

MicroRNA Expression in Perivascular and Paracardial Adipose Tissue Across Acute and Chronic Coronary Syndromes

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Background: Perivascular adipose tissue (PVAT) is an active component of the coronary microenvironment, while paracardial adipose tissue (PAT) represents an anatomically distinct cardiac fat depot. We hypothesized whether selected microRNAs, implicated in atherosclerosis, adipose biology, and cardiovascular inflammation, exhibit depot-specific and clinical setting related expression between patients with acute (ACS) and chronic coronary syndromes (CCS).

Aim: to assess and compare PVAT and PAT selected microRNA expression among study groups - patients undergoing heart surgery for ACS or CCS.

Materials and Methods: This project has received funding from the Research Council of Lithuania (LMTLT), agreement No S-MIP-25-70. 28 patients undergoing coronary artery bypass grafting surgery were included: 14 with ACS and 14 with CCS. Paired PVAT (located at the culprit lesion in ACS or the most severe lesion in CCS cases) and PAT samples were obtained during surgery just before the initiation of cardiopulmonary bypass, frozen and stored at -80°C until molecular analysis. MiR-155-5p, miR-26b-5p, miR-378a-3p, miR-455-3p, and miR-92a-3p expression was analyzed using quantitative real-time polymerase chain reaction. Expression was normalized to miR-103a-3p.

Results: Paracardial miR-455-3p expression was higher than paired perivascular expression ($P < 0.001$; fold change 3.74) in the whole study population. In PVAT, miR-378a-3p and miR-455-3p expression was higher in ACS group than in CCS ($P = 0.027$ and $P = 0.043$, respectively). In PVAT miR-378a-3p showed the highest discriminatory performance (AUC 0.745; $P = 0.010$) between ACS and CCS clinical patient groups.

Conclusion: MiR-455-3p showed a depot-specific expression pattern in cardiac adipose tissue. Perivascular miR-378a-3p emerged as the strongest exploratory signal distinguishing ACS from CCS.