EPIGENETIC ASPECTS OF ATHEROSCLEROSIS: THE ROLE OF DNA METHYLATION AND POTENTIAL TREATMENT STRATEGIES

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Abstract. The research explores how DNA methylation contributes to atherosclerosis, especially its impact on the expression of genes related to inflammation and lipid metabolism. It suggests potential treatments, like DNMT inhibitors, and stresses the importance of more research to improve treatment approaches.
Keywords: atherosclerosis, DNA methylation, DNMT inhibitors, therapeutic intervention.

Introduction. Atherosclerosis, characterized by the accumulation of lipid deposits, inflammation, and endothelial dysfunction in arterial walls, is a leading cause of cardiovascular diseases globally [1]. Understanding its intricate mechanisms is crucial for therapeutic advancements. Recently, epigenetics, notably DNA methylation, has emerged as a significant contributor to atherosclerosis pathogenesis, providing novel insights into its progression.

Aim and Objectives of the Study. This study aims to investigate the role of epigenetic modifications, specifically DNA methylation, in atherosclerosis pathogenesis.

Materials and Methods. A comprehensive review of existing literature and analysis of clinical data from studies investigating epigenetic alterations in atherosclerosis were conducted. Various databases were searched to collect relevant articles, and data from clinical trials evaluating the efficacy of epigenetic-targeted therapies were synthesized [2-4].

Results and Discussion. Aberrant DNA methylation patterns play a crucial role in atherosclerosis development and progression. Elevated DNA methylation levels in atherosclerotic lesions impact the expression of genes involved in inflammation, lipid metabolism, and endothelial function. Epigenetic modifications also contribute to atherosclerosis heterogeneity and its response to environmental stimuli like LDL and inflammatory cytokines [2]. Therapeutic strategies targeting DNA methylation, including DNA methyltransferases (DNMT) inhibitors and other epigenetic drugs, show promise in mitigating atherosclerosis-associated pathology. However, challenges such as off-target effects and the need for personalized approaches remain to be addressed [4].

Conclusions. Epigenetic mechanisms, particularly DNA methylation, play a significant role in atherosclerosis pathogenesis. Understanding the interplay between epigenetic modifications and traditional risk factors can inform targeted therapy development for this prevalent cardiovascular disease. Despite challenges, epigenetic-based interventions offer promise for improving patient outcomes and reducing

atherosclerosis-related morbidity and mortality.

Perspectives for Further Research in this Direction. Future research should focus on elucidating specific epigenetic signatures associated with different atherosclerosis stages and their functional consequences.

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