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Titel des Beitrags: Effects of ultrafine carbon particle inhalation on allergic inflammation of the lung.

Abstract: BACKGROUND: Epidemiologic studies show that exposure to particulate air pollution is associated with asthma exacerbation. Ultrafine particles (diameter<100 nm) may contribute to these adverse effects. OBJECTIVE: To investigate potential adjuvant activity of inhaled elemental carbon ultrafine particles (EC-UFPs) on allergic airway inflammation. METHODS: The effects of ultrafine particle inhalation on allergic airway inflammation was analyzed in ovalbumin-sensitized mice and nonsensitized controls. Particle exposure (526 microg/m3, 24 hours) was performed 24, 96, or 168 hours before or 24 or 72 hours after ovalbumin aerosol challenge. Allergic inflammation was analyzed at different time points after allergen challenge by means of bronchoalveolar lavage cell count and cytokine/total protein assays, lung histology, and airway hyperresponsiveness. RESULTS: In sensitized mice, inhalation of ultrafine particles 24 hours before allergen challenge caused a significant increase of bronchoalveolar lavage inflammatory cell infiltrate, protein, IL-4, IL-5, and IL-13 compared with relevant controls. These adjuvant effects were dose- and time-dependent and were still present when particle exposure was performed 4 days before allergen challenge. The adjuvant effect of ultrafine particles was also documented by increased mucus production, peribronchiolar and
perivascular inflammation, and enhanced airway hyperresponsiveness. In contrast, particle exposure in sensitized mice after allergen challenge caused only moderate effects, such as a delay of inflammatory infiltrate and a reduction of cytokines in bronchoalveolar lavage fluid. CONCLUSION: Exposure to ultrafine carbon particles before allergen challenge exerts strong adjuvant effects on the manifestation of allergic airway inflammation. Allergen-sensitized individuals may therefore be more susceptible to detrimental health effects of ultrafine particles.