

Correspondence

Bronchial challenge tests in baker's asthma

To the Editor:

The recent article by Merget et al. (J Allergy Clin Immunol 197;100:199-207) compares a bronchial challenge with wheat flour dust with aqueous wheat flour extract inhalation. The authors do not know why three control atopic subjects without prior exposure to flour had positive bronchial reactions to wheat extract, among them two subjects with severe asthma. None of them showed skin sensitivity to wheat flour.

Wheat flour allergens are immunologically partially identical with antigens of rye flour and common grass pollen. Also, the allergens involved in baker's asthma are not only cereal allergens. A bakery may expose workers to mold and mite contaminants in flour¹ and additives used in baking. The atopic control subjects may be sensitive to pollen or mites.

Recently, we identified the main allergens of wheat, barley, and rye.² They belong to a single family of seed-specific inhibitors of insect and mammalian α -amylases that are used as a biologic defense against insect parasitization. Eleven purified members of this family that showed very different IgE-binding capacities when tested in vitro were used in double-blind in vivo diagnostic tests to evaluate their allergenic activity. The glycosylated subunits of the tetrameric α -amylase inhibitors CM16* from wheat and CMB* from barley and the barley monomeric inhibitor BMAI-1 were found to be the strongest allergens by skin sensitivity and bronchial challenge. Thus patients with negative skin prick and challenge test responses to commercial extracts had positive responses in bronchial challenges with these purified allergens.

The major cereal glycoprotein allergens carry a single asparagine-complex glycan that contains both α -1-3 fucose and β -1-2 xylose.³ These residues are epitopes key to the allergenicity of these and unrelated glycoproteins from plants and insects that could have sensitized these patients previously.

The numbers of proteins involved in the development of cereal hypersensitivity is greater than previously believed.⁴ This common occupational asthma has diverse allergenic causes, and as yet unknown allergens may be needed for diagnosis.

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Reply

To the Editor:

Armentia et al. present a case of a positive challenge with a purified α -amylase inhibitor, but a negative challenge with a commercial wheat flour extract. Although this is an interesting observation, we note that in our experiments we had probable false-positive reactions and not false-negative ones. Armentia et al. do not provide any information about the doses of allergen administered in both challenges.

The amount of cross-reactive allergen or allergens might be enriched in flour extracts compared with flour dust depending on the method of extraction and solubility of the allergens. Water/salt-insoluble proteins probably play a role that explains the variability of different wheat flour preparations. Water-insoluble gliadins and glutenins are important in the development of specific IgE and cereal hypersensitivity.¹⁻³ The α -amylase inhibitors identified by Armentia et al.⁴ are water-soluble, easy to extract, and dissolve rapidly from airborne particles. Therefore these allergens are not likely to explain the differences we observed between the application of native wheat flour or extract in the challenge test.

In our article we reported only the maximal skin prick test reactions to environmental allergens. There was no sensitization to grass pollen in the three control subjects with a positive wheat extract challenge response. One individual was sensitized to tree pollen only, and the second was sensitized to both tree pollen and animal dander. The third was sensitized to house dust mites, but the two latter subjects had also small reactions to maize flour (4 mm and 2 mm diameter wheal reaction). Immunologic cross-reactivity between wheat flour and corn flour proteins was described by Block et al.⁵ Whether this is the reason for the false-positive responses is speculative. It is possible that the flour extract we used for challenges was contaminated with allergens to which the control subjects were sensitized. Nonspecific reactions are unlikely because the extract was free from glycerol and other irritants.

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