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Oral Communication Abstract
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Withdrawal from exposure to particulate matter results in reversible changes in the kidney

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

Methods: 8 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 $PM_{4.}$ To decide the reversible effect of PM exposure in the kidney, mice were sacrificed 72 hours after withdrawal from PM.

Results: Whole body exposure resulted in increased systemic inflammation in PM exposure groups. Proinflammatory cytokines such as IL-6, MCP-1, TNF-α, as well as anti-inflammatory IL-1β, IL-10, IL-17 were significantly increased in PM exposed lung. Withdrawal from PM for only 72 hours resulted in significant decrease in expressions of cytokines in the lung. In the kidney, PM exposure resulted in increase in Nox4, IL-6, IL-17, HIF-2α expressions, which changes were reversed after withdrawal from PM for 72hours. Histologic changes showed that PM exposure induced tubulointerstitial changes in the kidney with increased infiltration of inflammatory cells, which were ameliorated with PM withdrawal. No significant fibrosis nor glomerular injury were observed in the kidney with 6-week exposure. PM inhalation in the chamber induced both inhalation and ingestion by experimental rats. Considering that emptying time of gastrointestinal tract in mice is within 24hours, 72 hours was considered sufficient for withdrawal.

Conclusions: Air pollution by particulate matter may be an independent risk for acute kidney injury. Using mask or staying in PM free zone even after potent exposure to high concentration PM may be helpful to prevent possible kidney injury.