emission cars enter the city center without paying a charge, was implemented in 2008 with expectations of a 30% decrease in particulate matter (PM_{10}) levels. However, a field study conducted in 2009 showed no PM reductions in the city center, in spite of an objective decrease in vehicular traffic. Aerosolized black carbon (BC, also called elemental carbon) is a primary product of incomplete combustion and could be a better indicator of local air quality improvement than PM_{10}, which is more representative of background pollution. The aim is to study BC in assessing Ecopass impact on air quality compared to PM.

Methods: We measured BC and PM levels on the sidewalks of a radial metropolitan road characterized by 3 different traffic schemes: an outer segment without traffic restrictions, an intermediate one subject to Ecopass, and an inner pedestrian zone. BC was measured with a handheld analyzer (microAeth Aethalometer AE51, Magee Scientific, Berkeley, CA), while PM was measured with a laser-operated particle analyzer (Aerocet 531, Met One, Grants Pass, OR).

Results: PM levels were quite stable, with a mean ± standard deviation of 20.6 ± 3.2, 19.6 ± 2.2, and 21.2 ± 2.4 $\mu g/m^3$ for PM_1; of 26.5 ± 4.6, 24.2 ± 2.7, and 25.4 ± 2.7 $\mu g/m^3$ for $PM_{2.5}$; and of 69.0 ± 18.8, 54.5 ± 6.9, and 52.0 ± 7.1 $\mu g/m^3$ for PM_{10}, respectively for no-restriction, Ecopass, and pedestrian zone (significant only no-restriction/pedestrian zone for PM_{10}). On the contrary, for BC levels a progressive reduction was found moving toward the least polluted area, with 12.2 ± 4.6, 6.9 ± 1.5, and 3.0 ± 0.6 $\mu g/m^3$ for no-restriction, Ecopass, and pedestrian zone, respectively ($P < 0.0001$ for each comparison). $BC/PM_{2.5}$ ratios were also distinctive for each area, being 46.2 ± 5.2, 28.4 ± 2.1, and 11.7 ± 1.2, respectively ($P < 0.001$).

Conclusion: BC is more suitable than PM in detecting the impact of traffic restrictions on air quality.

S-29C2-1

The Effect of Traffic-related Air Pollution on Infantile Bronchiolitis and Susceptibility to Childhood Asthma

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Background/Aims: The present study was performed to evaluate the effect of pre- and postnatal traffic-related air pollution (PPTAP) on infantile bronchiolitis and childhood asthma through the life course approach. The relationship between PPTAP and bronchiolitis was investigated; then, the effect of the exposure to air pollution on the susceptibility to childhood asthma was analyzed, including interaction with the experience of bronchiolitis.

Methods: The present investigation involved 2754 children who participated in the study. Individual exposure to the environmental air pollution concentration was analyzed using geostatistical analysis and spatial statistical analyses. Individual exposure to traffic-related air pollution was calculated by the total length of nearby roads and the distance between the residence and nearby roads. A multiplicative model, which considered the interaction terms of multiple logistic regressions, was used to analyze the complex effects of various factors of PPTAP and the measured air pollution.

Results: The experience of bronchiolitis after birth was affected by the exposure to air pollution through particulate matter (PM_{10}) and CO, the early periods after birth with statistical significance. An incremental tendency toward bronchiolitis with the increasing total length of roads within 200 m from the residence was found. As for bronchiolitis according to the length of roads, within 200 m of the home and parental history of allergy, those with 200 m or more road length and parental history had more bronchiolitis (odds ratio [OR], 3.10; 95% CI, 1.62–5.92) than those without. Those whose parents were less educated and had prior experience of bronchiolitis showed higher OR when exposed to PM_{10} and CO above the upper limit, and increased length of roads. Moreover, the OR for bronchiolitis was the highest, when children were highly exposed to passive smoking and PM_{10}, born prematurely, and experienced longer nearby roads. The OR of asthma was calculated in relation to the experience of bronchiolitis and recent exposure to PM_{10}. Those with a history of bronchiolitis and with annual mean level of 50 $\mu g/m^3$ more exposure to PM_{10} showed the highest OR (9.39; 95% CI, 4.85–18.15) compared with those without these 2 risk factors. The OR of asthma was also calculated in relation to the experience of bronchiolitis and the total road length within 200 m of the home.

Conclusion: There are individuals who are especially susceptible to air pollution, and they have distinct characteristics compared healthy children. Children who suffered from bronchiolitis before the age of 2 years are at risk of asthma. Premature birth, passive smoking, air pollution, as well as allergy history of the parents, affect the risk of bronchiolitis before the age of 2 years, and are risk factors of the incidence of asthma thereafter. The reduction of PPTAP and passive smoking, therefore, are very important for the prevention of childhood asthma.

S-29C2-3

Traffic-related Air Pollution Is Associated With Aortic Distensibility in the Multi-ethnic Study of Atherosclerosis and Air Pollution

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Background/Aims: Long-term exposure to ambient and traffic-related air pollution is associated with cardiovascular disease, but the mechanisms remain uncertain. Research has demonstrated that measures of aortic distensibility and its reciprocal, aortic wall stiffness provide prognostic information independent of traditional risk factors for atherosclerosis. We hypothesized that exposure to traffic-related air pollution was associated with impaired aortic distensibility on magnetic resonance imaging (MRI).

Methods: We measured proximal aortic distensibility in baseline cardiac MRI examinations of the Multi-Ethnic Study of Atherosclerosis, among 3677 adults without clinical cardiovascular disease, aged 45–84 years. Distensibility is aortic strain divided by the product of minimal aortic lumen area and central pulse pressure. Of total, 83% (n = 3045) of participants with MRI had accurate address information for exposure assignment. Participants were considered exposed to traffic-related air pollution if their home was located within 100 meters (m) of a major highway, or within 50 m of a major arterial road at the baseline examination. We tested the association between distensibility and road proximity using ordinary least squares regression, adjusting for age, sex, race/ethnicity, education, smoking, environmental tobacco smoke, alcohol consumption, family history, waist-to-hip ratio, BMI, diabetes, physical activity, systolic blood pressure, cholesterol, C-reactive protein, homocysteine, and fasting glucose.

Results: Mean distensibility for the study population was 1.89 kPA-1·10–3 (standard deviation [SD]: 1.35). Approximately 30% of participants (n = 920) were classified as exposed to traffic-related air pollution. Regression results from the full model indicates that residential proximity to roadways was associated with a 0.116 unit decrease in aortic distensibility ($P = 0.02$). Results were attenuated when further adjusted for study site ($\beta = -0.103$, $P = 0.06$).

Conclusion: Increased aortic stiffness was associated with living very near a major roadway, but not with preliminary predictions of $PM_{2.5}$ concentrations, which are dominated by larger scale geographic variations in air pollution.

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