Perivascular Fat: Unveiling a New Contributor to Coronary Artery Disease Risk

Dongfulei Hakonarosom*

Department of Cardiology, University of Pennsylvania, Philadelphia, PA 191104, USA

Introduction

Coronary Artery Disease (CAD) remains a leading cause of morbidity and mortality worldwide. Traditionally, risk factors such as hypertension, hyperlipidemia and smoking have been well-documented in the pathology of CAD. However, recent research has unveiled a novel and significant risk factor: perivascular fat. This specialized adipose tissue, located around the coronary arteries, has emerged as a critical player in the development and progression of CAD [1]. Understanding the role of perivascular fat in coronary artery pathology may offer new insights into prevention and treatment strategies for CAD. Coronary Artery Disease (CAD) remains a leading cause of morbidity and mortality worldwide. Traditionally, risk factors such as hypertension, hyperlipidemia and smoking have been well-documented in the pathology of CAD. However, recent research has unveiled a novel and significant risk factor: perivascular fat. This specialized adipose tissue, located around the coronary arteries, has emerged as a critical player in the development and progression of CAD. Understanding the role of perivascular fat in coronary artery pathology may offer new insights into prevention and treatment strategies for CAD [2].

The growing body of evidence suggesting a link between perivascular fat and CAD highlights the need for a closer examination of this tissue's role. Traditionally, adipose tissue was considered merely a passive reservoir of energy, but it is now recognized for its active role in endocrine and paracrine signaling. Perivascular fat, in particular, exhibits distinct biochemical and physiological properties that contribute to cardiovascular health and disease. This introduction sets the stage for exploring how perivascular fat influences coronary artery disease, expanding our understanding beyond conventional risk factors.

Description

Perivascular fat, or epicardial fat, is a type of adipose tissue that surrounds the coronary arteries and is closely associated with the heart. Unlike other forms of fat, perivascular fat has a unique metabolic and inflammatory profile. It secretes various bioactive substances, including pro-inflammatory cytokines, adipokines and other mediators that can directly affect the endothelial function and contribute to atherosclerosis. One of the key features of perivascular fat is its proximity to the coronary arteries, which allows it to exert local effects on the vascular wall. This proximity facilitates the release of inflammatory mediators and other molecules that can directly influence the development of atherosclerotic plaques. Studies have shown that the accumulation of

perivascular fat correlates with increased levels of systemic inflammation and endothelial dysfunction, both of which are critical factors in the progression of CAD [3].

Advanced imaging techniques, such as Computed Tomography (CT) and magnetic resonance imaging (MRI), have revolutionized the ability to visualize and quantify perivascular fat. These imaging modalities allow for the assessment of perivascular fat volume and distribution, providing valuable insights into its role in CAD. Research has demonstrated that increased perivascular fat volume is associated with a higher burden of coronary artery lesions and a greater risk of adverse cardiovascular events. This correlation underscores the potential of perivascular fat as a valuable biomarker for assessing CAD risk and progression. Additionally, perivascular fat's role extends beyond merely influencing atherosclerosis. It is also involved in the regulation of local blood flow and vascular tone through the release of various mediators. The interaction between perivascular fat and the coronary vasculature is complex, involving both direct and indirect pathways. For instance, perivascular fat-derived cytokines can affect the expression of endothelial adhesion molecules, contributing to the recruitment of inflammatory cells and the progression of vascular inflammation [4,5].

Conclusion

The discovery of perivascular fat as a novel risk factor for coronary artery disease represents a significant advancement in cardiovascular research. Its unique role in inflammation and metabolic disturbances highlights its potential as both a diagnostic and therapeutic target. By focusing on perivascular fat, clinicians and researchers can develop more precise strategies for risk assessment and intervention. Further research is essential to fully elucidate the mechanisms by which perivascular fat contributes to CAD and to explore therapeutic options aimed at mitigating its effects. Ultimately, incorporating perivascular fat evaluation into routine clinical practice may enhance our ability to prevent and manage coronary artery disease more effectively.

Acknowledgement

Conflict of Interest

None.

***Address for Correspondence**: Dongfulei Hakonarosom, Department of Cardiology, University of Pennsylvania, Philadelphia, PA 191104, USA; E-mail: dongfuleihakona@hotmail.com*

References

1. Cypess, Aaron M. "Reassessing human adipose tissue." *N Engl J Med* 386 (2022): 768-779.

2. Antonopoulos, Alexios S., Fabio Sanna, Nikant Sabharwal and Sheena Thomas, et al. "Detecting human coronary inflammation by imaging perivascular fat." *Sci Transl Med* 9 (2017): eaal2658.

3. Oikonomou, Evangelos K., Mohamed Marwan, Milind Y. Desai and Jennifer Mancio, et al. "Non-invasive detection of coronary inflammation using computed tomography and prediction of residual cardiovascular risk (the CRISP CT study): A post-hoc analysis of prospective outcome data." *Lancet* 392 (2018): 929-939.

4. Antoniades, Charalambos, Alexios S. Antonopoulos and John Deanfield. "Imaging residual inflammatory cardiovascular risk." *Eur Heart J* 41 (2020): 748-758.

5. Simantiris, Spyridon, Charalampos Papastamos, Alexios S. Antonopoulos and Panagiotis Theofilis, et al. "Oxidative Stress Biomarkers in Coronary Artery Disease." *Curr Top Med Chem* 23 (2023): 2158-2171.

How to cite this article: Hakonarosom, Dongfulei. "Perivascular Fat: Unveiling a New Contributor to Coronary Artery Disease Risk." *Res Rep Med Sci* 8 (2024): 176.