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# ASSESSMENT OF FOOD ALLERGY AND FOOD SENSITIVITY

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By now you have seen it just about everywhere: the lowly peanut in the news, its impact on schools and businesses needing to create peanut-clean environments. Newer restaurants, catering to patrons with specialized menus that are gluten-free or casein-free, are opening all around the country. Is food allergy linked to other disorders like autism or obesity? Does egg allergy in pediatrics lead to asthma? What novel treatments are emerging and what's going on with the debate in the medical community about the standard of care and best practices?

The answers may surprise you, but one thing is certain: the incidence of food allergy, and many other immune disorders, is occurring earlier in life, with more severe consequence and with greater frequency than ever before.

What's behind this trend? Some experts propose the "hygiene theory" that the clean and sterile environment of modern life does not train our immune system at a young age to achieve the proper balance, leaving many susceptible to hyper-reactivity. Others say it's the chemicals and toxins; maybe vaccines or just that global warming is bringing longer and more severe allergy seasons. Perhaps it's the more widespread use of genetically modified foods. No one knows for sure.

But the facts that are emerging show that as many as 25-30% of households consider at least one family member to have a food allergy or sensitivity. Food allergy is a complicated and often misunderstood disease. Adverse reactions to foods can be broadly classified into two categories. The categories include immunological response and non-immunological response. Overall, foods can have a positive or negative impact on your overall health and well being.

"Food allergy" is defined as an abnormal response to a food triggered by your body's immune system. The immunological response is mediated by the antibody IgE. (Type I) The response is immediate and involves mast cells that release histamine and other inflammatory chemicals resulting in symptoms from mild to life threatening. Blocking the effects of this mediator with specific antihistamines is useful in emergency management of allergic symptoms. Food allergy accounts for a small fraction of overall food reactions. The actual prevalence of food allergies is estimated to be approximately 6% in infants and children and 3.7% in adults.<sup>1</sup> There are eight foods that appear to be responsible for 90% of all food allergic reactions. Milk, eggs, peanuts, wheat, soy, and tree nuts are the foods most often implicated in food allergic children. In adults, peanuts, tree nuts (walnuts and pecans), fish and shellfish are the most common culprits. Food allergens are typically water-soluble glycoproteins resistant to heating and proteolysis. These characteristics facilitate the absorption of these allergens across mucosal surfaces.

"Food sensitivity" is a delayed immunological response and can occur up to 72 hours after ingestion. Food sensitivity is commonly associated with the antibody IgG. Symptoms of delayed food sensitivity are diverse and may affect any system in the body such as gastrointestinal, respiratory, neurological and musculoskeletal. Delayed food sensitivities seem to be more common than the more easily recognized IgE-mediated reactions. Conditions associated with food sensitivity may include but are not limited to ADD/ADHD, autism, fatigue, eczema, asthma, and acne, migraine headaches, obesity, arthritis, IBS and depression. When the immune system starts tagging foods the way it does with bacteria and viruses it can cause constant inflammation. Therefore it is important to recognize the difference between food allergy and food sensitivity.

Each individual's immune system has its own threshold or tipping point. This is the moment when the immune system recognizes a harmless substance such as food as an allergen and is worthy of an immune response.

Normally, the process of digestion involves digestive juices breaking down food proteins into amino acids. These amino acids will be taken up into circulation and sent throughout the body. They are reassembled into other beneficial proteins. If however these proteins are not properly digested, they can permeate through the intestinal wall and leak into the bloodstream. When this

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occurs an immune response occurs. Often the response results in the production of allergen specific IgG and the development of immune complexes, similar to Arthus reaction/serum sickness model or a Coombs-Gell Type III reaction.

The question remains how much bio-burden of IgG antibody assault can one tolerate? There has to be a limit of tolerance and once this threshold exceeds a patient's tolerance, ill effects are seen in individuals. It is important to understand that each individual has different immunological responses that depend on the individual's genetic make-up. There are no fixed criteria that define the limits of these antibodies. Demographic variations exist including age, gender, geographical location, culture and life-style. Food sensitivity can be dose related yet there is no antigen quantity required to trigger the immunological response. Even micro or nano quantities are sufficient to express its immunological effect in terms of response. Therefore it is important that both IgE and IgG levels be used as guidelines in assessing the ill effects of food allergy and sensitivity.

A complete clinical and food history is recommended to identify the most appropriate test for each patient. For example, in pediatric populations, significantly elevated levels of antibodies to various food groups are often observed. This can be indicative of future risk factors for the future development of food allergy in these children. It is important to note that only IgG antibodies can cross the placenta from mother to child. Breast-feeding is also a carrier of IgG antibodies from mother to child. These children with elevated IgG antibodies should be tested for inhalant IgE allergy. Different methods of allergy testing are available yet

laboratory testing is the safest and most effective. Serum levels of IgE and IgG are the gold standard to assessing food allergy and sensitivity.

Yet, it is important to be aware of certain plant proteins that cross-react with different pollens. This phenomenon is known as concomitancy. Conserved homologous proteins shared by pollens and foods likely account for this cross-reactivity. During allergy season high levels of IgG plant protein antibodies are observed in food sensitive individuals. Food allergic and sensitive individuals may experience an increase in symptoms. For example, individuals with ragweed allergy may experience oropharyngeal symptoms following the ingestion of melons or bananas. Recommendations for IgE inhalant allergy testing is advised for these types of individuals. In some cases this can be attributed to some of the super protein families. The immune system cannot differentiate between the various members of this particular family causing cross reactivity. For example, increased levels of IgG antibodies to vegetables and beans (including coffee beans) are sometimes associated with Lipid transfer proteins (LTP), lectins (polysaccharides), and/or profilins (actin binding proteins). If the patient does not have a history of eating the vegetable or bean and if they show increased levels of IgG antibodies to these foods, this can be a positive reflection of LTP, lectin or profiling protein sensitivity. This response is commonly seen in pediatric populations and has been coined the term "allergic march." This suggests a future predisposition to food allergy or food sensitivity.

An advantage of measuring both IgE and IgG food allergen levels is that the test can be performed from a single blood sample. Utilizing laboratory testing to

Table 1

| Allergen | Potential Cross-Reactive Foods  |
|----------|---|
| Ragweed  | Bananas, melons (watermelon, cantaloupe, honeydew) zucchini, cucumbers, dandelions, chamomile tea   |
| Birch    | Apples, pears, peaches, apricots, cherries, plums, nectarines, prunes, kiwis, carrots, celery, potatoes, peppers, fennel, parsley, coriander, parsnips, hazelnuts, almonds, walnuts |
| Grass    | Peaches, celery, melons, tomatoes, oranges  |
| Mugwort  | Celery, apples, kiwis, peanuts, fennel, carrots, parsley, coriander, sunflower, peppers   |
| Alder    | Celery, pears, apples, almonds, cherries, hazelnuts, peaches, parsley   |
| Latex    | Bananas, avocados, kiwis, chestnuts, papayas  |

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identify food allergy and food sensitivity is beneficial. There is a phenomenon on the increase over the past ten years called “pseudo food allergy.” The condition is characterized by self-diagnosis of food allergy and intolerance in the absence of medical expertise.

Table 2  
Advantages in-vitro testing

|   |
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| Patient safety<br>Cost effective<br>Many allergens tested<br>Not affected by medications<br>No irritating skin reactions<br>Sets safe starting dose for immunotherapy |
|---|

Once the problematic allergens have been identified a treatment plan can be developed. Dietary manipulation by elimination of reactive foods or simple rotation diets is most beneficial. This can lead to a resolution of symptoms and help avoid nutritional deficiencies. Consult with an experienced dietician who understands food allergies so they can help your patients to make the proper choices for menus and recipes.

Other treatment strategies include sublingual immunotherapy also known as SLIT. Specialized protocols<sup>3</sup> are now available that base dosing on the patient’s degree of sensitivity. SLIT treatment provides for the gradual de-sensitization to the offending food, so that these foods can be gradually reintroduced around 3-6 months. Specific IgE and IgG levels are monitored during treatment to safely adjust the strength of treatment and to monitor progress. In the short term, the goal of food SLIT is to relieve the symptoms associated with food allergy such as chronic urticaria, or frequent ear infections. Over the longer term, up to 2-3 years, the goal is to develop long-term tolerance so that small amounts of the offending food can be tolerated and symptoms do not re-occur. SLIT offers a treatment option that is efficacious, safe, convenient and cost effective and offers the potential to modify the disease to prevent onset of more serious symptoms.

Technologies are improving so clinical laboratories’ results are now more reliable and reproducible than in the past, but all labs are not created equal. Clinicians should know the limitations of their test and not over-interpret test results. Patient results should always be interpreted carefully with respect to patient history and physical exam.

There are several important studies underway that will

help doctors understand more about the mechanisms of food allergy and benefits of treatment with the hope to improve patient outcomes. Stay tuned, since this is an area of medicine that is changing rapidly, to the potential benefit of millions of patients affected by food allergy diseases.

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