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Sub-chronic exposure to fine particulate matter results in kidney injury and hypoperfusion.

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Objectives: Recent epidemiologic studies have shown significant association between exposure to fine particulate matter and chronic kidney disease incidence and progression to end stage renal disease. In our study, we examined the effect of sub-chronic exposure to inhaled fine particulate matter on renal injury in experimental rat model.

Methods: 36 week old Sprague Dawley rats were exposed to Carbon Black particles for 5 hours for 6 weeks in an exposure chamber within the fume hood with HEPA-filter. Carbon black concentration measured by Aerosol Mass Monitor was average 248.0 ± 39.4 for $PM_{2.5}$ and 384.3 ± 72.0 for PM_4 .

Results: Weight loss was apparent in rats exposed to carbon black. Renal perfusion was accessed by spectral computed tomography. As expected, direct inhalation of carbon black resulted in lung injury. Contrast enhanced images showed that renal perfusion was decreased and excretion was impaired in the exposure group (Figure 1). Exposed group showed increased inflammation and fibrosis, with prominent tubular injury in the kidney. There was an incremental relation of tubular injury with exposure time.

Conclusions: Air pollution by particulate matter may be an independent risk for acute and chronic kidney injury.

Figure 1

cortical enhancement

