OPEN ACCESS Freely available online

Angiology: Open Access

Perspective

Gut Microbiome and its Role in Cardiovascular Health: A New Frontier

Rahul Verma*

Department of Internal Medicine, Madras Medical College, Tamil Nadu, India

DESCRIPTION

In recent years, research has increasingly emphasized the intricate connection between the gut microbiome and systemic health. This diverse collection of microorganisms, including bacteria, fungi, and viruses, plays a pivotal role in human physiology, influencing everything from digestion to immune function. However, a growing body of evidence suggests that the gut microbiome may also significantly impact vascular health, contributing to conditions like atherosclerosis, hypertension, and endothelial dysfunction. This article delves into the fascinating ways in which the gut microbiome affects vascular health and explores the potential for microbiome-based therapies to treat or prevent vascular diseases.

Gut microbiome and its role in inflammation

The gut microbiome is essential in regulating immune responses and maintaining a balanced state of inflammation. It's now well-established that an imbalance in the gut microbiota, known as dysbiosis, can lead to an inflammatory response that affects the entire body, including the vascular system. Dysbiosis has been linked to the development of chronic low-grade inflammation, which is a key contributor to atherosclerosis accumulation of plaque in the arteries that can lead to cardiovascular diseases.

Gut microbiome and blood pressure regulation

Emerging research also suggests a link between the gut microbiome and blood pressure regulation. Studies have shown that individuals with an altered gut microbiota are more likely to develop hypertension. This connection is thought to be mediated through several pathways, including the production of metabolites that influence the vascular tone and the autonomic nervous system, which helps regulate blood pressure.

The role of gut microbiota in atherosclerosis

One of the most compelling areas of research is the link between the gut microbiome and the development of atherosclerosis. The gut microbiota influences lipid metabolism, and certain bacterial species may increase the production of pro-atherogenic lipids. For example, the production of trimethylamine, a compound derived from certain dietary components like red meat and eggs, can be metabolized by gut bacteria into TMAO. Elevated levels of TMAO have been shown to promote cholesterol accumulation in arterial walls, a key factor in the development of atherosclerosis.

Gut-brain-vascular axis: The microbiome's influence on endothelial function

Another fascinating aspect of the gut microbiome's influence on vascular health is its connection to the brain, forming what is known as the gut-brain axis. The gut microbiota can influence the Central Nervous System (CNS) through signalling molecules, including neurotransmitters and hormones. This, in turn, can affect vascular tone and endothelial function, both of which are crucial for maintaining healthy blood vessels.

Potential therapeutic implications: Microbiome-based interventions

Given the growing evidence linking the gut microbiome to vascular health, there is increasing interest in developing microbiome-based interventions to prevent or treat vascular diseases. One such approach involves dietary modifications, as certain foods can help restore a healthy gut microbiome and improve vascular function. Diets rich in fiber, prebiotics, and polyphenols can promote the growth of beneficial bacteria that produce SCFAs, which help reduce inflammation and improve endothelial function. On the other hand, diets high in processed foods, sugars, and unhealthy fats have been shown to promote an imbalance in the gut microbiome, contributing to vascular dysfunction.

CONCLUSION

The growing understanding of the gut microbiome's role in vascular health is reshaping cardiovascular disease prevention and treatment. Dysbiosis, or an imbalance in gut bacteria, is linked to conditions like atherosclerosis, hypertension, and endothelial dysfunction. The microbiome affects inflammation, blood pressure, and lipid metabolism, playing a key role in

Correspondence to: Verma R, Department of Internal Medicine, Madras Medical College, Tamil Nadu, India; E-mail: Verma.rahul@gmail.com

Received: 30-Jan-2025, Manuscript No. AOA-25-36921; **Editor assigned:** 04-Feb-2025, PreQC No. AOA-25-36921 (PQ); **Reviewed:** 18-Feb-2025, QC No. AOA-25-36921; **Revised:** 18-Feb-2026, Manuscript No. AOA-25-36921 (R); **Published:** 25-Feb-2026, DOI: 10.35841/2329-9495.26.14.600

Citation: Verma R (2026) Gut Microbiome and its Role in Cardiovascular Health: A New Frontier. Angiol Open Access. 14:600.

Copyright: © 2026 Verma R. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

vascular health. While more research is needed, microbiome-based therapies such as diet changes, probiotics, and faecal microbiota transplantation offer potential strategies for managing and preventing vascular diseases, providing hope for patients at risk of cardiovascular issues.