

Gender differences in the association of tobacco smoke and social class with subclinical atherosclerosis and atherosclerosis progression

D. Baldassarre^{1,2}, F. Veglia², M. Amato², A.L. Ravani², D. Sansaro², C. Tedesco², F. Bovis², B. Frigerio², and E. Tremoli^{1,2}, on behalf of the IMPROVE Study group.

¹Dipartimento di Scienze Farmacologiche e Biomolecolari, Università di Milano, Milan, Italy

²Centro Cardiologico Monzino IRCCS, Milan, Italy

The harmful effect of smoking on atherosclerosis and cardiovascular health is well established. Educational campaigns have been successful in reducing the number of smokers in men but not in women, where the number of smokers (initially lower than men) is even increasing.

Aim of the study: To investigate the gender differences in the association of tobacco smoke with subclinical atherosclerosis and atherosclerosis progression also taking into account the effects of other variables strongly associated with tobacco smoke: C reactive protein (CRP) and number of white blood cells (WBC) as inflammation markers, and education as an index of social class.

Methods: The IMPROVE Study cohort includes 1694 men and 1893 women (age 54-79 yr) at high risk of cardiovascular disease of five European countries. Baseline mean and maximum IMT of the left and right common carotids, bifurcations and internal carotid arteries and the fastest IMT-progression (15 months of follow up) detected in the whole carotid tree regardless of its location were computed. Associations were assessed by multivariable analysis adjusting for conventional cardiovascular risk factors and recruiting centre.

Results: Pack-years, a lifelong index of tobacco exposure, significantly associated with baseline C-IMT in both genders. However, the estimated C-IMT increase for each pack-year was more than double in women than in men (3.7 ± 0.7 vs. 1.5 ± 0.5 μm) with a significant gender \times dose interaction ($P=0.01$). Moreover, the estimated increase in the fastest C-IMT progression associated with a unit of cigarettes/day, an index of daily dose of tobacco exposure, was more than five-fold in women than in men (5.5 ± 1.3 vs. 1.0 ± 1.3 $\mu\text{m}/\text{yr}$), ($P\text{-int}=0.008$). Also the relationships between C-IMT and CRP ($P\text{-int}=0.015$), WBC ($P\text{-int}=0.011$) and education ($P\text{-int}=0.014$) were different in men and women. Gender differences were also observed considering the relationships between current smoking and CRP ($P\text{-int}=0.045$) and WBC ($P\text{-int}=0.049$). Finally, a significant gender difference was also found in the relationship between education and smoking exposure ($P\text{-int}=0.0003$).

Conclusions. The effects of tobacco smoking on cross-sectional subclinical atherosclerotic burden and on carotid atherosclerosis progression appear to be more harmful in women than in men, prompting studies on gender specific mechanisms and development of preventive actions expressly oriented to women. Inflammation and social class seems to be implicated in the complex interrelation between tobacco smoke, gender and subclinical atherosclerosis.