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Biomarkers as Predictors of Cardiovascular Events: A Meta-Analysis of Emerging Biomarker Utility in Coronary Artery Disease Risk Stratification

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INTRODUCTION

Coronary Artery Disease (CAD) remains a leading cause of morbidity and mortality globally, underscoring the importance of effective risk stratification and early intervention. Biomarkers, measurable biological indicators of physiological processes, have emerged as valuable tools in predicting cardiovascular events and assessing CAD risk. Traditional biomarkers, such as cholesterol levels and C-reactive Protein (CRP), have long been utilized in cardiovascular risk assessment, but recent research has identified a range of emerging biomarkers that offer greater precision and predictive value. These novel biomarkers, including high-sensitivity troponin, N-Terminal Pro-B-Type Natriuretic Peptide (NT-proBNP), and galectin-3, provide insights into underlying pathophysiological processes such as myocardial injury, inflammation, and fibrosis. By integrating these biomarkers into clinical practice, healthcare providers can more accurately stratify patients based on their risk of future cardiovascular events, allowing for earlier and more targeted interventions. This meta-analysis explores the utility of these emerging biomarkers in coronary artery disease risk stratification, evaluating their predictive power and potential to enhance current diagnostic models. By synthesizing data from multiple studies, this analysis aims to provide a comprehensive understanding of how novel biomarkers can improve cardiovascular risk assessment and guide personalized treatment strategies in CAD management. Emerging biomarkers such as high-sensitivity troponin and NT-proBNP enhance coronary artery disease risk stratification, offering improved prediction of cardiovascular events. Integrating these biomarkers into clinical practice promises more accurate risk assessment and personalized treatment, ultimately improving patient outcomes.

DESCRIPTION

Coronary Artery Disease (CAD) poses a significant health challenge, driving the need for effective risk stratification tools to predict cardiovascular events and guide intervention strategies. Biomarkers have emerged as promising indicators for assessing CAD risk, offering insights into disease mechanisms and improving risk prediction accuracy. Traditional biomarkers, such as low-density lipoprotein cholesterol and high-sensitivity C-reactive protein, have been pivotal in cardiovascular risk assessment. However, recent research highlights the potential of novel biomarkers in enhancing predictive precision. Emerging biomarkers like high-sensitivity troponin, N-Terminal Pro-B-Type Natriuretic Peptide (NT-proBNP), and galectin-3 have shown promise in reflecting myocardial injury, cardiac stress, and fibrosis, respectively.

CONCLUSION

Emerging biomarkers offer significant potential for enhancing Coronary Artery Disease (CAD) risk stratification and predicting cardiovascular events. Novel indicators like high-sensitivity troponin, NT-proBNP, and galectin-3 provide deeper insights into disease mechanisms and improve the accuracy of risk assessment beyond traditional biomarkers. This meta-analysis underscores the value of integrating these biomarkers into clinical practice, which could lead to more personalized and effective treatment strategies. By refining risk prediction and enabling earlier interventions, these advancements promise to improve patient outcomes and advance the management of CAD. Continued research and clinical integration of these biomarkers will be crucial for optimizing cardiovascular care.

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CONFLICT OF INTEREST

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