

AIR POLLUTION EXPOSURE AND TELOMERE LENGTH IN HIGHLY EXPOSED SUBJECTS IN BEIJING, CHINA

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Background and Aims. Shortened leukocyte telomere length (LTL) is a marker of cardiovascular risk that has been recently associated with long-term exposure to ambient particulate matter (PM). However, LTL is increased during acute inflammation, allowing for rapid proliferation of inflammatory cells. Whether short-term ambient PM exposure increases LTL has not been evaluated.

Methods. The Beijing Truck-Driver Air Pollution Study was conducted shortly before the 2008 Olympic Games (June 15-July 27, 2008) and included 60 truck drivers and 60 office workers. Personal PM_{2.5} and Black Carbon (BC, a tracer of traffic particles) measured during work hours using portable monitors, and post-work blood samples were obtained on two different days separated by 1-2 weeks. Blood LTL was measured by real-time PCR and expressed in relative units. Ambient PM₁₀ was averaged from 27 monitoring stations operating in Beijing. We have regressed log-transformed LTL over exposure variables (occupational group, personal PM_{2.5}, personal BC, or ambient PM₁₀) in mixed-effect models adjusted for age, gender, BMI, day of week, cigarettes/day, central heating, commuting time/day, outdoor temperature, and dew point.

Results. Mean personal PM_{2.5} was 126.8 µg/m³ (inter-quartile range[IQR]:73.9-160.5) in drivers and 94.6 µg/m³ (IQR:48.5-126.6) in office workers (p<0.001). Covariate-adjusted LTL means were higher in drivers (0.87, 95%CI:0.74-1.03) relative to office workers (0.79, 95%CI:0.67-0.93; p=0.001). In all subjects combined, we estimated a 5.2% (95%CI:1.5-9.1, p=0.007) increase in LTL per an IQR increase in personal PM_{2.5}. LTL was also positively correlated with personal BC (+4.9%, 95%CI:1.2-8.8, p=0.01), and with average ambient PM₁₀ on the study day (+7.7%, 95%CI:3.7-11.9, p=0.001) and over the two days before (+8.1%, 95%CI:3.1-13.3, p=0.002). Longer PM₁₀ averages (e.g., 5-day) were not associated with LTL.

Conclusions. Our study showed that short-term exposure to ambient PM is associated with increased LTL. LTL may favor leukocyte proliferation and sustain the inflammatory mechanisms associated with PM health effects.

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