**SUPPLEMENTARY MATERIAL & METHODS**

**Study design and participants**

This cross-sectional study was based on a non-selected cohort as described in detail previously [[1](#_ENREF_1)]. In short, 501 school children from schools in the region of Salzburg, Austria participated in this study. Participants were recruited from school grades 8 to 13, with an expected age range of 13–19 years. Samples were taken between October 2013 and May 2014. Written informed consents from participants and their legal guardian (if they were underage) were obtained. The study was conducted according to common ethical principles and approved by the local ethics committee of Salzburg, Austria, No. 415-E/1669/6-2013.

**Assessment of IgE sensitization**

Capillary blood samples were taken from the fingertip and incubated at room temperature for 15 min. Serum was separated from the blood cells by centrifugation at 14,000 rpm. Subsequently, serum samples were stored at 4 °C for transport and at -20 °C until further analysis. Specific IgE to single purified allergens from natural or recombinant sources was detected by means of the ImmunoCAP ISAC® (Thermo Fisher Scientific, Uppsala, Sweden). Serum samples of 30 µl were used for analysis according to the manufacturer’s protocol (Protocol No. 20-01-02-6). Fluorescent signals were measured with a confocal laser scanner (LuxScan-10K, CapitalBio, Beijing, China). Data analysis was performed in Phadia Microarray Image Analyzer (MIA) software and transformed into semi-quantitative ISAC Standardized Units (ISU). Specific IgE values ≥0.3 ISU were considered positive. Sensitization was defined as a positive IgE reactivity to at least one allergen on the ISAC chip.

**ISAC score sum**

To obtain a value that would reflect the overall IgE sensitization of each subject in terms of number of allergens reactive to and level of reactivity in ISU, the ISAC score sum was established. Therefore, for every participant each ISU value to a single allergen <0.3 was scored with 0, values ≥0.3 and <1 were scored with 1, values ≥1 and <15 were scored with 2 and values ≥15 were scored with 3. Single allergens were then grouped according to the manufacturers list of allergens and their respective sources and source families, resulting in 13 allergen source families. The highest ISU score in each of the allergen source families was taken into account for the ISAC score sum. Hence, the ISAC score sum ranges from 0 to 39, where higher values indicate a higher number of single allergen sensitization and higher ISU values to these single allergens. The cross-reactive carbohydrate (CCD) marker MUXF3 was not taken into consideration for this scoring. Details on grouping of allergens into families and examples of score sum generation are provided in Supplementary Table E1 and Supplementary Figure E1.

**Assessment of intrinsic data and lifestyle**

A detailed questionnaire composed of 56 questions was used in the study. Questions on **personal and intrinsic data** covered gender and age, height, weight, and age of the subjects as well as family size, parental education and information on allergic family members. Furthermore **early life influences**, *i.e.* vaccines received as a child, being breastfed as infant, being born by caesarean, and growing up on a farm were assessed. **Lifestyle factors** such as stress, sleeping habit, diet, spending time outside, sports, smoking, alcohol consumption and hormonal contraception were assessed. Subjects also indicated their exposure to environmental air pollution and passive cigarette smoke. Self-assessment was conducted according to a scale ranging from 1 to 5. In addition, the frequency of having a cold in the last two years was evaluated.

**Statistical analysis**

Assuming a 25-35% prevalence for allergic diseases in the general population, a sample size of n= ≥500 allows for a confidence interval margin of error of 4 percentage points when estimating overall prevalence. Margins of error are larger for subgroups determined by personal and lifestyle factors or combinations of those. Statistical analysis was performed with R in RStudio [[2](#_ENREF_2)] and GraphPad Prism 5 for Windows (GraphPad Software, Inc., La Jolla, CA, USA). As data were not appropriate for parametric or semi-parametric location shift models, analyses were based on a nonparametric statistical model assuming that each multivariate observation is a realization from a multivariate distribution. Influencing factors were analyzed with regard to sensitization in general, ISAC score sum and ISU values to single allergens by means of Fisher’s exact test for contingency data, Spearman’s rank correlation test or a two-sample rank sum (or Wilcoxon-Mann-Whitney) test. P-values <0.05 were considered as statistically significant. P-values are reported without multiplicity adjustment throughout the manuscript. The children’s BMI-for-Age was calculated using the online available “Group BMI Calculator, Metric, v1.0 –CDC” excel spreadsheet based on recommendations provided by Barlow et al. [[3](#_ENREF_3)]. Percentiles of male and female study participants were calculated for 486 individuals and grouped as <5th percentile being underweight, 5th - 85th percentile as normal weight, ≥85th percentile as overweight/obese.

**REFERENCES**

1 Stemeseder T, Klinglmayr E, Moser S, Lueftenegger L, Lang R, Himly M, Oostingh GJ, Zumbach J, Bathke AC, Hawranek T, Gadermaier G: Cross-sectional study on allergic sensitization of Austrian adolescents using molecule-based IgE profiling. Allergy 2016

2 R Core Team: R: A Language and Environment for Statistical Computing. Vienna, Austria, R Foundation for Statistical Computing, 2016,

3 Barlow SE: Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. Pediatrics 2007;120:S164-S192.