

Table 1. Hp, cLMWPTP, and ADA: resistance to malaria and susceptibility to allergy. In order to compare data on atopic children to Sardinian data, villages were divided into two categories: those with past malarial morbidity of more than 50% and those with less than 50%

		LMW-PTP *A/*A and				
Hp *1/*1 genotype		*A/*B genotypes		ADA*1/*1 genotype		
Percent frequency	No. of subjects	Percent frequency	No. of subjects	Percent frequency	No. of subjects	
Continental Italy						
Atopic children	18.9	95	50.0	146	88.7	291
General population	11.1	1956	40.5	1026	83.3	1417
Chi-square test of independence	P<0.02		P<0.04		P<0.025	
Sardinia						
Past malarial morbidity >50%	19.0	326	34.2	691	90.9	683
Past malarial morbidity <50%	14.5	504	28.2	922	86.3	905
Chi-square test of independence	P<0.09		P=0.01		P<0.005	

(the genotypes with the lowest cLMW-PTP activity – $P<0.0001$), and with ADA*1/*1 (the genotype with the highest ADA activity – $P<0.02$) (6).

Table 1 shows the proportion of Hp*1/*1, cLMW-PTP*A/*A and *A/*B, and ADA*1/*1 in atopic children. In order to compare data on atopic children to Sardinian data, villages were grouped into two categories: those with past malarial morbidity of more than 50% and those with less than 50%.

For all genetic systems analyzed, the genotypes showing a higher frequency in populations subjected in the past to high malarial endemicity also showed a higher incidence in patients with atopic diseases than in the control population.

The overrepresentation of the Hp*1/*1 genotype in atopic asthma is in line with the increased proportion of Hp*1/*1 found by others in allergic contact dermatitis and allergic rhinitis (2). The cLMW-PTP*A/*A and *A/*B genotypes associated with past malarial morbidity and atopic state showed a lower activity than other cLMW-PTP genotypes (3). A lower degree of dephosphorylation may enhance signal transduction, favoring a strong immunologic response. Both atopic asthma and past malarial morbidity were associated with the ADA*1/*1 genotype, which was 15% more active than ADA*1/*2 and 30% more

active than *2/*2. A higher local concentration of adenosine may regulate adenosine receptor activities, decreasing resistance to malaria and susceptibility to atopy (5).

The present data indicate that some common genetic factors involved in malaria resistance may represent risk factors for atopic diseases, suggesting a possible evolutionary mechanism of susceptibility to allergy.

It would be interesting to investigate the possible role of the genetic factors considered in the present paper in orienting lymphocyte subpopulations to a Th2-like response. In fact, elevated total IgE levels have been found in people living in *Plasmodium falciparum*-endemic areas (8), and these findings have been attributed to a shift in balance between Th1 and Th2 cells. The search for loci associated with Th1 and Th2 responses could be guided by the analysis of loci associated with allergic disorders with a Th2 pathogenesis and with parasitic disorders showing a Th2 immune response.

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Occupational asthma caused by honey

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Key words: honey; occupational asthma.

● A 42-YEAR-OLD woman had been employed as a quality-control worker for 8 years by a company that produced breakfast cereal. Exposure to flour, grain, milk, eggs, vanilla, and honey was reported. A mixture of vanilla, honey, and water was sprayed onto some of the manufactured cereal. This spraying had occurred intermittently, approximately once a month, for 2 years before referral. During this

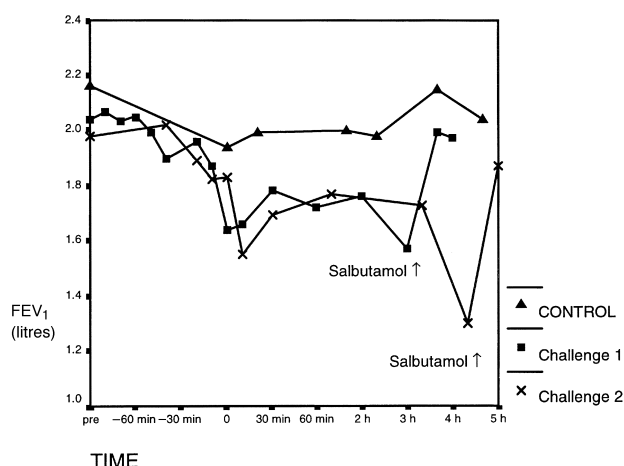


Figure 1. Dose-response curves for specific challenge tests with honey extract. On control day, diluent only was given. Time "0" corresponds to end of last exposure. FEV₁: forced expiratory volume in 1 s.

process, clouds of the mixture could be seen in the air and would settle on the worker's clothes and exposed skin. Before referral, she had intermittent wheeze, cough, dyspnoea, and generalized rash for 4 months. These would begin within 1 h of the spraying of the vanilla and honey mixture and resolve over 2 days. Between episodes, she was asymptomatic. Three months before referral, budesonide (400 µg/day) and salbutamol p.r.n. were commenced. She had no prior history of atopy or asthma and no symptoms with ingested honey. She had never smoked.

During her assessment, the patient continued to work. Her initial spirometry was normal and PC₂₀ to methacholine was 0.4 mg/ml. Skin testing by the prick method was performed with 24 common allergens including egg, milk, and wheat, to which she had no positive reactions. Monitoring of PEFr at work demonstrated up to 19% daily variation with deterioration from a daily mean of approximately 350 l/s to 300 l/s after exposure to the sprayed vanilla and honey. Extracts were made with the vanilla and honey from her workplace. On skin testing, there was a negative reaction to vanilla and a positive reaction to honey at a 1:64 dilution. Specific inhalational challenges were carried out in the laboratory with the honey extract (Fig. 1), and she developed a dual asthmatic reaction to a dilution of honey extract of 1:2. During the night after being challenged with honey, she required salbutamol on two occasions and developed a generalized rash. Three weeks later, the specific inhalational

challenge test with honey was repeated, and she again developed a dual asthmatic reaction. Honey-specific IgE was measured with the CAP System (Pharmacia). The patient had a level of 43.6 µg/l with a control of <0.84 µg/l.

We have described a case of occupational asthma caused by specific sensitization to honey. Specific inhalational testing with honey extract produced a dual asthmatic reaction on two separate occasions. To our knowledge, this is the first report of occupational asthma resulting from inhaled honey.

Honey is produced from nectar and honeydew (a product of sap-sucking insects) (1). To this are added grains of pollen during collection and enzyme-rich secretions from salivary and pharyngeal glands of the bee. Honey may also contain bee-body components, mould spores, and algae (2).

Sensitization to honey usually causes gastrointestinal, dermatologic, or systemic, anaphylactic reactions on ingestion (1). Pollen proteins and glandular enzymes from Hymenoptera insects are the allergens involved in most cases (1–4). IgE antibodies to these allergens have been demonstrated in affected individuals (1). We are aware of one report of occupational asthma occurring in a honey-processing plant (5). The subject was demonstrated to be sensitive on skin test and specific inhalational challenge to whole-body

honeybee extract, exposure apparently having occurred to bee-body parts during loading of honeycomb frames. We are not aware of any previous reports of occupational asthma caused by inhaled honey.

In conclusion, we have described a case of occupational asthma caused by specific sensitization to inhaled honey. The subject had positive skin tests and elevated specific IgE to honey. Serial PEFr and specific inhalational challenge with honey confirmed the diagnosis.

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