Modelling the conversion between specific IgE test platforms for nut allergens in children and adolescents

Jennifer Hoang[1], Alper Celik[1], Christian Lupinek[2], Rudolf Valenta[2], Lucy Duan[3], Ruixue Dai[1], May Brydges[1], Aimée Dubeau[1], Claire Lépine[1], Samantha Wong[3], Mara Alexanian-Farr[3], Ahuva Magder[3], Padmaja Subbarao[3], Julia Upton[3], Klara Schmidthaler[2], Zsolt Szepfalusi[2], Arun Ramani[3], and Thomas Eiwegger[3]

[1]Hospital for Sick Children Research Institute
[2]Medical University of Vienna
[3]Hospital for Sick Children

May 28, 2020

Abstract

Background: Multiplex tests allow for measurement of allergen-specific IgE responses to multiple allergen extracts and components and have several advantages for large cohort studies. Due to significant methodological differences, test systems are difficult to integrate in meta-analyses/systematic reviews since there is a lack of datasets with direct comparison. We aimed to create models for statistical integration of allergen-specific IgE to peanut/tree nut allergens from three IgE-test platforms. Methods: Plasma from Canadian and Austrian children with peanut/tree nut sensitization and a cohort of sensitized, high-risk, pre-school asthmatics (total n=166) were measured with three R&D multiplex IgE test platforms: Allergy Explorer, ALEX (Macro Array Dx), MeDALL-chip (Mechanisms of Development of Allergy) (Thermo Fisher), and EUROLINE (EUROIMMUN). Skin prick test (n=51) and ImmunoCAP (n=62) results for extracts were available in a subset. Regression models (Multivariate Adaptive Regression Splines, local polynomial regression) were applied if >30% of samples were positive to the allergen. Intra-test correlations between PR-10 and nsLTP allergens were assessed. Results: Using two regression methods, we demonstrated the ability to model allergen-specific relationships with acceptable measures of fit (r2=94-56%) for peanut and tree nut sIgE testing at the extract and component-level, in order from highest to lowest: Ara h 2, Ara h 6, Jug r 1, Ana o 3, Ara h 1, Jug r 2, Cor a 9. Conclusion: Our models support the notion that conversion is reasonably possible between sIgE multiplex platforms for allergen extracts and components and may provide options to aggregate data for future meta-analysis.

Hosted file

`IgE Conversion_Main_v4.pdf` available at https://authorea.com/users/327416/articles/454983-modelling-the-conversion-between-specific-ige-test-platforms-for-nut-allergens-in-children-and-adolescents