Release of LTB_4-like pollen associated lipid mediators ($PALM_{LTB4}$) from birch pollen in different air polluted areas in West and Southern Germany

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Background: Allergic diseases have increased in prevalence rates during the last decades world-wide. Among hypotheticals under discussion, lack of adequate stimulation of the immune system, improved hygiene, socio-economic factors (life style) as well as influence of environmental pollutants have gained substantial public and scientific attention. Pollen as a major cause of allergic rhinitis, function as allergen carriers that release allergens on contact with the aqueous phase of mucosal membranes. In addition, we recently demonstrated that pollen are a rich source of leukotriene B_4-like pollen associated lipid mediators ($PALM_{LTB4}$) which activate and stimulate both eosinophil and neutrophil leukocytes. In this study pollen from different polluted areas in West and Southern Germany were collected to delineate the impact of environmental factors on pollen in terms of $PALM_{LTB4}$ release and Bet v 1 amount.

Material and methods: We collected birch pollen at 50 locations in Bavaria and 43 locations in North Rhine-Westphalia (NRW). The study was performed in 2002 and 2003 during the birch pollen season. Each location was monitored for traffic-related air pollution, distance to next congested street, climate and phenology. After a drying period of 24 hours in a greenhouse, pollen were weighted and frozen at -70°C. The concentration of $PALM_{LTB4}$ were measured by commercially available enzyme immunoassays for LTB_4. Bet v 1 was determined using a sandwich ELISA with two Bet v 1 specific antibodies.

Results: In 2002 the geometric mean of $PALM_{LTB4}$ was significantly higher in Bavaria (551 pg/ml) compared to NRW (283 pg/ml). In 2003 the amount of $PALM_{LTB4}$ in pollen was higher in NRW (224 pg/ml) compared to Bavaria (159 pg/ml). In both years the $PALM_{LTB4}$ amount was higher in Bavaria in areas close to congested streets. Interestingly, $PALM_{LTB4}$ amount and Bet v 1 concentration correlated in both years negatively.

Conclusion: Pollen from West and Southern Germany differ significantly in their content of proinflammatory substances. Furthermore, air pollution seems to have an enhancing effect on release of $PALM_{LTB4}$ from birch pollen.