



Research: Gestational Exposure to Even Secondhand Cigarette Smoke May Promote Allergic Asthma and Bronchopulmonary Dysplasia in Children

Lead Scientist(s): Mohan Sopori, PhD, and Shashi Singh, PhD

Disease/Condition: Childhood Asthma

The incidence of childhood asthma is steadily increasing in the Western world; however, reasons for this rise are unclear. Increasing epidemiological evidence suggests that environmental factors are important in lung development and parental smoking strongly increases the risk of childhood allergic asthma, bronchopulmonary dysplasia (BPD), and chronic obstructive pulmonary disease (COPD).

To simulate children's exposure to parental smoking, scientists from Lovelace Respiratory Research Institute exposed pregnant mice to secondhand cigarette smoke at a concentration that was equivalent to a 3-hour daily exposure in a smoking bar or smoking just half a high-tar high-nicotine cigarette per day throughout the gestational period. Mice exposed to fresh air during pregnancy served as control.

The results from these experiments were quite dramatic. Mice that were exposed *in utero* to secondhand cigarette smoke developed extremely exaggerated allergic asthma than compared with control animals. In addition, cigarette smoke essentially blocked the production of airway surfactant proteins that are required for proper airway function and permanently affected septation and blood flow around the airsacs. This condition resembles human BPD. The permanent loss of normal airsac septation looked like adult emphysema, except in emphysema, pre-formed septae (alveolar walls) are dissolved, while in BPD the formation of septae is suppressed. Interestingly, similar exposure after birth had much weaker effects. Therefore, the results suggest that developing embryos are immensely susceptible to the noxious effects of cigarette smoke, and mothers who directly or indirectly inhale cigarette smoke during pregnancy are putting their children at very high risk of developing allergic asthma, BPD, and a COPD-like condition.