Altered number of apoptotic-modified endothelial cells originated micro vesicles predict phenotypes of heart failure

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Background: Heart failure (HF) remains a global health problem with increased risk of premature death and extremely high economic and social burden. Numerous factors corresponding to HF severity, such as some hormones (angiotensin-II, aldosterone, endothelial-1), pro-inflammatory cytokines, chemokines, components of oxidative stress may be triggers of an apoptosis of endothelial cells and thereby negatively influence on vascular function. Apoptotic-modified endothelial cells release micro vesicles (MVs) that are not just cargo of several active molecules, peptides, growth factors, and microRNAs participating in cell-to-cell cooperation, but they are able to directly injury endothelium and sub-intima layer inducing microvascular inflammation and extracellular matrix accumulation.

The aim of the study was to evaluate the associations between signature of MVs and biomarkers of fibrosis, inflammation and cardiac remodeling in patients with different phenotypes of chronic HF.

Methods: The study cohort consisted of 388 prospectively involved subjects with established chronic HF. Phenotype of HF was determined according to left ventricular ejection fraction (LVEF) value per contemporary clinical guideline. HFrEF (LVEF =40%), HFmrEF (41-49%) and HFpEF (LVEF =50%) were determined. All biomarkers were measured at baseline.

Results: The number of circulating CD31+/annexin V+ MVs in HFpEF patients was significantly different from both HFrEF and HFmrEF individuals, but it was similar in HFrEF and HFmrEF patients. The number of circulating CD144+/annexin V+ MVs in HFrEF patients was significant higher to HF mrEF and HFpEF. We determined that a combination of number of circulating CD31+/annexin V+ MVs and galectin-3 (AUC=0.68; 95% CI = 0.61 - 0.77; P=0.001) was the best predictor of HFpEF. The predictive values of sST2 (AUC=0.65; 95% CI = 0.60 - 0.69), number of circulating CD31+/annexin V+ MVs (AUC=0.63; 95% CI = 0.58 - 0.69) alone and their combination (AUC=0.65; 95% CI = 0.59 - 0.70) for HFmrEF did not distinguished significantly (P=0.48). The double combinations of number of circulating CD144+/annexin V+ MVs and sST2 (AUC=0.70; 95% CI = 0.66 - 0.75) or number of circulating CD144+/annexin V+ MVs and galectin-3 (AUC=0.71; 95% CI = 0.65 - 0.76) were the best prognosticators for HFrEF.

Conclusion: we found that number of circulating CD31+/annexin V+ MVs may improve a prediction of galectin-3 for HFpEF, and that number of circulating CD144+/annexin V+ MVs is able to increase predictive capabilities of sST2 and galectin-3 for HFrEF.