

Relation Between Endothelial Microparticles and Endothelial Function Following Acute Exercise in Men with CAD

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Purpose: Microparticles (MP) are small membranous vesicles shed from formed elements such as circulating platelets and vascular endothelial cells. They express surface antigens characteristic of their cell-of-origin and contain DNA, RNA, miRNA and intracellular proteins. Depending on the dynamic morphological state of the parent cell, phenotypically varied MP may be released into the circulation. MP serve not only as markers, but also potential mediators of inflammation, coagulation and endothelial dysfunction. This study examined the relation between total MP, endothelial MP (EMP), platelet MP (PMP) and endothelial function (a validated surrogate measure of early atherosclerosis) in response to acute exercise in men with coronary artery disease (CAD).

Methods: Eight men with CAD (65.7 ± 4.5 yr, $VO_2\max$ 18.6 ± 4.1 ml/kg/min, BMI 29.7 ± 3.3 kg/m²) underwent 20 min of treadmill walking at 66 % $VO_2\max$. Endothelial dependent dilation of the brachial artery was assessed before and 1 h following the acute bout of exercise. Vessel diameter was determined using high resolution vascular ultrasonography (SonoSite, MicroMaxx) from flow mediated dilation (FMD) following 5 min of forearm occlusion. Endothelial independent vasodilation (EID) was measured following the administration of glyceryl trinitrate (0.4 mg). MP counts were enumerated by flow cytometry from platelet poor plasma (PPP) stored at -80°C . MP were characterized based on size (0.5 – 1.0 μm sizing gate) and their ability to bind annexin V. MP had also to bind to CD62E or CD41 to be of endothelial or platelet origin respectively.

Results: Compared to baseline, FMD was significantly increased at 60 min following the acute bout of exercise. There was no change in EID. There was significant relation between the percent change in total MP (annexin V+ events) and the percent changes in flow mediated dilation 60 min after the exercise bout and between the percent change in EMP (annexin V+/CD62E+ events) and the percent changes in flow mediated dilation 60 min after the exercise bout.

Conclusion: Changes in endothelial function in response to acute exercise may be mediated by alterations in circulating levels of MP.

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