Ozone (O\textsubscript{3}) is an urban air pollutant known to cause alveolar epithelial barrier damage and altered pulmonary functioning. EPA compliant levels of O\textsubscript{3} are linked to an increased incidence of acute respiratory distress syndrome, a severe form of acute lung injury (ALI). We previously showed that O\textsubscript{3} exacerbates sepsis-induced ALI by promoting neutrophil accumulation in the lung. In these studies, we analyzed the role of resident and inflammatory macrophages in this pathogenic response. Male C57Bl/6J mice were exposed to O\textsubscript{3} (0.8 ppm) or air for 3 h followed 24 h later by i.v. lipopolysaccharide (LPS) (2.5 mg/kg) to model bacterial sepsis or PBS control. Bronchoalveolar lavage (BAL) was collected 24 and 48 h later, and fluid analyzed for markers of lung damage (protein, IgM, phospholipids). BAL cells were magnetically separated based on Cd11b expression and subsets characterized by flow cytometry as resident alveolar macrophages (CD11b\textsuperscript{-} CD45\textsuperscript{+} SiglecF\textsuperscript{+} Ly6G\textsuperscript{-} CD11c\textsuperscript{+} F4/80\textsuperscript{+}), inflammatory macrophages (Cd11b\textsuperscript{+} CD45\textsuperscript{+} SiglecF\textsuperscript{-} Ly6G\textsuperscript{-} CD11c\textsuperscript{-} F4/80\textsuperscript{-}) and neutrophils (CD11b\textsuperscript{+} CD45\textsuperscript{+}SiglecF\textsuperscript{-} Ly6G\textsuperscript{+} CD11c\textsuperscript{-} F4/80\textsuperscript{-}). Lung damage was significantly increased in mice exposed to O\textsubscript{3}+LPS at 24 h relative to the other groups, a response correlated with increased numbers of neutrophils. At this time, Nos2, Il1\textbeta, Cxcl1, Ccl2, and Ptgs2 mRNA expression was upregulated in resident macrophages. By 48 h, lung damage abated and resident macrophage expression of these genes decreased, while Il4 and Arg1 expression increased suggesting a switch from an M1 (proinflammatory) to an M2 (antiinflammatory) phenotype. In O\textsubscript{3}+LPS treated mice, infiltrating macrophages increased in the lungs at 24 and 48 h post exposure. Whereas at 24 h, these cells were mainly Nos2 and Ptgs2 positive, by 48 h they were Arg1 positive indicating a similar phenotypic switch from a pro- to an anti-inflammatory phenotype. These results suggest that the O\textsubscript{3} exacerbation of ALI is due to early pro-inflammatory activation of resident and infiltrating macrophages, which release reactive nitrogen species and recruit neutrophils into the lung. Subsequent resolution of injury occurs as a consequence of macrophage phenotypic switching. Supported by NIH ES004738, ES005022, IRSS Donald E. Gardner Toxicology Education Award.