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Associations of black carbon with lung function in COPD patients

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Abstract

Introduction: Few studies have investigated the 24h respiratory health effects of personal exposure to carbon black (BC) and fine particles (UFP) in COPD patients.

Objective: A cross-sectional study was conducted on 50 male volunteers (VTs) with mild COPD (PT), 25 residing in areas with high traffic density and 25 in low traffic areas in Turin city (IT). 24h measurements of BC and UFP exposure concentrations were taken by a background monitoring station for one year and compared with respiratory function.

Methodology: 3 weekly spirometry tests were performed for one year on male VTs with the following demographic characteristics: average age 66 years,average weight 76kg,height 1.68m,body mass index 27kg/m2. A diary of sleep apnea was kept and the trends of forced expiratory volume in 1s (FEV1) and forced vital capacity (FVC) were determined.

Results: Higher traffic density was significantly associated with lower forced expiratory volume in 1s (FEV1) and forced vital capacity (FVC). Relative to the lowest quartile of traffic density,the adjusted differences between the rising quartiles were 5.2, −14.3 and −22.5ml for FEV1 (p-value of linear trend across quartiles=0.041) and 1.2, −23.5 and −34.9ml for FVC (p trend=0.010). Using distance from major roads as the simplest index of traffic-related air pollution exposure, the FEV1 was −15.9ml lower (95%CI −34.4to2.9) and the FVC was lower than −24.4mL

(95%CI −46.2to−2.3) for VTs living within 160m compared to subjects living further away. FEV1/FVC ratio was not significantly associated with traffic exposure.

Conclusion: VTs suffering from persistent respiratory symptoms and residing in busier areas appear to be more vulnerable to BC exposure and presented greater nocturnal dyspnea.

Air pollution COPD Spirometry

Footnotes

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