Nitration Enhances the Allergenic Potential of Proteins

Background: Recent investigations have shown that proteins, including Bet v 1a, are nitrated by exposure to polluted urban air. We have investigated immunogenic and allergenic properties of in vitro nitrated allergens in in vivo models.

Methods: Untreated and nitrated samples of ovalbumin or Bet v 1a were compared for their ability to stimulate proliferation and cytokine secretion in splenocytes from DO11.10 or from sensitized BALB/c mice, and for their ability to induce specific immunoglobulin (Ig)G1, IgG2a and IgE in sensitized mice. Additionally, sera from birch pollen-allergic individuals were analysed for IgE and IgG specific for nitrated Bet v 1a.

Results: Upon splenocyte stimulation with nitrated as compared with unmodified allergens, proliferation as well as interleukin 5 and interferon-γ production were enhanced. Sera of mice sensitized with nitrated allergens showed elevated levels of specific IgE, IgG1 and IgG2a, compared with sera from mice sensitized with unmodified allergens. Moreover, cross-reactivity of antibodies against unrelated, nitrated allergens was observed in mice. We also found higher amounts of functional, specific IgE against nitrated than against untreated Bet v 1a in sera from birch pollen-allergic patients.

Conclusions: Our findings suggest that nitration enhances allergic responses, which may
contribute to an increased prevalence of allergic diseases in polluted urban environments.

Stichworte:
Air pollution; Bet v 1; Epitopes; Immunoglobulin E; Nitration; Nitrotyrosine; Ovalbumin

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