

sensitive than the "gold standard" of manometry or that there are considerable numbers of false-positive results. The explanation that dysmotility is intermittent, so that concordance between the two tests should not be expected, cannot be correct since radionuclide tests are always more frequently abnormal than manometry.

To establish that a patient with recurrent chest pain has an oesophageal cause for his symptoms provocative tests should be done. It is clear, however, from the paper of de Caestecker and colleagues that most patients with non-cardiac chest pain do not have an oesophageal cause for their pain. In our experience most of these patients are women with atypical chest pain in whom the pain is a somatisation of underlying psychiatric disease.^{6,7} After exclusion of a cardiac cause for the pain, investigation of another intrathoracic organ, as suggested by de Caestecker et al, before considering a psychiatric cause would seem wasteful, potentially dangerous (since the investigations are invasive), and counterproductive (since the belief that the pain is physical is reinforced).

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ROLE OF ASPERGILLUS AMYLASE IN BAKER'S
ASTHMA

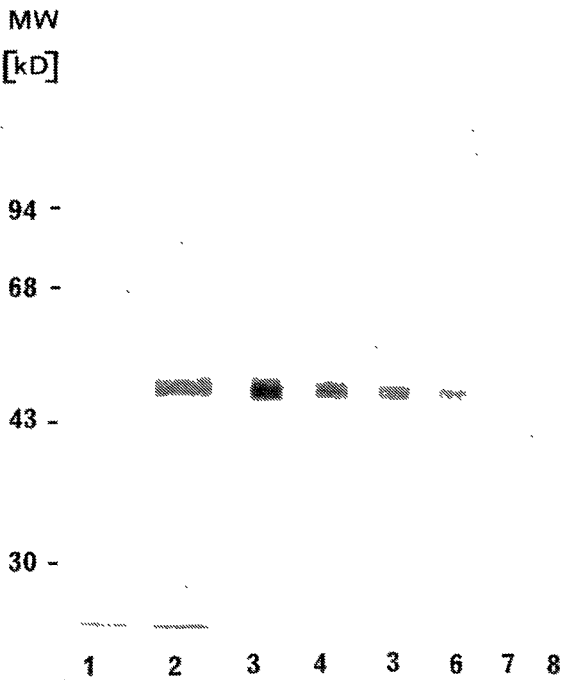
SIR,—Allergy to flour dust has been known since 1700¹ and it is one of the most common causes of occupationally related obstructive airway disease. The frequency of sensitisation in bakers, millers, and grain workers varies from 2 to 40%.² We have identified an important non-flour antigen, an enzyme of *Aspergillus oryzae*. α -amylase from *A. oryzae* is added routinely to baking flour to compensate for the low natural content of amylases and thus of carbohydrates fermentable by yeast. α -amylase stimulates the growth of *Saccharomyces*, improving the rising of the dough and the quality of the bread.

We studied 118 people who had worked in bakeries or confectioners' for 1 to 45 years (mean $\pm$ SD=14 $\pm$ 12). 91 were screened at random for symptoms and 27 had consulted our outpatient department because of workplace-related complaints. 35 people regularly had bronchial asthma (31), rhinitis (27), and/or conjunctivitis (9) after contact with flour. Intracutaneous skin tests and radioallergosorbent tests (RAST) (and inhalation challenges in doubtful cases) revealed IgE-mediated sensitisation to wheat flour in all 35 cases and to rye flour in 33.

When we learned that aspergillus amylase is added to baking flour we tested all 118 sera for IgE antibodies against commercially available aspergillus amylase. 12 (34%) of the symptomatic group but none of the symptomless individuals had significant levels of specific IgE immunoglobulins against this enzyme (RAST method³). Immediate-type hypersensitivity to aspergillus amylase in RAST-positive workers was confirmed by skin tests (0.01-0.1 mg/ml) in all 10 symptomatic bakers investigated but not in 10 healthy controls. Immediate onset rhinitis or asthmatic response was observed in 4 bakers with symptoms who were challenged by this enzyme by inhalation (0.01-1.0 mg/ml).

In the screened group of 91 bakers 8 with symptoms had IgE antibodies against wheat flour, 7 against rye flour, and 2 against α -amylase. All those with IgE antibodies against aspergillus amylase were atopic, being sensitive to flour and often to other common allergens and having increased levels of total IgE (above 150 U/ml).

Polyacrylamide gel electrophoresis (PAGE) identified two closely related strong bands and two closely related weak bands all of which bound to IgE immunoglobulins from sensitised people. All four bands exhibited amylase activity as shown by iodine staining. These bands may be isoenzymes; only one major immunologically reactive band (molecular weight about 52 000) was detected by electrophoresis in an sodium dodecyl sulphate (SDS) containing gel (figure).



Detection of immunologically reactive components of *A. oryzae*
amylase using immunoblot technique after SDS-PAGE.

Method of Laemmli⁴ with 8% polyacrylamide gel. For blotting and immunological detection samples were transferred to nitrocellulose sheets with a Bio-Rad electroblot apparatus and, as transfer medium, 25 mmol/l "tris", 192 mmol/l glycine containing 20% methanol, and 0.1% SDS, and incubated with patients' sera (100 μ l) followed by ¹²⁵I-labelled rabbit anti-human IgE (100 μ l, 60 000 cpm; Pharmacia) and autoradiography (7-10 days) on Kodak XAR-5 film. (1) Molecular weight markers, stained with Coomassie brilliant-blue. (2) Proteins stained with Coomassie brilliant-blue. (3-8) Autoradiograms of nitrocellulose sheets after incubation with sera of individual sensitised patients (3-7) or serum of healthy control (8).

IgE-mediated sensitisation to aspergillus amylase should be taken into consideration in asthmatics exposed to flour dust. We found that 2% of the exposed population and 34% of workers with baker's asthma were sensitised to this previously unrecognised, potent allergen in baking flour.

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