

Anaphylaxis after hamster bites – identification of a novel allergen

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Summary

Background Hamsters are popular household pets and anaphylaxis after their bites have been described. However, the putative allergen has not been identified.

Objective This study was conducted to identify the allergen causing dwarf hamster (*Phodopus sungoris*) bite-induced anaphylaxis.

Methods Two children with hamster bite-induced anaphylaxis were enrolled. They both had negative results to skin testing and specific IgE to hamster epithelium. However, they were both allergic to *Dermatophagoides pteronyssinus* (Der p). Identification of the putative IgE-binding allergens from the hamster saliva was performed using immunoblot analysis.

Results A specific IgE-binding component at 21 kD in the hamster saliva was identified. ELISA inhibition tests showed partial inhibition with Der p.

Conclusions The putative allergen from the hamster saliva causing dwarf hamster-induced anaphylaxis was identified. Possible cross-reactivity with Der p was demonstrated. Further studies will be needed to identify the exact nature and function of this allergen.

Keywords anaphylaxis, *Dermatophagoides pteronyssinus*, hamster bites, *Phodopus sungoris*, saliva

Submitted 26 August 2003; revised 13 January 2004; accepted 24 March 2004

Introduction

Hamsters are becoming increasingly popular household pets. There have only been a few case reports of anaphylaxis after the bite of hamsters [1–3] and the putative allergen has not been identified. We describe two children with symptoms of anaphylaxis after being bitten by their pet dwarf hamster (*Phodopus sungoris*). The putative allergen from the dwarf hamster saliva was identified using the patients' sera.

Methods

Study subjects

Two children were admitted to The Children's Medical Institute, National University Hospital, Singapore with symptoms of anaphylaxis after being bitten by their pet hamsters.

The first patient was a 13-year-old Chinese girl with a known history of asthma, allergic rhinitis and *Dermatophagoides pteronyssinus* (Der p) allergy. She has kept a pair of dwarf hamsters for the last year and was bitten on three previous occasions but did not develop any symptoms after the bites. On the day of admission, she was bitten once on her index finger and within 5 min, she developed generalized urticaria associated with angioedema. The symptoms resolved within 24 h with intravenous hydrocortisone and antihistamines.

The second patient was an 11-year-old Japanese boy with a history of asthma and Der p allergy. He was also bitten on numerous occasions with no untoward effects. On the day of admission, he was bitten on the second finger and within minutes began sneezing and developed generalized urticaria and angioedema. In the emergency room, he also was noted to be wheezing but his blood pressure was normal. He received subcutaneous epinephrine, nebulized salbutamol, intravenous hydrocortisone and antihistamines. His symptoms resolved within 24 h.

The sera from the two children were obtained with informed consent. The patients' hamsters that induced the reactions were used for this study. Skin testing was performed with the commercially available hamster epithelium extract (Greer, NC, USA). The detection of specific IgE to hamster epithelium was done using CAP System IgE FEIA (Pharmacia Diagnostics, Uppsala, Sweden).

SDS-PAGE and IgE immunoblot assay

The hamsters were subjected to anaesthesia before collection of their saliva. Blots were using 7.5% tricine SDS-PAGE and the IgE immunoblot was performed according to a previously described protocol [4].

Inhibition ELISA

Inhibition ELISA was performed according to a previously described protocol [4]. Each well was coated with 50 µL of 50 µg/mL of the hamster saliva or Der p extract. The Der p extracts were obtained from the paediatric allergy laboratory of the National University of Singapore.

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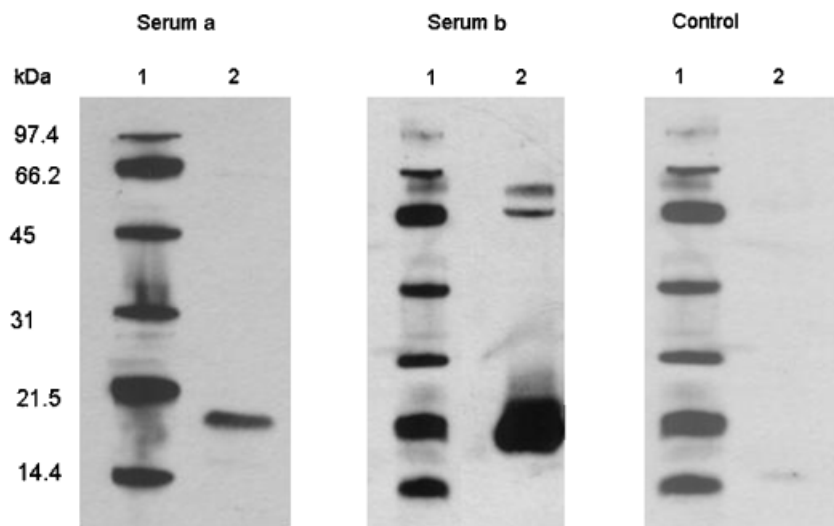


Fig. 1. IgE immunoblot with sera from the two patients (a and b) and a control serum. Blots showed a common allergenic protein in the dwarf hamster saliva at the 21 kDa region reacted with both sera a and b. Lane 1: molecular weight marker and Lane 2: Dwarf hamster saliva.

Results

Skin prick tests and specific IgE

Both patients had negative reactions to the skin tests and specific IgE to the commercially available hamster epithelium extract. Skin prick testing using the dwarf hamster saliva extract was not performed as both children experienced anaphylactic reactions.

SDS-PAGE and IgE immunoblot

The 7.5% SDS-PAGE analysis of the dwarf hamster saliva resolved into four bands ranging from 14 to 115 kD. The band at 21 kD bound to the IgE antibody in both patients and this was not present in the control serum. There was also a 66 kD band that was recognized by one patient (Fig. 1).

IgE ELISA inhibition assay

After absorption with Der p extract, there was a 41.25% reduction in IgE reactivity of the hamster saliva. Absorption with hamster saliva showed an 83.75% reduction.

Discussion

Anaphylactic reactions to hamsters have been increasingly recognized [1–3]. Allergens from rodents have been well characterized [5] but the allergen from the hamster causing anaphylaxis has not been well studied. This report describes two cases of hamster bite-induced anaphylactic reactions and is the first study to identify the putative allergen from the hamster saliva.

In both patients, routine allergy testing using the commercially available hamster epithelium extracts was negative. However, the hamster epithelium extracts are derived from different species of hamsters – the skin test (Greer, NC, USA) is derived from *Cricetus cricetus* and the allergen used for specific IgE (Pharmacia, Sweden) is derived from *C. cricetus* and *Melocricetus auratus*. This may imply that testing has to

be species specific. Moreover, as the putative allergen is present in the hamster saliva, these tests that contain the hamster epithelium are inappropriate to detect this type of allergy.

The immunoblot analysis revealed an IgE-binding component at the 21 kD region. This finding confirmed it was the hamster saliva that induced the IgE-mediated allergic reactions in these patients. The exact function of this allergen is not known. The precise structure and function of this allergen need further investigation.

Both patients were allergic to Der p and this has also been shown to be a concomitant feature of patients in another case report [1]. ELISA inhibition demonstrated partial inhibition with Der p extract implying possible cross-reactivity between Der p and the dwarf hamster saliva allergen.

In conclusion, we have found that anaphylaxis due to dwarf hamster bites is an IgE-mediated reaction to a 21 kD protein found in the saliva. This has important consequences with regard to the diagnosis of such patients, as currently available skin tests using hamster epithelium extracts will be negative. As cross-reactivity with Der p was found, it is possible that individuals with house dust mite allergy are more susceptible to hamster bite-induced anaphylactic reactions. Hamsters are becoming increasingly popular pets and physicians should be alerted to this clinical entity.

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