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Letter to the Editor

Cardiovascular Breakthroughs: Exploring New Treatments and the Gut-Heart Axis

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Dear Editor,

Cardiovascular disease (CVD), the top global killer, encompasses all heart and blood vessel diseases (hypertension, CHD, cerebrovascular disease). CVD accounted for nearly 30% of global deaths and was responsible for more than 17.5 million deaths in 2012 according to the World Health Organization[1]. Advances in genomics, tissues engineering and gut microbiome research have uncovered novel paths that may represent the panacea to this public health challenge.

In a new perspective published in the peer-reviewed journal Pharmaceutical Research from Springer, researchers from the University of Houston's College of Pharmacy highlight the importance of expression of Itgb1 in cardiomyocytes, which is a gene essential for heart development. Its development is necessary for the appearance of trabeculae, muscle bundles that help oxygen and nutrient exchange in the embryonic heart. Disruption of trabecular integrity by simultaneous loss of Itgb1 impairs sarcomere organization and induces LVNC cardiomyopathy. Such findings highlight the importance of Itgb1 and its binding partner β1 integrin in regulating cardiomyocyte function and provide a strong basis for further therapeutic development[2].

In a new report Public Library of Science, scientists at the Stanley Manne Children's Research Institute in Chicago describe removal of the gene UQCRFS1 in adult mice that permit damaged heart muscle cells to be rejuvenated as well as replace. Such process actually revert cardiomyocytes into a state which was seen in fetal heart and thus aid in cardiac tissue generation. This approach could be used for congenital heart defects in newborns and for regenerating damaged hearts in adults applying it post-heart attack. This genetic impact, provided we can determine a way to induce (or possibly inhibit) it with medication, represents a non-invasive therapeutic pathway[3].

The gut microbiome also recently entered the whole world of cardiovascular health. Gut dysbiosis has been reported as accelerating CVD progression[4]. Specific bacteria may also ferment cholesterol (within the intestines) e.g., species in the genera Oscillibacter, Eubacteria that metabolize cholesterol for excretion which could lead to decreased cholesterol levels in blood plasma[5]. On the other hand, different bacteria like Parabacteroides merdae, show an association with having a higher C-reactive protein (CRP) concentration, indicating higher inflammation that correlates with higher risk of CVD. Furthermore, the metagenomic species msp-120 from the Firmicutes phylum also associated with cholesterol metabolism, with elevated plasma cholesterol levels relating strongly with increased levels of msp-120. Such associations between systemic inflammation and gut microbiota suggest that targeting gut microbiota may be candidate microbiome-targeted therapies that may help mitigate CVD[5].

In Pakistan, while CVD is an increasing health burden, the situation is even more challenging owing to the lack of public awareness regarding such scientific advancements. We need to channel our efforts and work towards raising awareness about heart health, encouraging preventive action and ensuring that there is early diagnosis and therapeutic intervention! Public health campaigns, collaboration between researchers and policy-makers, dissemination of best research findings can create a road to a healthier nation, reducing the burden and impact of cardiovascular diseases.

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REFERENCES

1. Greenfield DM, Snowden JA. Cardiovascular diseases and metabolic syndrome. The EBMT handbook: hematopoietic stem cell transplantation and cellular therapies. 2019:415-20.
2. Miao L, Lu Y, Nusrat A, Zhao L, Castillo M, Xiao Y, et al. β1 integrins regulate cellular behavior and cardiomyocyte organization during ventricular wall formation. Cardiovasc Res. 2024;20(11):1279-94.
3. Waypa GB, Smith KA, Mungai PT, Dudley VJ, Helmin KA, Singer BD, et al. Mitochondria regulate proliferation in adult cardiac myocytes. J Clin Invest. 2024;134(13):e165482.
4. Jin M, Qian Z, Yin J, Xu W, Zhou X. The role of intestinal microbiota in cardiovascular disease. J Cell Mol Med. 2019;23(4):2343-50.
5. Li C, Stražar M, Mohamed AM, Pacheco JA, Walker RL, Lebar T, et al. Gut microbiome and metabolome profiling in Framingham heart study reveals cholesterol-metabolizing bacteria. Cell. 2024;187(8):1834-52.

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