

controlled studies, in which the numbers of patients with a positive history ranged from 24 to 37. Although reactions occurred to both non- β -lactam antimicrobials and nonantimicrobial drugs, the frequency of these reactions was not greater in group A or B, compared with group C, which suggests that the existence of a history of penicillin allergy causing a change in prescribing habits was not a factor and that there was no significant difference in reporting patterns. Only one patient in the vasomotor rhinitis group gave a history of penicillin allergy, and this patient had no history of a reaction to non- β -lactam drugs.

Because patients with a history of penicillin allergy in this study have an incidence of reactions to non- β -lactam drugs that is equal to that found in the vasomotor rhinitis group, they do have multiple drug reactions, because they reacted to both β -lactam and non- β -lactam drugs. But the risk of reacting to non- β -lactams is not increased in either patients with a positive history of penicillin allergy or those with skin test-proven penicillin allergy, when compared

with the control rhinitis group. So although this survey is also subject to the deficiencies of retrospective evaluation and limited by the preponderance of female subjects and sample size, it does suggest, in contrast to previous studies, that the development of penicillin allergy and non- β -lactam allergy are not associated, but occur independently.

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Occupational asthma caused by roasted coffee: Immunologic evidence that roasted coffee contains the same antigens as green coffee, but at a lower concentration

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Occupational asthma in coffee production plant workers was described by Figley and Rawling,¹ who implicated the castor bean. Cross-reactivity between castor beans and green coffee beans was later suspected but could not be demonstrated.² Although green coffee beans contain allergens, it is not known whether roasted coffee beans contain allergenic proteins. Zuskin et al.³ found that 9% of

45 coffee workers had immediate skin reactivity in response to roasted coffee bean extracts, whereas the frequency was 12% in the case of green coffee bean extracts. However, Lehrer et al.² were unable to identify allergens in roasted coffee. In this study, we present the case of a subject who showed

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immunologic and functional evidence of occupational asthma caused by roasted coffee.

CASE REPORT

A 34-year-old man had been employed for 10 years in a food company producing coffee. He worked on a machine that roasted green coffee beans. Three to four years after starting work, this patient reported episodes of dyspnea, wheezing, and chest tightness at work and in the evening. He reported improvement of symptoms during weekends and holidays. A few months later, the patient started experiencing rhinitis and conjunctivitis during the same periods that he had the chest symptoms. The patient started using albuterol on an as-needed basis, that is, six to eight times daily. In the 2 to 3 years preceding referral, the symptoms worsened and persisted during weekends. Regular inhaled steroids were administered. Even with this treatment, the patient was still having symptoms and started waking up at night as a result of chest symptoms. He continued using the same number of puffs of albuterol. The patient had smoked 2 to 3 pack-years and had stopped smoking 5 years earlier. Skin tests done by the prick method showed reactivity to several aeroallergens: tree, grass, and ragweed pollens, *Dermatophagoides pteronyssinus*, *D. farinae*, and cats. He had a 1 × 1 cm wheal in response to an extract of green coffee beans and a 3 × 3 mm wheal in response to a roasted coffee bean extract. Coffee bean extracts were prepared as described previously.² The FEV₁/forced vital capacity was 1.4/2.8 L (predicted value, 3.0/4.4 L)⁴ and improved to 2.7/4.0 L after administration of albuterol (200 µg by inhalation) while the subject was at work. Serial monitoring of peak expiratory flow at work and away from work showed increased fluctuations, lower minimum values, and increased use of albuterol while at work. Specific inhalation challenges were carried out by having FEV₁ serially assessed at work. The patient showed a fall of 26% in FEV₁ 2 hours after starting work, without late reactions. Nebulizing the roasted coffee bean extract at a concentration of 1 mg/ml for a total of 8.5 minutes resulted in an immediate asthmatic reaction without a late component (Fig. 1), thus confirming the coffee worker's reactivity.

Immunologic assessment

The patient's serum was tested for specific IgE by RAST, with the following results: heated castor bean, 5.2% bound (lower than the 15% to 50% binding previously seen in some coffee bean workers tested in other studies); Ethiopian green coffee bean, 54.7% bound; roasted coffee bean, 37.4% bound; and human serum albumin, 0.9%. Because the reactivity to roasted coffee bean was high, further investigations were carried out. RAST inhibition (Fig. 2) suggests that the same allergens are present in both green and roasted coffee beans but that they are approximately 20-fold more concentrated in the green coffee beans than in the

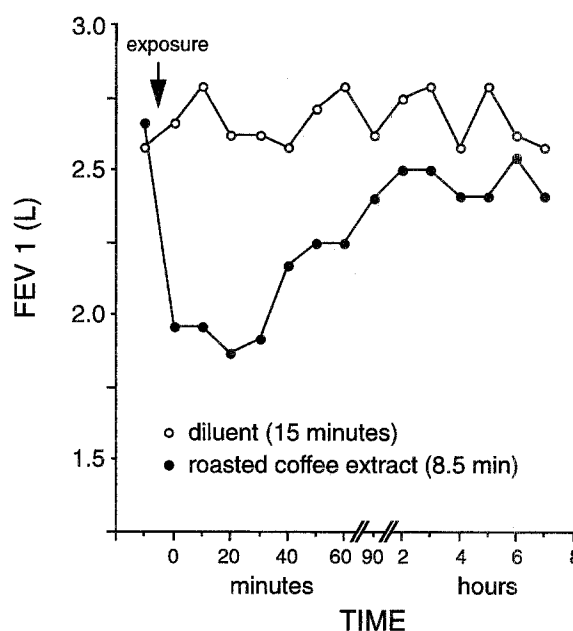


FIG. 1. Specific bronchoprovocation test, showing an isolated immediate reaction.

roasted coffee bean extracts. Twenty-two micrograms of roasted or green coffee bean extract was fractionated by sodium dodecylsulfate-polyacrylamide gel electrophoresis, blotted on CNBr-activated nitrocellulose membrane. The membrane was stained for proteins with India ink. Allergens were identified by incubation with the patient's serum (1:2:5), followed by alkaline phosphatase-labeled monoclonal mouse anti-human IgE (1:1000). Binding was visualized with a colorimetric substrate. Although 9 to 10 protein bands (15 to 60 kD) were identified for the green coffee bean extract, only 1 band (approximately 43 kD) was present in the roasted coffee bean extract. This 43 kD protein was a major band in the green coffee bean extract as well (Fig. 3).

DISCUSSION

This case report indicates that occupational asthma can be caused by roasted coffee beans as demonstrated by specific inhalation challenges, which elicited an isolated immediate asthmatic reaction. To our knowledge, this has not been demonstrated before with roasted coffee; asthmatic reactions of the isolated immediate or late type have been shown when green coffee bean extracts were used.⁵

This report provides evidence for IgE-dependent sensitization to roasted coffee beans as demonstrated by immediate skin reactivity and the presence of specific IgE antibodies. Before

GREEN and ROASTED COFFEE BEAN INH

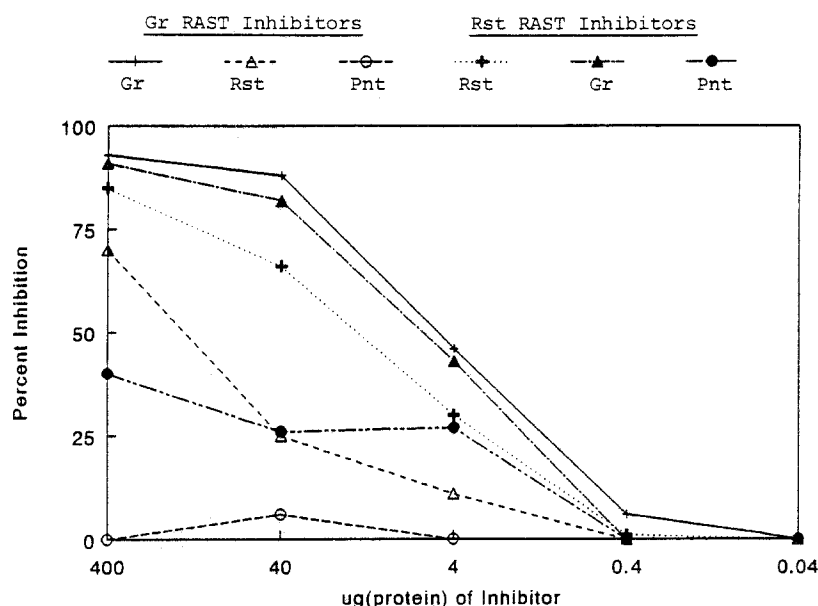


FIG. 2. Inhibition of green and roasted coffee bean RAST. *Gr*, green; *Rst*, roasted; *Pnt*, peanut.

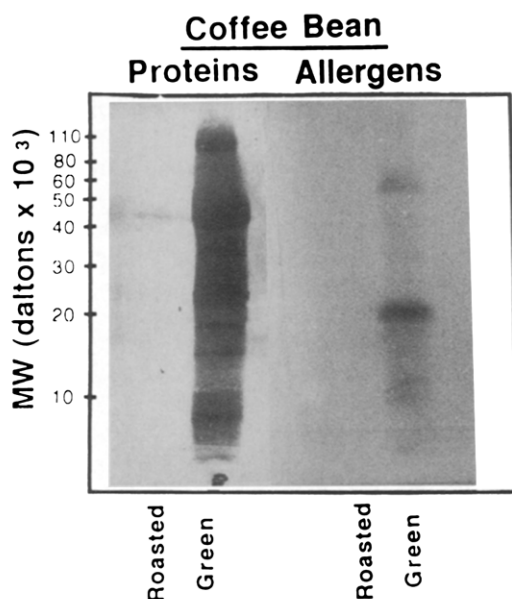


FIG. 3. Western blot identification of proteins and allergens in roasted and green coffee bean extracts. *MW*, Molecular weight.

this study, immunologic sensitization had been demonstrated only with green coffee bean extracts.¹⁻³

This report also shows the presence of allergens in roasted coffee beans of the same nature but in lower concentrations than in green coffee beans. These roasted coffee beans are not related to castor beans, which were originally thought to be responsible for sensitization to green coffee. This study demonstrates that roasted coffee beans can sensitize coffee workers, probably because of residual green coffee bean allergens that survive the roasting process.

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