

MiRNA-208a, -208b and -499 as Biomarkers for Myocardial Damage after Cardiac Surgery in Children

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Abstract

Objective: Test the hypothesis that cardiac-enriched micro-RNAs can serve as accurate biomarkers that reflect myocardial injury and predict the postoperative course following pediatric cardiac surgery. MiRNAs have emerged as plasma biomarkers for many pathological states. We aimed to quantify pre- and postoperative plasma levels of cardiac-enriched miRNAs-208a, -208b and -499 in children undergoing cardiac surgery, and to evaluate correlations between their levels, the extent of myocardial damage and the postoperative clinical course.

Design: Samples from 30 pediatric patients were obtained preoperatively, 12hr and 24hr post-surgery. Following RNA extractions, miRNAs were quantified by RQ-PCR. Correlations between the patient's clinical variables and miRNA levels were tested.

Results: At 12hr post-surgery, the plasma levels of the miRNAs increased by 300- to 4000-fold. At 24hr, their levels decreased, but remained significantly higher than before surgery. MiRNA levels were associated with troponin levels, longer cardiopulmonary bypass and aortic crossclamp times, maximal postoperative aspartate aminotransferase levels and delayed hospital discharge.

Conclusions: Circulating miRNAs-208a, -208b, and -499 are detectable in the plasma of children undergoing cardiac surgery and may serve as novel biomarkers for monitoring and forecasting postoperative myocardial injury and recovery.