Persistent Aeroallergen Sensitization at Ages One and Two in the Cincinnati Childhood Allergy and Air Pollution Study

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Abstract

Rationale: Few studies have evaluated the longitudinal persistence of sensitization to a large number of aeroallergens in infants and young children.

Methods: Children born at least one atopogenic parent were skin prick tested (SPT) at ages one and two with the following categories of allergens: 1) Pollen (birch, grass, ragweed, and tree); 2) molds (Alternaria, Aspergillus fumigatus, Penicillium, and Cladosporium); 3) dust mite (Dermatophagoides pteronyssinus, D. farinae, and Blattella germanica); 4) animal fur and feathers; and 5) food (milk and egg).

Results: A total of 723 children were tested prior to age two, with 706 before the age of 12 months and 672 between the age of 10-50 months. Of the total tested, 52% (360) were tested twice, once at age one and again at age two. The prevalence of aeroallergen sensitization in these children decreased from 18.6% at age one to 15.6% at age two. About 64% of those sensitized to an aeroallergen at age one retained SPT+ to an aeroallergen at age two, the risk of persistent sensitization to pollen, mold, dust, and animal fur was 58.6%, 39.6%, 22.2%, and 38.4%, respectively. A positive SPT to pollens or animal fur at age one was significantly associated with persistent sensitization at age two in the same category of allergen (p < 0.05). A positive SPT to dust at age one was associated with persistent sensitization at age one (p < 0.01). Dust sensitization at age two was not associated with persistent sensitization at age one.

Conclusions: In general, infants sensitized to an aeroallergen at age one remained sensitized to at least one aeroallergen at age two. The risk of persistent sensitization to the same category of allergen, however, is much lower. The developing immune system, early environmental exposures, and genetics may all play a role in the pattern of aeroallergen sensitization which has been described. This ongoing study will determine the long-term consequences of infant aeroallergen sensitization and identify genetic and environmental factors which may be associated with very early development of persistent aeroallergen sensitization.

Objectives:

- Describe the prevalence and persistence of sensitization to specific aeroallergens in children at ages one and two.
- Determine aeroallergen sensitizations at age one which are predictive of other aeroallergen sensitizations at age two.
- Determine if infant sensitization at age one is predictive of persistent sensitization to specific aeroallergen at age two.

Methods:

- **Subjects:** Children of atopogenic parents with a skin prick test at a panel of 16 aeroallergens and 2 foods at ages one (6-18 months of age) and two (18-30 months of age).
- **Sensitization and Symptom Definitions:**
  - **New sensitization:** SPT+ at age two and SPT− at age one.
  - **Early sensitization:** SPT+ at age one and SPT− at age two.
  - **Late sensitization:** SPT− at age one and SPT+ at age two.
  - **Persistent sensitization:** SPT+ at age one and SPT+ at age two.
- **Analytic:** Logistic regression was utilized to determine which categories of sensitization and symptoms at age one were significantly associated with persistent sensitization at age two.

Summary:

- Children of atopogenic parents are sensitized as early as age one to multiple aeroallergens.
- Infants sensitized to an aeroallergen at age one remain sensitized to at least one aeroallergen at age two.
- The rate of persistent sensitization to the same category of allergen is low.
- The highest rate of persistent sensitization is pollen.
- Infants SPT+ to cockroach, dog, and ragweed at age one were most likely to be sensitized to a different allergen at age two.
- An infant’s developing immune system may be influenced by their pattern of sensitization.
- Environmental exposures in the first year of life coupled with genetic susceptibility may be associated with early persistent aeroallergen sensitization.

Future Directions:

- Early-life environmental exposures will be examined.
- Studies of air pollution exposure and sensitization will be expanded.
- Allergen challenge studies will be conducted.
- Genetic-environment interactions will be studied.

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