

Letter to the Editor



Spectrum of Allergen Sensitization to Food and Inhalant Allergens Across All Ages

Ju Hee Kim ,¹ WonKyung Cho ,² Jaewoo An ,¹ Eun Kyo Ha ,³ Wonki Lee,² Seung Won Lee ,⁴ Chang Ho Lee,⁵ Sohyun Hwang ,⁶ Youn Ho Shin ,⁷ Man Yong Han *

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Correspondence to

Man Yong Han, MD

Department of Pediatrics, CHA University School of Medicine, 59 Yatap-ro, Bundang-gu, Seongnam 13496, Korea.
Tel: +82-31-780-6262
Fax: +82-31-780-5239
E-mail: drmesh@gmail.com

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ORCID iDs

Ju Hee Kim
<https://orcid.org/0000-0002-4945-0753>
WonKyung Cho
<https://orcid.org/0000-0002-0290-8667>
Jaewoo An
<https://orcid.org/0000-0002-6390-5363>
Eun Kyo Ha
<https://orcid.org/0000-0001-8863-5729>
Seung Won Lee
<https://orcid.org/0000-0001-5632-5208>
Sohyun Hwang
<https://orcid.org/0000-0003-2461-6806>
Youn Ho Shin
<https://orcid.org/0000-0003-3227-5511>
Man Yong Han
<https://orcid.org/0000-0002-9077-5779>

¹Department of Pediatrics, CHA Bundang Medical Center, CHA University School of Medicine, Seongnam, Korea

²School of Medicine, CHA University, Seongnam, Korea

³Department of Pediatrics, Kangnam Sacred Heart Hospital, Hallym University Medical Center, Seoul, Korea

⁴Department of Data Science, Sejong University College of Software Convergence, Seoul, Korea

⁵Department of Otorhinolaryngology-Head and Neck Surgery, CHA Bundang Medical Center, CHA University School of Medicine, Seongnam, Korea

⁶Department of Pathology, CHA Bundang Medical Center, CHA University School of Medicine, Seongnam, Korea

⁷Department of Pediatrics, CHA Gangnam Medical Center, CHA University School of Medicine, Seoul, Korea

To the Editors,

Determining sensitivity to allergens is the first step in diagnosing and predicting the prognosis of individuals with asthma, allergic rhinitis and food allergies. Sensitization to allergens varies over the course of a lifetime, depending on the type of allergen.¹ To our knowledge, no comprehensive studies to date have assessed changes in sensitization to food and inhalant allergens throughout life. The purpose of our study was to shed light on sensitization to a large variety of allergens, including food and inhalant allergens, over a lifetime, in part through a cluster analysis based on cross-reactivity.²

This single-center retrospective study evaluated patients with suspected allergies who underwent multiplex specific immunoglobulin E (sIgE) tests. The study was approved by the Institutional Review Board (IRB no 2017-04-004) of our hospital. Serum sIgE concentrations were measured by multiplex tests (Polycheck Allergy [Biocheck GmbH, Munster, Germany] or Advansure [LG Life Science, Seoul, Korea]). Serum sIgE concentrations were classified into 6 classes according to the manufacturer's guidelines, with class ≥ 1 defined as positive. Hierarchical cluster analysis was conducted using R package. All statistical analyses were performed using R package (ver. 3.3.2) and IBM SPSS (Chicago, IL, USA).

During the study period, 13,326 subjects, consisting of 7,580 (56.9%) males and 5,746 (43.1%) females, visited our institution with suspected allergic disease and underwent serum IgE tests. The demographic and clinical characteristics, including the age distribution, of the study subjects are shown in **Supplementary Table S1**. Allergens were roughly divided into 2 groups with similar characteristics—clusters I and II—based on hierarchical clustering (**Figure; Supplementary Table S2**). Cluster I consisted of 24 allergens with low cross-reactivity, including indoor inhalants, egg, and milk. Cluster II consisted of 37 highly cross-reactive allergens, including outdoor inhalants, vegetables and fruits. In addition, milk was classified into the same allergen group as various animal epithelium and dander allergens,³ including

Disclosure

There are no financial or other issues that might lead to conflict of interest.

those from guinea pig, hamster, rabbit, horse, and sheep. Also, egg allergen was in the same cluster as mackerel and mold species allergens.

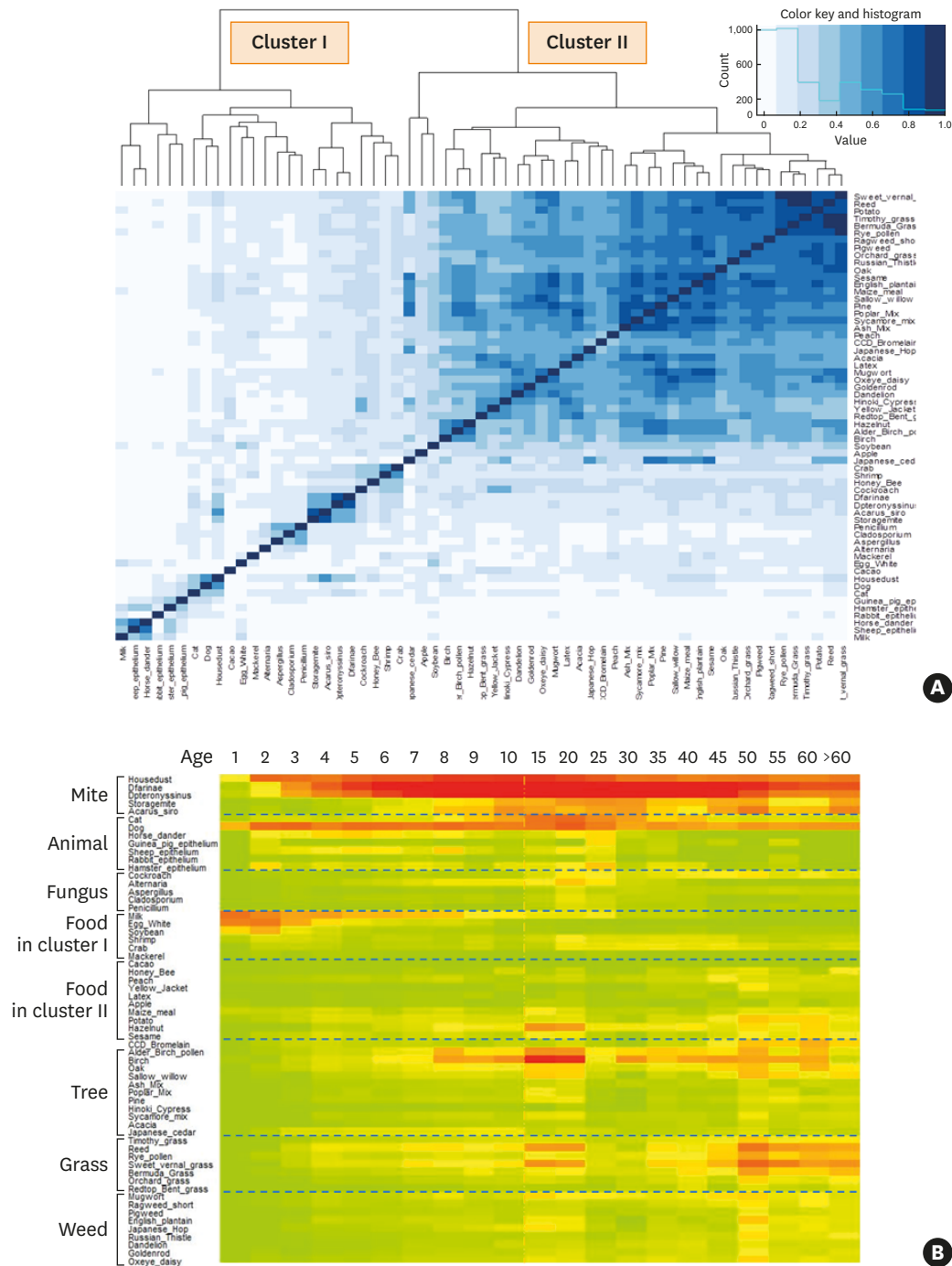


Figure. Hierarchical clustering and age-dependent sensitivities. (A) Hierarchical clustering of 61 food and inhalant allergens. Cluster I consisted of indoor inhalant allergens, eggs, and milk; whereas Cluster II consisted of outdoor inhalant allergens, vegetables, and fruits. In contrast to cluster II, cluster I is a collection of small heterogeneous groups. (B) Age-dependent sensitivities to 61 allergens. Mean sensitivities of each age group to each allergen are shown. Age-dependent sensitivities to cluster II components were similar, whereas age-dependent sensitivities to cluster I components were different. Darker color indicates a higher correlation coefficient.

The trends in allergen sensitization with aging are shown in **Figure B**. Interestingly, dog dander sensitization was high at most ages, while cat dander sensitization was highest at the age 20–29 years and lower than dog dander sensitization at most ages. Cockroach sensitization was lower in children under 10 years of age and increased at the ages over 20 years.⁴ Also, tree pollen sensitization was higher than that of grass or weed pollen at all ages. Sesame and peach, which have cross-reactivity with tree pollen, showed higher sensitization rates than other types of food allergen, and the trends of sensitization by aging were similar to tree pollen sensitization.

While previous studies have addressed sensitization to limited numbers of allergens during a follow-up period of up to 20 years,⁵ our study examined a larger and more diverse set of allergens across ages for a substantial number of patients with allergies. Although the question of whether this clustering was due to cross-reactivity or coexposure/sensitization remains unresolved, our results provide new insights into the trends of allergen sensitization by aging and cross-reactivity.

In conclusion, the trends in sensitization to allergens varied according to age. Allergens could be classified into 2 clusters by hierarchical clustering, with allergens in each cluster showing a similar trend. The present results expand our understanding of the comprehensive flow of allergic sensitization across ages and levels of cross-reactivity.

SUPPLEMENTARY MATERIALS

Supplementary Table S1

Demographic and clinical characteristics of study subjects (n = 13,326)

[Click here to view](#)

Supplementary Table S2

List of allergens in Clusters I and II

[Click here to view](#)

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