Occupational allergy to transglutaminase in a chef – a case story

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Introduction

Enzymes are well known as sensitizers and causes of occupational allergy primarily in the industries producing and using the products. We present a case of occupational contact urticaria, rhino-conjunctivitis and asthma in a 32-year male chef who used a transglutaminase powder, also known as meat glue. This transglutaminase is industrially produced by fermenting *streptomyces mobaraense* and has been used for industrial protein food preparation since 1992 to improve protein texture of rich foods (e.g. surimi or ham).
In this case story, transglutaminase powder was used in small scale in a gastronomy restaurant kitchen by spraying the powder over raw meat with a sieve without any protective equipment in contrast to the producer's recommendation. The chef was also found allergic to several dried, edible mushrooms, one of which (horn of plenty) was part of the meat dish prepared with the transglutaminase powder. Besides the contact urticaria and airway response, the patient on one occasion also had a reaction with itching and swelling of the oral mucosa, stridor, face angioedema, and urticaria after ingesting a meat dish treated with transglutaminase and rolled in unheated dried horn of plenty mushroom powder.

Methods

The patient was tested by Skin Prick Test (SPT), peak flow measurements and pulmonary function test.
Patient blood was used for Histamine Release Test (RefLab, Copenhagen, Denmark) and ELISA measurement of sIgE. The ELISA assay was performed in wells coated either with 20 µg/ml of horn of plenty or 500 µg/ml of transglutaminase powder I. A serum pool of healthy controls was run alongside patient serum. sIgE was detected using HRP-coupled anti-IgE.
An inhibition ELISA was made by incubating 10% serum with 5, 50 or 500 µg/ml transglutaminase powder I prior to ELISA with horn of plenty.

Results

SPTs were positive to both transglutaminase powders tested and negative to the powder additives (maltodextrine, miprodane and lactonate). SPTs with the transglutaminase powders were negative in a control subject. In addition, the patient had positive SPTs to horn of plenty, three other mushroom powders (porcini, dotted stem bolete, king trumpet) and cat. SPTs were negative to meat from cow, pig, lamb, other mushrooms, common food allergens, pollens, dog, horse, house dust mites and moulds.
Peak flow measurements during weekdays showed a 21% variation with reduced values at the end of workweeks. Exhaled NO (FeNO) was measured to be 70.4 ppb when exposed, falling to 27.9 ppb after terminated employment. FEV1 and FVC were normal.
Histamine Release Test with the two transglutaminase powders and horn of plenty were positive.
ELISA measurements showed high binding of sIgE in patient serum to transglutaminase powder I as well as binding to horn of plenty compared to the control serum.
Pre-incubation with transglutaminase powder I could not inhibit sIgE binding to horn of plenty, illustrating no cross-reactivity.

Conclusion

We present to our knowledge the first case of occupational enzyme allergy to transglutaminase powder used in molecular gastronomy. No cross-reactivity was found to the mushroom horn of plenty, indicating that this is two different allergies.