

Brief communications

α -Amylase contained in bread can induce food allergy

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Enzymes from different sources are being used increasingly in food. To compensate for a low content of natural amylase, α -amylase, currently obtained from *Aspergillus oryzae*, is added to wheat flour to enhance carbohydrate fermentation by yeast. This improves the rising of dough and the quality of bread. Occupational asthma related to α -amylase has been reported in bakers.¹ The frequency of sensitization in exposed workers ranges from 24% to 34%.^{2,3} Nevertheless, no cases of food allergy to α -amylase induced by eating bread have been reported so far.

CASE REPORT

We recently encountered a case of worsening asthma in a 34-year-old woman. She had had asthma since she was 14 years old. In 1976, she married a baker and soon thereafter experienced asthma when working in the bakery. An allergist diagnosed allergy to wheat flour; so she stopped working in the bakery, and the family moved to a house that was located far away from the bakery. However, her asthma worsened, and in addition, she had perennial rhinitis. She first came to our attention in 1993. At that time, skin prick tests (SPTs) with common aeroallergens and food allergens revealed only sensitization to house dust mites. SPT responses to cereal pollens and various flours were negative. SPT response was, however, strongly positive to uncooked *Aspergillus oryzae* α -amylase (1 mg/ml; Gist-Brocade, Seclin, France), with a wheal diameter of 10 mm; the positive 9% codeine control was 5 mm in diameter. The SPT also induced a systemic reaction with nasal pruritus, rhinorrhea, and wheezing. SPT responses to cooked α -amylase (100° C for 30 minutes) measured 4 mm. SPT responses to α -amylase from *Bacillus subtilis*, amylo-1,6-glucosi-

Abbreviations used

DBPCFC:	Double-blind placebo-controlled food challenge
PEFR:	Peak expiratory flow rate
SPT:	Skin prick test

dase, protease, papain, hemicellulose, soy lipoxygenase, and ammonium persulfate (Sigma Chemical Co., St. Louis, Mo.) were all negative. IgE specific for *Aspergillus* α -amylase was detected in the patient's serum at a level of 2.42 KUI/L (Cap-RAST Phadebas; Pharmacia, Uppsala, Sweden).

We performed double-blind placebo-controlled food challenges (DBPCFC) when the patient's asthma was well controlled. First, a labial provocation test with uncooked α -amylase induced labial pruritus and erythema of the cheeks. The DBPCFC with 5 mg of uncooked α -amylase induced cough, wheezing, and a decrease in peak expiratory flow rate (PEFR) of 27% within 30 minutes. A bronchodilator (salbutamol) was then given to the patient, and it induced a rapid improvement of pulmonary function. Six hours later, we noted a late-phase reaction with a decrease in PEFR of 50%. A second DBPCFC was performed with 10 mg of cooked α -amylase, and it was followed 15 minutes later by cough, wheezing, and a fall in PEFR of 21%. A fall of 17% in PEFR was noted 5 hours later. Challenge test with 50 gm of crumbs from the loaf induced wheezing and urticaria 2 hours later.

We suggested that the patient avoid all bakery products containing α -amylase. She followed our advice, and her improvement was then complete: she had no asthma attacks during the subsequent 4 months.

DISCUSSION

This observation indicates that α -amylase contained in bread may evoke food allergy, including chronic asthma, in sensitized patients. It is worth noting that in this case, the only source of α -amylase was bread, because the patient's husband took particular care to leave his work clothes at the bakery. The patient's allergic reaction could be induced by both cooked and uncooked α -amylase, which demonstrates that cooking did not destroy

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the allergenic activity of this enzyme. A positive challenge response to 10 mg of uncooked α -amylase in a pharmaceutical worker who was exposed to powdered *Aspergillus* α -amylase was reported previously. In that case, the ingestion of bread was tolerated without any symptoms. The use of α -amylase as an additive has been authorized in France since 1983. The amount of α -amylase contained in bread is not negligible: French bread contains approximately 4 to 18 mg of the enzyme per 100 gm portion.

This case study points out the risk of masked food allergy to α -amylase.⁴ Indeed, α -amylase is used not only in baked goods and sweets but can also be present in starch, fruits, vegetables, beverages, sugar, honey, and diet foods.⁵ Thus new cases of food allergy to this substance are likely to occur in the future. We suggest that this possibility be

considered systematically in cases of allergy to foods.

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The effects of nebulized recombinant interferon- γ in asthmatic airways

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Recombinant interferon- γ (rIFN- γ) is an immunomodulatory cytokine known to inhibit IgE synthesis and T_{H2} cell proliferation and function.¹ These observations suggest a potential role for rIFN- γ in the treatment of allergic diseases.

In a double-blind, placebo-controlled trial, we have previously shown that patients with atopic dermatitis treated with subcutaneous rIFN- γ demonstrate clinical improvement along with a significant decrease in circulating eosinophil counts compared with placebo-treated control patients.² On the other hand, patients with steroid-dependent asthma treated with subcutaneous rIFN- γ

Abbreviations used

BAL:	Bronchoalveolar lavage
FEV ₁ :	Forced expiratory volume in 1 second
IL:	Interleukin
rIFN- γ :	Recombinant interferon- γ

showed no improvement, although they did have an observed decrease in circulating eosinophil counts.³ One explanation for this might be that the subcutaneous rIFN- γ did not exert a biologic effect in the airways. Indeed, Jaffe et al.⁴ have shown that subcutaneously administered rIFN- γ , given over a 3-day period, does not reach the respiratory epithelial surface. We recently examined the feasibility of administering rIFN- γ by nebulization into the airways of normal subjects and found that rIFN- γ could be delivered safely and effectively over a 12-day interval.⁵ This pilot study was therefore undertaken to evaluate the effects of nebulized rIFN- γ in patients with mild atopic asthma.

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