

Anaphylaxis to lipid transfer protein from sunflower seeds

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Although sunflower seeds have long been used as pet food for small animals, such as guinea pigs, rats and birds, recently people have also begun to eat dried sunflower seeds. In Europe, allergy to sunflower seeds may be associated with inhalant allergy to pollen from plants of the family

Compositae, especially *Artemisia* (mugwort)(1). Although several cases of anaphylaxis to

Sunflower seeds have the potential to cause severe anaphylactic reactions.

sunflower seeds have been reported, the seeds' sensitizing capacity and possible cross-reactivity have been unclear (2, 3). The aim of this study was to characterize the major allergen(s) in a patient who showed anaphylaxis to sunflower seeds.

A 22-year-old female, with histories of atopic dermatitis and Japanese cedar pollinosis, ate five pieces of sunflower seed chocolates made in Korea. Five minutes later, she experienced sudden nausea and dyspnea, followed by development of wheals all over her body. When she visited the emergency room in our hospital, wheezing was heard in the region of her larynx. Her bulbar conjunctiva was hyperemic. She was successfully treated with injections of epinephrine and corticosteroids. After

that, although she again ate chocolate confectioneries, no immediate allergic reactions occurred. She recalled having often eaten sunflower seeds as a snack during high school.

We performed skin prick tests (SPTs), the CAP assay (Phadia Diagnostics, Uppsala, Sweden), the enzyme-linked immunosorbent assay (ELISA), the ImmunoCAP® inhibition assay, immunoblot and immunoblot inhibition assays, and N-terminal sequence analysis.

SPTs were performed with the native protein extract from sunflower seeds and seven other *Asteraceae* family members (cirsium, burdock root, lettuce, chicory, tarragon, chrysanthemum, and dandelion) and four kinds of nuts (almonds, macadamia nuts, peanuts, and chestnuts). Although she showed positive reactions to the extracts of sunflower seeds in SPTs, she did not react to any of the extracts.

The level of serum IgE antibody specific for sunflower seed was high

(35.1 UA/ml, class 4). She also showed a high titer of IgE antibody specific for Japanese cedar pollen (27.2 IU/ml, class 4). On the other hand, her serum was negative for specific IgE antibodies against mugwort, birch, ragweed, dandelion, latex, chocolate, cacao, peanuts, almonds, Brazil nuts, and gelatin.

On ELISA using the extract from sunflower seeds, the patient's serum showed significantly higher absorbance than the controls ($P < 0.01$). In contrast, she showed negative reactions to the four kinds of nuts.

The ImmunoCAP® inhibition assay using the extract from sunflower seeds revealed suppression that depended on the concentration of the inhibitor (sunflower seed). The same test for Japanese cedar pollen with sunflower seeds showed no suppression. We identified several IgE-binding protein bands on the immunoblot assay using the extract from sunflower seeds, (13, 14, and 37 kDa) (Fig. 1). These IgE-binding

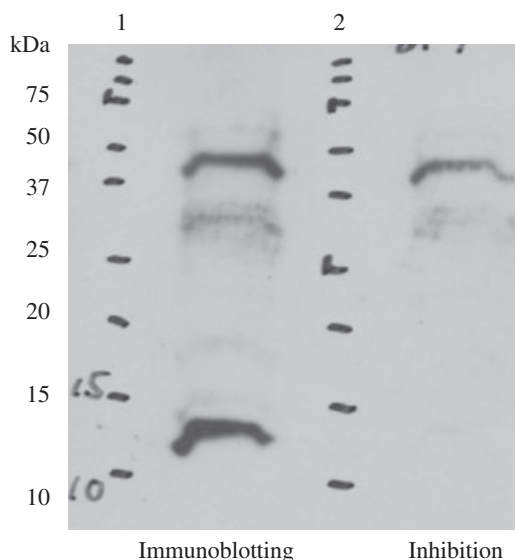


Figure 1 Immunoblotting (lane 1) and immunoblotting inhibition (lane 2) with sunflower seed.

protein bands were almost undetectable when using control sera. On the inhibition immunoblot assay using the extract from sunflower seeds, the IgE-binding signal of one band (13 kDa) disappeared completely.

The N-terminal amino acid sequence of the IgE-binding protein band (13 kDa) of sunflower seed closely matched lipid transfer protein (LTP) from sunflower seeds (prf:2719280A) (4) by computer homology search using the FASTA program (<http://fasta.genome.jp/>).

We present a patient with anaphylaxis to sunflower LTP with positive SPT and immunoblotting. Plant LTPs are basic polypeptides of ~9 kDa (91–95 amino acids), which have been identified as relevant. All LTPs are potent pan allergens, and their biological activity is favored by their resistance to heat and gastric reaction (5). Therefore, LTP is able to induce severe and systemic symptoms and sensitization by the oral route in fruit-

allergic patients who do not have associated pollen allergy (6).

This is the first case with a systemic hypersensitivity reaction to LTP from sunflower seeds. In conclusion, it is important to recognize that sunflower seeds have the potential to cause severe anaphylactic reactions.

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