

Interaction of Blood Pressure and LDL Cholesterol in Early Atherosclerosis. The Los Angeles Atherosclerosis Study

Ping Sun, Kathleen M Dwyer, Noel Bairey Merz, Wei Sun, Lisa M Nicholson, Cheryl Nordstrom, James H Dwyer.

Background. The response to injury model of atherosclerosis has been investigated in animal models but not in epidemiologic studies. Relations between LDL cholesterol and carotid intima-media thickness (IMT) within levels of SBP provide a test of this model.

Methods. Data are from a longitudinal study of 573 randomly sampled asymptomatic employees of a large company aged 40-60 years. IMT and change in IMT over 18 months (Δ IMT) were determined sonographically in the common carotid artery. 497 subjects were available for cross-sectional analysis. To investigate interactive effects of SBP and serum LDL on IMT, linear slopes ($\beta \pm$ SE in mm/mmol/L) of IMT regressed on LDL were computed within SBP tertiles: Low 93-122, Middle 123-131, and High 132-175 mmHg. Covariates were age, body height, sex, body mass index, ethnicity, diabetes, smoking status, and treatment for hypertension or hypercholesterolemia. Analysis of Δ IMT in 414 subjects was similar.

Results. In cross-sectional models, IMT was positively related to LDL in the high SBP group ($\beta=0.028 \pm .008$, $p=0.0006$), but not in the middle ($\beta=-0.005 \pm .008$, $p=0.51$) or low ($\beta=-0.003 \pm .009$, $p=0.78$) SBP groups. These differences in slope between SBP groups were statistically significant ($p=0.004$ for high vs middle, $p=0.011$ for high vs low). Results were comparable for the longitudinal analysis: Δ IMT was significantly related to LDL in the high SBP group ($\beta=0.013 \pm .005$, $p=0.009$), but not in the middle ($\beta=-0.006 \pm .005$, $p=0.18$) or low ($\beta=-0.005 \pm .005$, $p=0.31$) groups. The differences in slope between SBP groups were again significant ($p=0.005$ and $p=0.010$, respectively).

Conclusion: These cross-sectional and longitudinal findings are consistent with the hypothesis that wall injury due to elevated SBP increases the susceptibility of the artery wall to LDL induced atherogenesis.