

# **Nanotherapeutic Strategies to Reduce Vascular Inflammation in Cardiovascular Diseases**

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## **Abstract**

Cardiovascular diseases (CVD), a group of disorders affecting the heart and blood vessels, are the leading cause of morbidity and mortality in the world. A major underlying cause of CVD is atherosclerosis, a systemic disease characterized by dyslipidemia and a chronic inflammatory process in the arterial wall. Recent advances in nanomedicine have led to new approaches for diagnosing and treating vascular inflammation associated with CVD. Innovative nanoparticles targeted to the key players in the arterial wall inflammation in atherosclerosis (i.e. inflammatory molecules, immune or resident cells) have been already developed to diagnose and/or reduce excessive inflammation and are eagerly awaited promising preclinical and early clinical results to boost the approval of the first nanocarrier in this field. The presentation will cover the development of nanoparticles surfaced with peptides with high-affinity for cell adhesion molecules for delivering various therapeutic agents to the inflamed endothelium to reduce its activation and consequently lessen the progression of atherosclerotic lesions. Also, will be presented a strategy based on monocyte membranes-covered biomimetic nanocarriers of pro-resolving lipid mediators for the resolution of inflammation in atherosclerosis. The results of in vitro and in vivo investigations will be discussed, and these will cover aspects such as the physico-chemical characteristics of developed nanoparticles, their targeting potential and accumulation to the atherosclerotic plaque, mechanisms of interaction with vascular and immune cells, therapeutic effects, and safety assessment. Acknowledgments. The support from Romania’s National Recovery and Resilience Plan, PNRR-III-C9-2022-I8, CF 93/15.11.2022, Financing Contract no. 760063/23.05.2023 is acknowledged.