScienceDirect

(<https://www.sciencedirect.com/journal/genes-and-diseases>).

Submissions to Genes & Disease may be made using Editorial Manager

(<https://www.editorialmanager.com/gendis/default.aspx>).

Print ISSN: 2352-4820

eISSN: 2352-3042

CN: 50-1221/R

Contact Us: editor@genesndiseases.com

X (formerly Twitter): @GenesNDiseases (<https://x.com/GenesNDiseases>)

#

Reference

Tao Wang, Xueyao Wang, Weibin Ren, Zeyu Sun, Yanhui Zhang, Nanping Wu, Hongyan Diao, Cardiomyocyte proliferation: Advances and insights in macrophage-targeted therapy for myocardial injury, Genes & Diseases, Volume 12, Issue 3, 2025, 101332,

<https://doi.org/10.1016/j.gendis.2024.101332>

Genes & Diseases Editorial Office

Genes & Diseases

+ +86 23 6571 4691

editor@genesndiseases.com

This press release can be viewed online at: <https://www.einpresswire.com/article/790884661>

EIN Presswire's priority is source transparency. We do not allow opaque clients, and our editors try to be careful about weeding out false and misleading content. As a user, if you see something we have missed, please do bring it to our attention. Your help is welcome. EIN Presswire, Everyone's Internet News Presswire™, tries to define some of the boundaries that are reasonable in today's world. Please see our Editorial Guidelines for more information.

© 1995-2025 Newsmatics Inc. All Right Reserved.