

The allergy epidemic: what is the Australian response?

Andrew S Kemp, Raymond J Mullins and John M Weiner

Australian researchers are at the forefront of allergy prevention and treatment

Allergic diseases increased dramatically throughout the 20th century, a change that has been described as an “epidemic”.^{1,2} To mark the launch of the the *MJA Practice Essentials — Allergy* series in this issue, we review some aspects of the Australian response.

The incidence of allergic disease in Australia is one of the highest in the world. Between 1993 and 2002, the Australian arm of the International Study of Asthma and Allergies in Childhood demonstrated increases in the 12-month prevalence of rhinitis (from 9.7% to 12.7%) and eczema (from 11.1% to 17.2%), but a fall in asthma prevalence (from 27.2% to 20.0%).³ The reasons why asthma prevalence almost doubled between 1984 and 1994,⁴ but then fell,³ remain unclear. Food allergy and anaphylaxis are also increasing.^{5,6} The emergence of new food allergy-related disorders, such as the eosinophilic enteropathies (inflammatory disorders of the gastrointestinal tract with significant eosinophilic infiltration),⁷ and the unabated increase in demand for hypoallergenic formulae in infants⁸ and injectable adrenaline for people at risk of anaphylaxis indicate that the epidemic has not subsided.

One popular explanation for the epidemic is the “hygiene hypothesis”, which postulates that lack of recurrent early exposure to infections and bacterial products (such as endotoxin) may promote an allergic response to environmental allergens.⁹ Australian researchers have been at the forefront in demonstrating that potentially allergic infants have an imbalance between allergy-promoting (T_H2) and non-allergy-promoting (T_H1) cytokines.^{10,11} It has been proposed that this imbalance, combined with early allergen exposure, promotes the development of allergic disease. However, the simplistic T_H1/T_H2 paradigm that forms the basis for the hygiene hypothesis can be challenged.¹²

The role of allergen exposure has been explored in Australian studies that have demonstrated an association between asthma incidence and levels of exposure to fungal¹³ and house dust mite allergens¹⁴ and the triggering of acute asthma attacks by submicronic pollen particles released after rain (so-called “thunderstorm asthma”).¹⁵ Despite the associations between allergen exposure and disease prevalence and severity, it has been difficult to demonstrate a clinical benefit from a reduction in exposure to inhaled allergens such as house dust mite allergen in the Australian environment.¹⁶

As the response to allergen minimisation is often incomplete and pharmacological therapies are not curative, the prospect of permanently modulating the immune response is attractive.

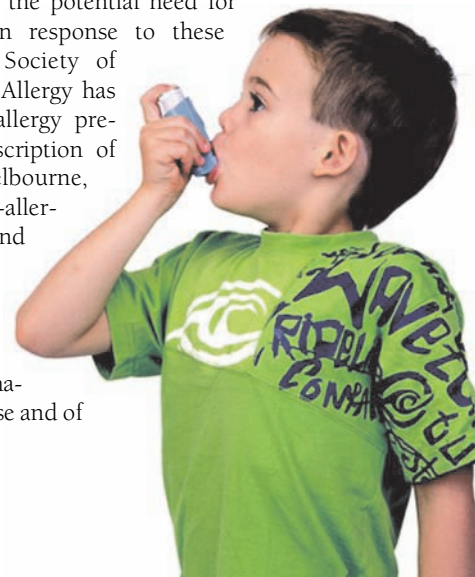
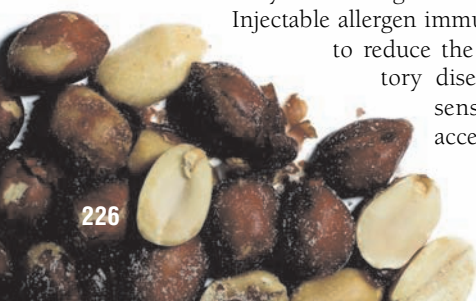
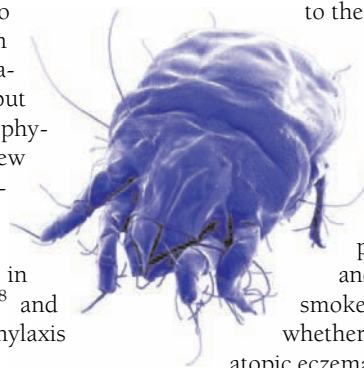
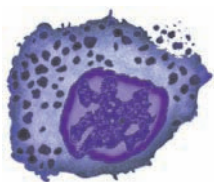
Injectable allergen immunotherapy has been shown to reduce the severity of allergic respiratory disease and the onset of new sensitisations,^{17,18} but is not acceptable to young children

and poses a small (but definite) risk of adverse allergic reactions. Immunotherapy substantially reduces the risk of anaphylaxis to stinging insects. For example, the Australian Jack Jumper ant is a major cause of severe allergy in many parts of Australia, and immunotherapy has proved effective in combating serious reactions to its sting.¹⁹ The ant is a uniquely Australian problem and the market for such a vaccine is relatively small, so funding is problematic. However, in view of the seriousness of anaphylaxis in susceptible people, making ant venom immunotherapy available to the at-risk population should be a major priority. Future challenges include reducing the risk of adverse reactions to immunotherapy (eg, by using modified or peptide-derived allergens²⁰) and making immunotherapy more acceptable to younger patients (eg, by sublingual or oral administration).²¹

The ultimate goal is to understand the reasons for the epidemic of allergic disease and develop preventive strategies. While breastfeeding of infants²² and preventing children from being exposed to cigarette smoke have a role in reducing allergic disease, it is unclear whether benefits extend beyond childhood. Modification of atopic eczema by dietary supplementation with probiotics (supplements containing live bacteria given with the aim of altering the gut flora) has shown promising results,²³ and research is continuing in this area. Based on the possible role of early dust mite allergen exposure and the proinflammatory impact of arachidonic acid metabolites (derived from ingested fatty acids), a study of asthma prevention by dietary supplementation with omega-3 fatty acids and house dust mite allergen avoidance from birth was commenced in 1999. The study showed that neither intervention achieved a significant reduction in asthma or eczema at 5 years.²⁴

Allergic disease has a negative impact on quality of life.²⁵ Excluding visual conditions and deafness, asthma, hayfever and “allergy” comprised three of the top six most common long-term self-reported illnesses in New South Wales in 1997.²⁶ Food allergy engenders significant anxiety regarding care in schools, risk of death and the potential need for injectable adrenaline.²⁷ In response to these issues, the Australasian Society of Clinical Immunology and Allergy has published guidelines on allergy prevention, anaphylaxis, prescription of EpiPen (CSL Limited, Melbourne, VIC) and the care of food-allergic children in schools and preschools.²⁸

So, what challenges remain for the future? We have some understanding of the immunological mechanisms of the allergic response and of



epidemiological associations, but this is yet to be translated into proven preventive measures. We require more reliable testing for the non-IgE mediated immune responses to food observed in some patients with atopic dermatitis and the eosinophilic enteropathies. Current tests for food allergy provide reliable indicators that hypersensitivity exists, but do not necessarily prove that a food is the cause of allergic symptoms or help us predict the severity of reactions. As immunotherapy may alter the natural history of allergic disease, there is a major need for more effective and child-friendly therapy modalities. We also need to educate our doctors and patients on the impact of allergic disease and on evidence-based methods for management. We hope that the current *MJA Practice Essentials — Allergy* series, which addresses all the topics raised here, will achieve some of these goals.

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