

Carbon Black Particles Decrease Serum CC16 and Increase Sp-A and Affect Small Airway in Exposed Population and Mice

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Although the potential threat of superfine carbon black (CB) particles to human health has received attention, few human toxicological data are currently available. The purpose of this study was to investigate the relationship between serum CC16 or SP-A and small airway related pulmonary functions in CB workers. Ninety-nine male CB packers and 115 non-CB-exposed healthy male workers were recruited. Serum CC16 and/or SP-A and pulmonary function tests were evaluated and the relationship between them were also analyzed. To further assess the pulmonary damage induced by CB particles in target organ, an animal inhalation exposure study was conducted. The male C57BL/6 mice were exposed to CB for 6 hours per day for 28 days. The levels of CC16 and SP-A were evaluated by ELISA and immunohistochemical staining (IHC). The results showed that the medians of CC16 had a 20% decrease and SP-A had a 15% increase in CB workers. FEV1%, FEV/FVC, MMEF%, FEF25% and FEF75% were decreased in CB workers ($P < 0.05$). The significant positive correlation was observed between serum CC16 and FEV1/FVC, meanwhile an apparent negative correlation was found between serum SP-A and FEV1/FVC. In mice exposed to the CB particles, serum CC16 in high exposure group had a significant reduction of 72% and serum SP-A in low and high exposure groups were 1.65- and 1.17- times higher than the control group, respectively. Lung CC16 and serum CC16 levels were positively correlated in mice ($P = 0.024$). Long-term exposure to ultrafine CB particles can cause a decrease in CC16 and an increase in SP-A in peripheral blood of exposure workers. In conclusion, superfine CB particles have the potential to cause small airway obstruction.

Biography:

Dr. Zheng Yuxin is a Professor and Dean of School of Public Health at Qingdao University. From 1996 to 2016, Dr. Zheng held an appointment as an Associate Professor (1996-2000) and later Professor and Deputy Director (2000-2016) in National Institute for Occupational Health and Poison Control, China CDC. His research field is biomarkers in populations exposed to environmental pollution, industrial chemicals, metals, for biomonitoring. The association and mechanism of some biomarkers with disease phenotypes also studied. The research includes: (1) the industrial chemicals or byproducts, such as PAHs, trichloro ethylene, formaldehyde, lead and manganese; (2) air pollution, such as PM2.5 and diesel engine exhaust. He has authored for three books, 200 original research manuscripts. Dr. Zheng was an elected vice President of the Chinese Society of Toxicology (2009-2018). He has been invited as an Adjunct Professor of Peking University and University of Chinese Academy of Science.