

LETTER TO THE EDITOR

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Learning from the Molecular Profile of *Blattella Germanica* Allergens Identified from Allergic Patients in Tehran, Iran

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Cockroaches produce several potent allergens associated with sensitization and the development of asthma¹. Sensitized individuals, living in urban places with high levels of cockroach infestation, are at risk of suffering serious allergenic reactions and developing asthma. Thus, sensitivity to cockroach allergens is being a major health problem in these areas.

Cockroaches are almost ubiquitous and their distribution in some countries such as Iran is increasing. The most important cockroach species found in this region belong to the Blattellidae family² including *Blattella germanica*, the German cockroach and *Supella longipalpa*, the brown-banded cockroach. Cockroaches produce several allergens that are involved in the sensitization of type I hypersensitivity or are the cause of allergic asthma. At least 29 allergens detected from German cockroach are implicated in allergic processes, including respiratory allergic diseases. These components have been described as proteins with molecular weights of 92, 80, 67, 48, 36, 27, 25 and 18 kDa.³

KEYWORDS;

Blattella Germanica; German cockroache;
Molecular profile; Sensitivity

Allergens characterized to date include Bla g 1, a 21-56 kDa heat-labile protein, Bla g 2, a 36 kDa heat-stable protein, an inactive aspartic proteinase, Bla g 3, a 78 kDa protein, a hemocyanin, Bla g 4, a 21 kDa protein, a lipocalin (calycin), Bla g 5, a 22-23 kDa protein, a glutathione-S-transferase, Bla g 6, Troponin C, a 18-21 kDa protein, a calcium-binding protein, Bla g 7, a 31-34 kDa protein, a tropomyosin, Bla g 8, a light chain myosin, Bla g 9, arginine kinase, Bla g 11, alpha-amylase, Bla g Trypsin, a 35 kDa protein, a serine protease, Bla g Enolase., Bla g RACK1, a receptor for Activated Protein Kinase C-like protein, Bla g Vitellogenin, an apolipoprotein, Bla g TPI, a triosephosphate isomerase and Bla g GSTD1, a 25 kDa protein, a glutathione-S-transferase (www.meduniwien.ac.at/allfam/, www.allergome.org, www.allergen.org).

In addition, Jeong et al⁴, demonstrated the presence of an important allergen in the fecal extract of German cockroach with α -amylase activity. The recombinant form of this allergen was used in ELISA, demonstrating the presence of specific IgE against this allergen in the 41.4% (12/29) of serum samples from German cockroach-sensitized subjects⁴.

On the other hand, Teifoori et al² demonstrated by immunoblotting that the 86% of 71 cockroaches sensitized Iranian patients' sera, showed specific IgE against a 53 kDa α -amylase (probably Bla g 11) present in the whole extract of *Blattella germanica*. These results revealed that this protein was a major allergen in the studied population.

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To identify this protein, a mass spectrometry analysis followed by a BLAST alignment of protein sequences of *Blattella germanica* was made. The results shown that there was a significant homology of the cockroach α -amylase protein with *Aspergillus oryzae* α -amylase (a 50% query cover; E-value: 4E-12). A new database search was made using the official Structural Database of Allergenic Proteins (SDAP). The SADP search revealed that there was a match of at least six contiguous amino acids between the α -amylase of *Blattella germanica* and the α -amylase of *Blomia tropicalis* (Blo t 4.0101), *Dermatophagoides pteronyssinus* (Der p 4) and *Euroglyphus maynei* (Eur m 4), which were also described as mite allergens. These data suggested that the 53 kDa α -amylase IgE-binding protein would be a new major allergen of *Blattella germanica*.

The World Health Organization and International Union of Immunological Societies (WHO/IUIS) Allergen Nomenclature Sub-committee reviews new allergen submission for nomenclature of allergens based on allergen characterization, structure, function, molecular biology, and bioinformatics and is responsible for maintaining and developing a unique, unambiguous and systematic nomenclature for allergenic proteins. After the above mentioned Sub-committee assess that the 53 kDa α -amylase IgE-binding protein fulfills the molecular and immunological requirements for including it into the international allergen nomenclature database, we can confirm the *Blattella* 53 kDa α -amylase as a major allergen.

Taking into account the analysis of the prevalence of sensitization to cockroach allergenic extracts in the

atopic population of Iran, other studies reported different findings showing a wide range of prevalence (13.7% to 42.2%).^{2,4} To the best of our knowledge, there are no studies about molecular diagnosis of *Blattella* sensitization in Iran and consequently, the prevalence of sensitization of *Blattella* α -amylase 53 kDa allergen in Iranian population is currently reported by Teifoori *et al.*²

The review of the literature suggests, as a concluding remark, that the molecular profile of *Blattella germanica* allergens depends essentially, on the allergic population studied and the geographic location of the mentioned population.

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