Animal Model of Susceptibility: Effects of Exposure to Ultrafine Carbon Black Particles on Respiratory Syncytial Virus Infection in Mice

Jeffrey Everitt, Amy L. Lambert. CIIT Centers for Health Research

Epidemiological studies have demonstrated that increased levels of particulate matter (PM) pollution in the ambient air are strongly correlated with increased morbidity and mortality in exposed populations, chiefly in individuals with preexisting pulmonary disease. Particle size contributes to these adverse health associations, and PM with a diameter of < 0.1 µm (ultrafine PM) is thought by some investigators to be the most toxic. Increased incidence and severity of symptoms associated with asthma and lower respiratory tract infections such as wheezing, bronchoconstriction, and cough have been reported in children and older adults following PM excursions. Respiratory syncytial virus (RSV) causes worldwide epidemics of respiratory disease each year and commonly afflicts infants (6 months to 1 year old), immunocompromised individuals, and older adults (60+ years old). Severe RSV infection is strongly associated with wheezing, childhood asthma, and repeated episodes of bronchospastic bronchitis, which can continue into adulthood. The primary aim of this project is to examine the effects of ultrafine PM on host defenses to RSV infection. The overall hypothesis of this project is that individuals with preexisting respiratory viral infection exposed to ultrafine PM have decreased host defenses and subsequent exacerbation of viral infection, including elevated pulmonary inflammation, lung function decrements, and reduced ability to clear the virus. A mouse model of RSV infection will be used to determine (1) the effects of ultrafine (UF) carbon black (CB) particles on the course of RSV infection in the lung and on pulmonary inflammation and lung function; (2) the effect of UF CB exposure on immune cytokine expression by RSV-infected bronchial epithelial cells; (3) the role of PM-induced cytokine production by RSV-infected bronchial epithelial cells in host defense to RSV. These studies will address for the first time the effects of ultrafine PM on pulmonary host defense to a viral infection in vivo and will provide mechanistic information regarding the pathophysiology of viral disease following PM exposure.

Start and end date: January 2003 – December 2003

Presentation(s):


This abstract was prepared by the principal investigator for the project. Please see www.USLRI.org for more information about the LRI.


Peer-reviewed publication(s):


Other publication(s):


This abstract was prepared by the principal investigator for the project. Please see www.USLRI.org for more information about the LRI.

Additional sponsors: None.

Preparation data: January 2006.