

Ozone and LPS Effects on Lung Airway Elastin Fibers and Macrophages

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Exposure to ozone (O_3) is a risk factor for the development of acute respiratory distress syndrome (ARDS), a severe form of acute lung injury (ALI) with sepsis. ARDS causes inflammation in the lung, and pro-inflammatory macrophages produce elastase that breaks down elastin fibers, compromising lung structure and function. In this study, we investigated the effects of O_3 and lipopolysaccharides (LPS) on lung structure. LPS models ALI, triggering inflammation by mimicking sepsis. We hypothesize that exposure to O_3 and LPS induces changes in elastin fibers in the lung. C57BL/6 male 13-week-old mice were exposed to O_3 (800ppb, 3hrs) or air. Twenty-four hours post-exposure, animals were intraocularly injected with LPS (3mg/kg) or PBS (control) and sacrificed 48 hours post- O_3 or air exposure. Lungs were excised, fixed, embedded and 6-micron sections cut for histology and immunohistochemistry. Elastin fibers were evaluated using Verhoeff-Van Gieson stain. Proinflammatory M1 macrophages were identified in the large airway epithelium and alveoli using YM-1 (Chitinase-like protein 3). Both O_3 /PBS and O_3 /LPS induced degradation of elastin fibers in the large airways, whereas elastin fibers were contiguous in the control animals. YM-1 was expressed in both large airway and alveolar macrophages; O_3 /LPS > O_3 /PBS > Air/PBS. These data suggest that O_3 /LPS plays a role in the degradation of elastin fibers, possibly through the release of elastase from M1 macrophages. Future studies will investigate the effects of O_3 /LPS on M1 macrophage elastase production and the role of elastin fiber integrity on lung function in mice. Supported by NIH R25ES02072.

