PLASMA FLUORESCENT OXIDATION PRODUCTS AND SHORT-TERM AMBIENT AND OCCUPATIONAL PARTICULATE EXPOSURES

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Background and Aims: Experimental evidence suggests that exposure to fine particulate air pollution results in oxidative induced tissue damage. To assess whether ambient and occupational particulate exposure in humans results in systemic oxidative stress, we used a novel fluorescent oxidation products (FLOx) assay measured in plasma samples.
Methods: Blood samples were collected from a total of 236 nonsmoking, Caucasian, male trucking industry workers either before, during, or after their work shifts. FLOx was measured as relative fluorescent intensity (FI) units per milliliter (FI/ml) of plasma. County-level ambient $PM_{2.5}$ exposures on the day of blood draw and the proceeding two days were determined based on US EPA monitors. Occupational exposures to $PM_{2.5}$ were based on job-specific area-level sampling, weighted by time worked prior to blood draw. Generalized linear models were used to determine associations between FLOP levels and the ambient and occupational exposures, adjusted for each other and age, alcohol consumption, aspirin, and cholesterol medications.
Results: Participants were 51.0 (SD=8.8) years old on average, had mean FLOx levels of 265.9 FI/ml (SD=96.0), and spent an average of 5 hours (range 0 to 17 hours) working prior to blood draw. Ambient $PM_{2.5}$ levels on the day of blood draw varied from 3.6 to 18.8$\mu g/m^3$ (mean=10.2$\mu g/m^3$) and occupational $PM_{2.5}$ levels varied from 0 to 87.0$\mu g/m^3$ (mean=16.4$\mu g/m^3$). Only 40 of the workers came in before work (occupational $PM_{2.5}$=0$\mu g/m^3$). In fully adjusted models, FLOx was positively associated with average ambient $PM_{2.5}$ levels on the day of blood draw, increasing 3.1 FI/ml (95%CI:0.6, 5.5) for each 1$\mu g/m^3$ increase in $PM_{2.5}$. No associations were observed between FLOx and occupational $PM_{2.5}$ levels.
Conclusions: Our results suggest a small, but positive association of recent ambient exposure to $PM_{2.5}$ with this novel marker of systemic oxidative stress. However, we did not observe the same relationship with occupational $PM_{2.5}$ exposures.