

Specific metals in PM_{2.5} associated with HRV in the elderly with coronary heart disease: a community-based panel study

Exposure to PM_{2.5} is linked with cardiovascular mortality and morbidity, and the underlying biological mechanisms considering metals have raised increasingly concern. It has been an inevitable issue to assess associations of specific metal constituents with risk for cardiovascular health. To evaluate the exposure to specific chemicals of PM_{2.5} from various sources and their cardiac effects, a panel study was conducted with four repeated measurements of elderly participants' HRV and PM_{2.5} species in urban Beijing. Multiple metals and other PM_{2.5} bound chemicals were characterized for PM_{2.5} source apportionment and personalized exposure assessment. Five sources were identified with specific chemicals as the indicators: oil combustion (1.1%, V & PAHs), secondary particle (11.3%, nitrate & sulfate), vehicle emission (1.2%, Pd), construction dust (28.7%, Mg & Ca), and coal combustion (57.7%, As & Se). In addition, multiple metals including Pb, Ni, Zn, Cu, Cd, Cr, and Sb presented relatively high loadings in relevant sources. As observed, each IQR increases in exposure to PM_{2.5} significantly decreased rMSSD by 11.1% (95% CI: -19.6%, -1.9%) at lag 0 and 14.3% (95% CI: -26.2%, -0.21%) at lag 3. There were a 1.26-fold to 2.51-fold decrease in rMSSD with elevated exposure to Pb, Ni, Zn, Cu, Cd, Cr, and Sb at lag 0 compared to those of PM_{2.5} mass. While those of vehicle emission (Pd) and coal combustion (Se) had a 2.47-fold and 2.23-fold at lag 0 respectively, and those of oil combustion (V) with 1.82-fold at lag 3 compared to those of PM_{2.5} mass. Increased exposures to specific sources/constituents of PM_{2.5} disrupt cardiac autonomic function in elderly and have a stronger adverse effect than PM_{2.5} mass. In the stratified analysis, medication and gender modify the associations of specific chemicals from variable sources with HRV. The findings of this study provide evidence on the roles of influential metals of ambient air PM_{2.5} and their sources in terms of their adverse cardiovascular health effects.

Primary author: Dr CHEN, Xi (National Institute of Environmental Health, Chinese Center for Disease Control and Prevention)

Presenter: Dr CHEN, Xi (National Institute of Environmental Health, Chinese Center for Disease Control and Prevention)