Dear Editor,

I am writing to submit our manuscript entitled "Unlocking the Potential of microRNAs: Machine Learning Identifies Key Biomarkers for Myocardial Infarction Diagnosis" for consideration in Cardiovascular Diabetology.

MicroRNAs (miRNAs) have been recognized as important regulators of cardiovascular diseases, making them attractive targets for potential biomarkers. In this study, we aimed to identify a key set of miRNA biomarkers using integrated bioinformatics and machine learning analysis. Specifically, we merged and analyzed three gene expression datasets from the Gene Expression Omnibus (GEO) database, which contains peripheral blood mononuclear cell (PBMC) samples from individuals with myocardial infarction (MI), stable coronary artery disease (CAD), and healthy individuals. Additionally, we selected a set of miRNAs based on their area under the receiver operating characteristic curve (AUC-ROC) for separating the CAD and MI samples. We designed a two-layer architecture for sample classification, in which the first layer isolates healthy samples from unhealthy samples, and the second layer classifies stable CAD and MI samples.

Our results revealed that miR-21, miR-186, and miR-32 were identified as the only miRNAs among the differentially expressed genes, and a set including miR-186, miR-21, miR-197, miR-29A, and miR-296 as the optimum set of miRNAs selected by their AUC-ROC. Both biomarker sets could distinguish healthy from not-healthy samples with complete accuracy. The best performance for the classification of CAD and MI was achieved with an SVM model trained using the biomarker set selected by AUC-ROC, with an AUC-ROC of 0.96 and an accuracy of 0.94 on the test data.

Our study has important implications for the development of novel biomarkers for cardiovascular diseases. The miRNA signatures derived from PBMCs could serve as valuable biomarkers, and our results provide a foundation for future research in this area.

We believe that our study will be of great interest to the readership of Cardiovascular Diabetology and we hope that you will consider it for publication. Thank you for your time and consideration.

Sincerely,