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Vascular Medicine

CHANGES IN OXIDATIVE STRESS AND VASCULAR FUNCTION AS DETERMINANTS OF PROGRESSION OF ATHEROSCLEROSIS

Poster Contributions

Hall C

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Background: Complications of atherosclerosis are the leading cause of morbidity and mortality in the Western world. Progression of atherosclerosis is associated with a greater risk for adverse outcomes. We sought to investigate the determinants of progression of carotid atherosclerosis.

Methods: Subjects (n= 120, 60±9 years, 51% male) with carotid intima media thickness >0.65 mm by ultrasound underwent repeat carotid magnetic resonance imaging (MRI) using T2-weighted black-blood imaging at baseline, 12, and 24 months. The change in mean carotid bulb vessel wall area (VWA) was compared to 1) the demographic and risk factor profile, and changes in 2) endothelial function, measured as flow-mediated dilation (FMD) of the brachial artery, 3) inflammation, measured as plasma C-reactive protein (CRP) level, and 4) oxidative stress, measured as plasma redox potential of glutathione (EhGSH) and cysteine (EhCys). Correlations between continuous variables were assessed with two-way Pearson or Spearman correlation tests, as appropriate. Linear multivariate analysis was performed adjusting for age, sex, hypertension, diabetes, smoking, statin use, and history of cardiovascular disease.

Results: There was no association between changes in CRP, blood pressure, or lipid profile and the change in carotid VWA. However, an increase in carotid VWA was associated with a decrease in FMD at 12 months ($r = -0.28$, $P = 0.036$) and 24 months ($r = -0.31$, $P = 0.026$), a more oxidized EhGSH at 12 months ($r = +0.37$, $P = 0.006$) and 24 months ($r = +0.34$, $P = 0.041$), and a more oxidized EhCys at 24 months ($r = +0.35$, $P = 0.033$). After adjusting for aforementioned risk factors and statin use, a decrease in FMD ($P = 0.04$), and progression of oxidative stress [EhGSH ($P = 0.009$) and EhCys ($P = 0.032$)] remained independent predictors of progression of carotid atherosclerosis.

Conclusion: Worsening endothelial function and systemic oxidative stress burden are independent predictors of progression of carotid atherosclerosis. Thus, these markers may be useful for assessment of individual risk and for effectiveness of therapeutic interventions.