

Apoptotic Progenitor Cells: Potential Determinants of Atheromatous Plaque Size and Phenotype

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Background: Initiation, progression and rupture of the atheromatous plaque is a complex process in which metabolic hormonal and inflammatory effectors have contributory roles. Bone marrow derived stem cells are the origin of subsets of circulating stem cell populations some of which differentiate to the endothelial lineage. We have recently detected a subset of apoptotic CD34 progenitors which is significantly increased in patients with acute coronary syndrome.

Methods and results: We sought to investigate the prevalence and effects of apoptotic progenitor cells in atherosclerosis prone ApoE KO mice.

Apoptotic CD34 cells are increased in old ApoE knockout mice that exhibit experimental atherosclerosis compared to young ApoE or wild-type C57BL/6 littermates. The higher percentage of the apoptotic progenitors correlated with a higher titer of antibodies to oxidized LDL measured in the old ApoE mice, reflecting the extent of oxidative stress.

Interestingly adoptive transfer of apoptotic Sca-1 positive cells caused a significant reduction of plaque size in the aortas of 4-month old ApoE KO mice compared to aortas of litters injected with non-apoptotic Sca-1 positive cells or with vehicle-control only.

Conclusions: The levels of apoptotic progenitor cells are increased in atherosclerotic mice. However transfer of this sub-population reduces plaque size in the aortas of ApoE KO mice. Further experiments are needed to elucidate the possible role of apoptotic Sca-1-positive cells in the pathogenesis of atherosclerosis.