

# Nutrition and Health Info Sheet: Food Allergies

For Health Professionals

## What exactly are food allergies?

Food allergies are a type of immune response that happens with the consumption of certain food proteins referred to as allergens.<sup>1</sup> Immediately after consuming the food, an allergic reaction can occur and symptoms range from stomach pain and vomiting, to anaphylaxis. Anaphylaxis causes a constricted airway, low blood pressure, shock, and can be fatal. Severity depends on the individual and the amount of the allergen consumed.<sup>2</sup>

The most common food allergy types are sometimes referred to as 'the Big Eight', which include: milk, egg, soy, wheat, peanut, tree nut, fish and shellfish.<sup>1-3</sup> These foods account for 90% of the food allergies in the United States and because of this, the Food Allergen Labeling and Consumer Protection Act of 2004 requires that food sources related to these allergens must be identified and listed on food labels.<sup>2</sup>

## How is vitamin D important in calcium metabolism?

Calcium in the blood is tightly regulated; Vitamin D plays an important role in maintaining calcium homeostasis.<sup>2</sup> In response to a drop in blood calcium, vitamin D acts in three ways to maintain calcium levels in the blood: increasing absorption of calcium from the gut; increasing reabsorption of calcium by the kidney to limit urinary excretion; and mobilizing calcium from bone.<sup>2</sup> Low vitamin D levels can result in inadequate calcium absorption from the gut, and over time can negatively impact bone health.

## What is the prevalence of food allergies around the world?

The World Allergy Organization reports that food allergies appear to be increasing in both developed and developing countries around the world.<sup>4</sup> The prevalence of clinical food allergies in young children was as high as 10% in developed countries and may affect up to 15-20% of infants.<sup>1,4</sup> Similarly, rapidly developing parts of Asia also show a high prevalence of clinical food allergies in young children. In Western countries, peanut allergy in particular doubled between the years of 2002 and 2012, and is becoming more apparent in Africa and Asia.<sup>4</sup>

Within the United States, there are differences in prevalence between ethnic groups. African Americans tend to have higher risk of shellfish allergy than other non-white ethnic groups.<sup>5</sup> Caucasians, however, have the highest prevalence of diagnosed food allergy; Asian Americans have the lowest reported prevalence of diagnosed food allergy.<sup>6</sup>

## How are food allergies developed?

There are a variety of theories about the development of food allergies that take different risk factors into consideration including family history, excessive exposure, and living in an urban environment.<sup>5</sup> Genetics are a main driving factor in the development of food allergies; if both parents have food allergies, the child has a 75% chance of developing one as well. In contrast, if neither parent has food allergies, the chance that the child will have a food allergy drops to only 10%.<sup>7</sup>

One theory of how one develops food allergies is referred to as the hygiene hypothesis. The hypothesis states that a general reduction in exposure to microbes from siblings and the environment has led to the immune system reacting to an excess of triggers, including some kinds of food proteins.<sup>8</sup> Recently, several studies have shown that early infection influences the microbiota, the microbes that live in the gastrointestinal tract (GI), which plays a key role in the development of the immune system.<sup>9-11</sup> Another theory notes that low vitamin D levels increase the risk of developing food allergies as the rise in food allergy prevalence has mirrored the increase in vitamin D deficiency.<sup>5</sup> Areas further away from the equator have higher rates of childhood food allergies than areas closer to the equator.<sup>12</sup>

## Allergies, sensitivities and intolerances: what are the differences?

Food allergies are not the same as sensitivities or intolerances. Food intolerance or sensitivity is when an individual cannot digest certain foods properly. Those experiencing a minor food allergy and those experiencing food sensitivity or intolerance may experience the same symptoms such as stomach pain and vomiting, making it easy to confuse these.<sup>13</sup> Food allergies, however, are much more severe and can be life threatening because they involve multiple organs in the body.

Food allergies can trigger an immune response in the body releasing immunoglobulin E, or IgE.<sup>3,14</sup> IgE is an antibody that is used to detect allergens. IgE can also bind to food proteins and release histamine, causing an allergic response within minutes.<sup>3,9</sup> Anaphylaxis, an acute food allergy with severe symptoms involving more than one organ, can occur with IgE-mediated food allergy. If a food allergy is not mediated by IgE, but instead T cell activation, symptoms may take hours or days to present.<sup>3,14</sup>

Three tests for identifying IgE-mediated allergy include the skin prick test, blood tests, and physician-supervised oral food challenge. For the skin prick test, a drop of allergen is introduced to the top layer of skin by piercing the skin. Reaction for this test typically takes around 15 minutes. Blood tests can identify the amount of IgE and related compounds in the blood accounting for the allergenic response. During the physician-supervised oral food

challenge, a suspected food allergen is introduced to the patient and symptoms are monitored.<sup>14</sup>

## What are the health implications?

Each year, millions of Americans have allergic reactions to their food resulting in 30,000 emergency room visits, 2,000 hospitalizations, and 150 deaths.<sup>2</sup> Current estimates state that food allergies affect up to 15 million people in the United States.<sup>9</sup> Peanut allergy is the leading cause of death by anaphylaxis. In the United States, food allergies cost \$24.8 billion annually.<sup>15</sup>

The intensity of the reaction to food allergies depends on the individual, the amount of allergen ingested, the tissue receptors that are affected, and the length of time since last exposure. IgE-mediated allergies usually involve the GI tract, the respiratory system, and skin; symptoms include nausea, vomiting, diarrhea, asthma, itching, edema and hives. In the most severe cases, anaphylactic shock can cause death.<sup>2,3</sup>

## How are food allergies treated and managed?

There is no cure for food allergies, making the goal of treatment of food allergies to reduce the severity and frequency of symptoms as well as reducing future reactions.<sup>2</sup> This can be done by avoiding foods that act as a trigger or through use of medications. Common medications used for mild allergies are antihistamines like Benadryl® or Zyrtec®; antihistamines block the histamine that is released because of IgE and can prevent rash, runny nose, or headache. For more severe symptoms, steroids and anti-inflammatory medications may be used.<sup>16</sup> In the event of anaphylaxis, epinephrine must be used and 911 should be called immediately. Epinephrine is the medication inside of an Auvi-Q®, Adrenaclick® or Epi-Pen® and should only be used with recommendation by a prescribing medical practitioner.<sup>3,16</sup>

Under the recommendation and monitoring of a physician, desensitization may also be used as treatment. Desensitization is a temporary state of increased tolerance for an allergen and can be achieved by introducing a small amount of allergen into the diet and slowly increasing the amount until a reaction no longer occurs.<sup>16</sup>

## What are the recommendations for introducing foods to infants?

The American Academy of Pediatrics recommends introducing solids to children between four and six months of age while still providing breast milk or formula.<sup>17,18</sup> While breast milk contains immunoglobins and can reduce risk of developing food allergies, this alone will not prevent the development of food allergies. Research has shown that introduction of solid food to infants before week 17 promotes allergies.<sup>19</sup> While historically pediatricians do not recommend feeding a child under the age of 1 year highly allergenic foods ('the Big Eight') a recent recommendations by the American Academy of Allergy, Asthma, and Immunology have stated that waiting to introduce these foods may increase the risk of developing allergies in the future.<sup>5,20</sup> This group recommend introducing highly allergenic foods at home very slowly once the baby is accepting other food well.<sup>20</sup>

Peanut allergies are of particular concern as they are the most prevalent in Western countries and are the leading trigger of anaphylaxis-induced death. A study of 530 infants found that the early introduction of peanuts significantly decreased the frequency of peanut allergy in childhood for children at high risk for developing peanut allergy.<sup>21</sup>

## Acknowledgements:

Michelle Chellino, BS contributed to this Fact Sheet.

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