European Respiratory Society
Annual Congress 2012

Abstract Number: 5144

Publication Number: P4783

Abstract Group: 6.2. Occupational and Environmental Health

Keyword 1: Air pollution **Keyword 2:** Inflammation **Keyword 3:** Monocyte / Macrophage

Title: Particulate air pollution on systemic inflammatory response: Roles of monocytes and neutrophils

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Body: Research has increasingly demonstrated the detrimental effects of air pollution on systemic human diseases. However, there has been little examination of the pattern and scope how neutrophils and monocytes respond to the inhalatants. We exposed C57BL/6 mice to ambient fine particulate matter (PM2.5) in a timely manner to investigate the roles of neutrophils and monocytes. C57BL/6 mice were exposed to PM2.5 or filtered air 6 hours a day, 5 days a week for up to 3 weeks in Columbus, OH in a versatile aerosol concentration enrichment system. The measurements were conducted at days 5, 14, and 21 for circulating inflammatory biomarkers via magnetic beads, leukocytes rolling and adhesion in mesentery via intravital microscopy, inflammatory responses in the lung and visceral adipose tissues via flow cytometry and immunohistochemical staining (IHS), and inflammatory chemotaxic responses via Boyden chamber. We found that both rolling and adhesion leukocytes were increased in mesentery, especially at days 14 and 21. Circulating MCP-1, IL-6, and TNFα were elevated, especially at day 5. There were increases in Ly6G+ (neutrophil) and F4/80+ (monocyte) expression from lung bronchoaveolar lavage by flow cytometry and lung and visceral adipose tissues by IHS, especially F4/80 expression throughout the time course. Boyden chamber assay also indicated that lung and visceral adipose tissues were “inflamed”, especially monocytes/macrophages after PM2.5 exposure. We concluded that, in this murine model of inhalational exposure to ambient PM2.5, the murine monocytes respond rapidly to chemokines locally (in the lung) and systemically (in visceral adipose tissue), which may not be accompanied by neutrophils.