Sensitization Profiles to Peanut Allergen Components Across the United States of America

I. Background
IgE anti-peanut component serology is currently the most clinically predictive application of allergenic components in the diagnosis of human allergic disease. We have investigated the relationship between patient demographics (age, location) and rates of sensitization to peanut allergen components among subjects across the USA with suspected peanut allergy.

II. Methods
Sera from 12,155 individuals with peanut extract-specific IgE (sIgE) antibody ≥0.35 kUA/L were analyzed by Laboratory Corporation of America for IgE against Ara h 1, 2, 3, 8, and 9 by ImmunoCAP. The regional and age-dependent prevalence of component sensitization (values ≥0.35 kUA/L) and quantitative agreement between levels of IgE to peanut components and extract were evaluated.

Figure 1: Age dependency of component sensitization (≥0.35 kUA/L) for all 12,155 sera tested.

III. Results
79.1% of young American children (<3 yrs) were sensitized to one or more storage proteins (Ara h 1-3) in contrast to 62.1% of adolescents (12-15 yrs) and 22.1% of adults (≥20 yrs). While sensitization was more prevalent to Ara h 2 than to other storage proteins, a sizable fraction of patients were sensitized to Ara h 1 and/or Ara h 3 in the absence of IgE to Ara h 2, especially among children <3 yrs (11%), 8.9% of young children, 8.7% of adolescents and 5.3% of adults were sensitized to Ara h 9 (mLTP) while 2.0% of young children, 28.9% of adolescents and 8.9% of adults were sensitized to Ara h 8 (PR-10). Sensitization to Ara h 8 was more frequent in the Northeastern USA (62.1% of adolescents) relative to other regions (South: 44.5%; Midwest: 24.1%; West: 23.6%). 17% of peanut extract positive sera had IgE levels ≥0.35 kUA/L to all peanut components tested.

Figure 2: Proportional Venn diagrams displaying relative sensitization and co-sensitization to (A) seed storage proteins and (B) all components for two age groups (0-3 yr. olds and 12-15 yr. olds).

Figure 3: USA regional rates of positivity across the age groups for IgE antibodies specific for Ara h 2 (A), at least one of Ara h 1, 2 and 3 (B), Ara h 8 [PR-10] (C) and Ara h 9 (mLTP) (D). The data are graphed by regions of the USA [Northeast, South, Midwest and West] as defined by the U.S. Census Bureau.

IV. Conclusions
• Sensitization to individual peanut components is highly age and geographic location dependent.
• Primary peanut sensitization, as indicated by the presence of IgE to the storage proteins, was detected in a minority of the adult, peanut extract positive patients.
• Quantitative levels of IgE anti-peanut do not always agree with the sum of IgE anti-Ara h 1, 2, 3, 8, and 9 components.