Gene Expression Profiling in Circulating Microparticles of Patients with Acute Coronary Syndrome

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Authors: Luigi M. Biasucci, Margherita Marcantoni, Maria Teresa Cardillo, Gina Biasillo, annalisa caroli, Giovanni Luigi De Maria, Iliaria Dato, Massimo Gustapane, Luca Di Vito, Filippo Crea, Catholic University, rome, Italy

Background: Microparticles (MP) are small vesicles released from activated cells. MP are increased in Acute Coronary Syndromes (ACS) and have been consistently associated with coagulant activity, yet little is known about their mRNA expression. We sought to characterize mRNA expression in MP of ACS and stable angina (SA) patients.

Methods: Venous blood samples were drawn from 32 patients: 16 with Non-ST Elevation Myocardial Infarction (NSTEMI) and 16 with SA. Gene expression of NSTEMI and SA was compared with a control group of 17 healthy subjects. Total RNA was isolated from circulating MP. mRNA expression was examined with a PCR-array system for the atherosclerosis and transcription factors pathways.

Results: 168 genes were investigated. Compared to controls, mRNA expression analysis identified 5 modulated genes for the atherosclerosis pathway between NSTEMI and SA (3 up- and 2 down-regulated in NSTEMI vs SA). Elastin, Matrix Metalloproteinase -1 (MMP-1) and Selectin showed differences in mRNA with a fold change > 5 in NSTEMI vs SA (p<0.05). On the contrary, Angiotensin I Converting Enzyme (ACE) and Neuropeptide Y (NPY) mRNA were down-regulated in NSTEMI (p<0.05). The transcription factors-related pathway revealed 8 modulated genes (1 up- and 7 down-regulated in NSTEMI patients). Androgen receptor (AR), forkhead box 01 (FOX01), were down-regulated with a fold-change > 10 (p<0.05); MYC associated factor X (MAX), Nuclear factor of kappa light polypeptide gene (NFKB1), V-retericuloendotheliosis viral oncogene (RELA) and signal transducer and activatorof transcription 4 (STAT4), were down-regulated with a fold expression > 5 in NSTEMI vs SA (p<0.05). General transcription factor IIB was up-regulated in NSTEMI with a fold change > 3 (p<0.05).

Conclusion: Our study revealed a different MP mRNA profile in NSTEMI patients compared to SA. The higher differences in mRNA expression were found among proteins involved in extracellular matrix synthesis or degradation, leukocyte infiltration and inflammation suggesting a role of MP also on plaque instability (possibly also as counter regulatory mechanism) and myocardial damage and as a potential novel therapeutic target.