

Differential Predictive Power of Endothelial Progenitor Cell Phenotypes in Acute Coronary Syndromes

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Background: Endothelial progenitor cells (EPCs) originate from hemopoietic stem cells, and can transform into mature endothelial cells and participate in new vessel formation in ischemic tissue by angiogenesis. EPCs are a heterogeneous group of cells that can be characterized by the expression of surface markers, such as CD34, CD133, and KDR in various combinations and currently, precise phenotype definition is lacking. Previous studies have shown that reduced numbers of EPCs as measured by Colony Forming Units in cell culture or by CD34+KDR+ phenotype count as assessed by flow cytometry analysis constitute a predictor of cardiovascular risk.

Objective: We sought to determine which phenotype combination of EPC (CD34+KDR+/CD34+CD133+/CD133KDR+) correlates best with adverse cardiovascular outcome in a cohort of patients with acute coronary syndrome (ACS).

Methods and results: Peripheral blood mononuclear cells were isolated by Ficoll density-gradient from 76 consecutive patients with acute coronary syndrome (ST-elevation MI, NSTEMI and unstable AP) who underwent coronary angiography in our institution. Samples were incubated with stained monoclonal antibodies for CD34, CD133, and VEGFR2. Circulating number of EPCs of various phenotype combinations (CD133+CD34+, CD133+VEGFR2+, CD34+VEGFR2+), were determined by FACS analysis. Telephonic follow-up each 6 months was performed for a maximum period of 24 months. The primary end point was a combination of censored mortality and recurrent ACS events.

Results: During the follow-up period, there were 7 deaths, 3 occurring within less than a month of initial PCI. We did not find a significant correlation between any of the EPC phenotype combinations and the primary endpoint, but we did find a weak albeit statistically significant correlation between CD133+KDR+ cells and recurrent ACS.

Conclusion. Our results can be explained by the inherent difficulty in using a very small number of cells as a biomarker in addition to the relatively small number of patients enlisted. Given the positive correlation between CD133+KDR+cells (but not the two other phenotype combinations) and recurrent ACS, it seems the various EPC phenotypes cannot be used interchangeably. Further studies enrolling more patients should be performed in order to explore the relative value of various EPC phenotypes in predicting cardiovascular outcomes.