

## FOOD ALLERGY IN ADULTS



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**Adverse non-toxic reactions to foods are typically classified as food allergy if the immune system is involved.<sup>1</sup> An average of 15% of UK adults and 20% of Europeans report allergic reactions to foods.<sup>2,3</sup> However, true food allergy is likely to affect less than 5.0% of the adult population.<sup>4,5</sup>**

Food allergy is more likely to present in those who have other allergic conditions (rhinitis, eczema, asthma) and are sensitised (have specific IgE antibodies) to aeroallergens, such as pollens. However, the presence of specific IgE antibodies to foods is not a risk factor<sup>6</sup>, probably because adults are frequently sensitised to foods in the absence of any reported symptoms.<sup>3</sup>

Those referred to an adult food allergy clinic frequently suspect milk and/or wheat to be causing or exacerbating their symptoms. However, milk, wheat, egg and soy allergy usually resolve in childhood and rarely present as a new allergy in adult life.<sup>7-10</sup> The most probable cause of symptoms to milk in adults is some degree of lactose intolerance,<sup>11</sup> although respiratory symptoms are also frequently reported by those with asthma or other lung conditions.<sup>12</sup> Wheat is primarily associated with gastrointestinal symptoms,<sup>13</sup> so coeliac disease should be excluded prior to considering other differential diagnoses such as functional gut disorders provoked by fermentable carbohydrates<sup>14</sup> or non-coeliac gluten sensitivity.<sup>15</sup>

However, wheat does play a prominent role in a relatively rare IgE-mediated food allergy; food-dependant exercise-induced anaphylaxis (FDEIA)<sup>16</sup> is characterised by a lack of reaction

to the trigger food unless it is consumed in close proximity to taking strenuous exercise, although dancing, gardening and even walking have all been reported to trigger symptoms.<sup>17</sup> In the absence of exercise, other co-factors such as aspirin, non-steroidal anti-inflammatory drugs (NSAID) and alcohol can also enhance or precipitate an allergic reaction to food.<sup>17,18</sup> Apart from wheat, other common trigger foods include shellfish, tomatoes, celery and nuts.<sup>19,20</sup>

### SEAFOOD

Seafood, fruits, nuts and vegetables are the foods most likely to provoke new-onset allergic symptoms in adults.<sup>2,3,6,21</sup> Seafood allergy in adults usually involves shellfish rather than vertebrate fish, with crustaceans, especially prawns, most likely to provoke symptoms which are often severe.<sup>22-24</sup> Although sensitisation to minor seafood allergens can occur, it is the muscle protein tropomyosin which is the primary pan allergen in both crustaceans and molluscs.<sup>25-27</sup> Tropomyosin is water soluble and heat stable, so allergic symptoms can be triggered by inhalation of cooking vapours<sup>28</sup> or by the residue of prawns in cooking oils.<sup>29</sup> The low similarity or homology between the tropomyosin

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in molluscs and crustaceans means crustacean-allergic individuals are less likely to also react to molluscs.<sup>28</sup> The pan allergen  $\beta$  parvalbumin is responsible for most allergy to fish; its abundance in cod and herring means that adults with fish allergy are more likely to react to these fish, rather than swordfish and tuna which have very low levels of  $\beta$  parvalbumin.<sup>30-32</sup> The lack of homology between tropomyosin and  $\beta$  parvalbumin usually enables shellfish-allergic individuals to tolerate fish and vice versa.<sup>33</sup> Scombroid poisoning, caused by an excessive level of histamine due to the bacterial decarboxylation of histidine, is a common differential diagnosis for seafood allergy.<sup>34</sup>

#### POLLEN-FOOD SYNDROME

Although seafood is a common provoking agent, cross-reactivity syndromes cause the majority of presenting symptoms in adults.<sup>35</sup> Dominant amongst these is Pollen-Food Syndrome (PFS), also known as Oral Allergy Syndrome (OAS), an allergy caused by cross-reactions between pollens and plant foods.<sup>36,37</sup> The cause of PFS symptoms is the homology or similarity between allergen sequences in pollens and the Pathogenesis-Related 10 (PR-10) proteins and profilin allergens found in plant foods.<sup>38</sup> Over 60% of birch sensitised individuals are likely to develop PFS<sup>39</sup> because the PR-10 proteins cross-react with Bet v 1, the dominant sensitising allergen in 90% of birch-pollen allergic subjects,<sup>40</sup> although profilins in trees, grass, and weeds can also provoke symptoms by cross-reacting to those in plant foods.<sup>37</sup> PR10 allergens and profilins are susceptible to heat and digestion, so, although the foods involved can cause immediate moderate to severe localised oropharyngeal symptoms when raw, reactions to

cooked plant foods or systemic reactions such as anaphylaxis are unlikely, although high protein foods such as tree nuts and legumes have the potential to provoke more severe PFS reactions.<sup>41</sup> In the UK, 2.0% of the adult population has PFS and the foods usually involved include tree nuts, apples, kiwifruit, strawberries, peaches, cherries, tomatoes, carrots, peanuts, melon and potato peel.<sup>2</sup> Since only 8.0-10% of newly diagnosed peanut and tree nut allergy occurs in adolescence or adulthood, new onset symptoms to nuts are usually due to PFS.<sup>42,43</sup> The use of molecular diagnostic methods can determine whether the individual is sensitised to the primary allergens in peanuts (Ara h 2), soy (Gly m 5/Gly m 6) and hazelnuts (Cor a 9 and Cor a 14), or whether it is the PFS-related Bet v 1 homologues in peanut (Ara h 8), soy (Gly m 4) and hazelnut (Cor a 1) that are predominant.<sup>44-46</sup>

#### LATEX-FRUIT SYNDROME

A similar cross-reactivity syndrome is latex-fruit syndrome, but instead of pollen, the primary sensitising agent is natural rubber latex (NRL) (*Hevea brasiliensis*). Individuals sensitised or allergic to NRL have reactions to plant foods containing homologous allergens.<sup>47</sup> Characteristic foods involved are avocado pear, chestnut and banana, but a huge number of other plant foods have been reported to provoke symptoms, especially in individuals sensitised to the NRL profilin allergen Hev b 8.<sup>48,49</sup> The other major cross-reactivity syndrome also involves homologous plant allergens; lipid transfer proteins (LTP) are prolamins which, in addition to being primary sensitising allergens, may also cross-react with other LTP allergens.<sup>50</sup> LTP allergy is most prevalent in the Mediterranean region, typically manifesting as a primary allergy

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to peaches due to sensitisation to the peach LTP allergen Pru p 3, with some individuals experiencing symptoms to other plant foods due to cross-reactivity between Pru p 3 and other LTP allergens.<sup>51,52</sup> Unlike PR10 and profilin allergens, LTP allergens are not susceptible to heat or gastric degradation and, therefore, both cooked and raw foods are involved. Reactions involving LTP allergens are particularly associated with presence of co-factors, especially alcohol and exercise.<sup>53</sup> Although peach is the main trigger food in Italy and Spain; in the UK, those with LTP allergy most frequently report tree nuts, peanuts, stone fruit, apples and tomatoes to cause the most reactions.<sup>54</sup>

#### MULTIPLE FOOD REACTIONS

If the reactions are to multiple foods and PFS is not suspected, then an added allergen, such as an ingredient in composite dishes, may be implicated.<sup>55</sup> Potential food allergens include cereals such as barley and rice (which can be due to LTP allergy),<sup>56</sup> buckwheat,<sup>57</sup> legumes added to other products (soy, lupin, chick peas, pea protein, lentils, fenugreek and guar gum),<sup>58-62</sup> seeds (mustard, sesame, pine nut)<sup>63,64</sup> and seasonings, including celery,<sup>65</sup> mustard,<sup>66</sup> coriander, cumin, anise, paprika and spice mixes such as garam masala and curry powder which can also contain fenugreek. Natural food colourings, such as carmine (cochineal)<sup>67</sup> and annatto<sup>68</sup> may also be relevant. Reactions to multiple foods in the absence of IgE-sensitisation might indicate sensitivity to benzoates, sulphites, mono-sodium glutamate, vasoactive/biogenic amines or salicylates, although there is little published robust evidence to demonstrate the prevalence of reactions to these substances.<sup>69</sup>

#### DIAGNOSIS

With regards to diagnosis, skin prick testing is a useful first line test, using fresh fruits and vegetables if PFS is suspected. Specific IgE blood tests to individual foods are also useful, but due to the degree of poly-sensitisation to foods in those with pollen allergies, it is important not to test for foods which are tolerated and habitually eaten without symptoms. Skin prick or specific IgE testing to aeroallergens is, therefore, essential to address potentially confounding results due to cross-reactivity,<sup>1</sup> and molecular allergy tests can be useful for the diagnosis of cross-reactive syndromes.

It is important to undertake oral food challenges where tests are negative, giving increasing standard doses of the food suspected.<sup>70</sup> An adult-sized standard serving of the food must be given at the end of a challenge, in order to ensure sufficient allergen has been consumed; for some foods such as prawns, the cumulative dose required to provoke an allergic reaction can be considerable.<sup>31</sup>

Avoidance of the major allergens affecting adults will not normally cause major nutritional deficiencies where only single foods are avoided, but adults avoiding multiple foods can be at nutritional risk.<sup>71</sup>

People with a chronic lung condition requiring regular doses of oral prednisolone, or those with severe or prolonged gastrointestinal symptoms, should have a full dietary assessment and blood screen to assess their level of vitamin D, calcium, vitamin B12, folate and iron studies, even if they are only avoiding one major food group.<sup>72</sup>

For article references please email:  
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