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 (∆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 (β±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 ∆IMT in 414 subjects was similar.

Results. In cross-sectional models, IMT was positively related to LDL in the high SBP group (β=0.028±0.008, p=0.0006), but not in the middle (β=-0.005±0.008, p=0.51) or low (β=-0.003±0.009, 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: ∆IMT was significantly related to LDL in the high SBP group (β=0.013±0.005, p=0.009), but not in the middle (β=-0.006±0.005, p=0.18) or low (β=-0.005±0.005, 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.