Blood Testing for Food Allergies and Sensitivities

Rationale, indications and clinical outcomes

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Food allergy panels are the most widely used lab test for identifying food allergies and sensitivities within complementary medical practice. Food allergy panels identify and quantify IgG and/or IgE antibodies to various food derived proteins (allergens) present in the patient's blood; they are either a finger-prick or blood draw test depending on the particular lab and parameters measured.

While dietary elimination followed by challenge, a.k.a. elimination diet, is a common method of identifying food sensitivities, blood tests offer a more objective means of identifying sources of dietary sensitivity. They also achieve a higher level of compliance from patients requested to follow a restricted, hypoallergenic diet. Blood testing is especially useful and expedient in determining the particular food sensitivities of patients likely to have multiple sensitivities, and for whom determination through an elimination diet would be unduly lengthy or difficult. In addition, some patients simply decide that the convenience and value of an objective measure outweigh the burden of additional cost (in the range of a few hundred dollars). Various combinations and specific profiles are available depending on the laboratory used; testing by *Rocky Mountain Analytical* and *Great Plains Laboratories* are detailed at the conclusion of this article.

Immunology Refresher

Food allergy/sensitivity testing via blood work measures serum IgG and IgE levels. An allergy in the commonly used sense of the term implies an IgE response, such as characterizes rhinitis or an anaphylactic (Type I) reaction, and may occur in reaction to specific foods as well as environmental stimuli; food sensitivities, conversely, are characterized primarily by an IgG response to ingested proteins (Atkinson 2004). This is a delayed (Type IV) hypersensitivity response. Food sensitivities and subsequent synthesis of specific antibodies can also trigger formation and deposition of antibody-allergen immune complexes in tissues, a Type III response, as may occur in rheumatoid arthritis (RA) (Hvatum 2006). Thus, while not allergies in the true sense of the word, food sensitivities nonetheless involve an adaptive immune response in the form of IgG production.

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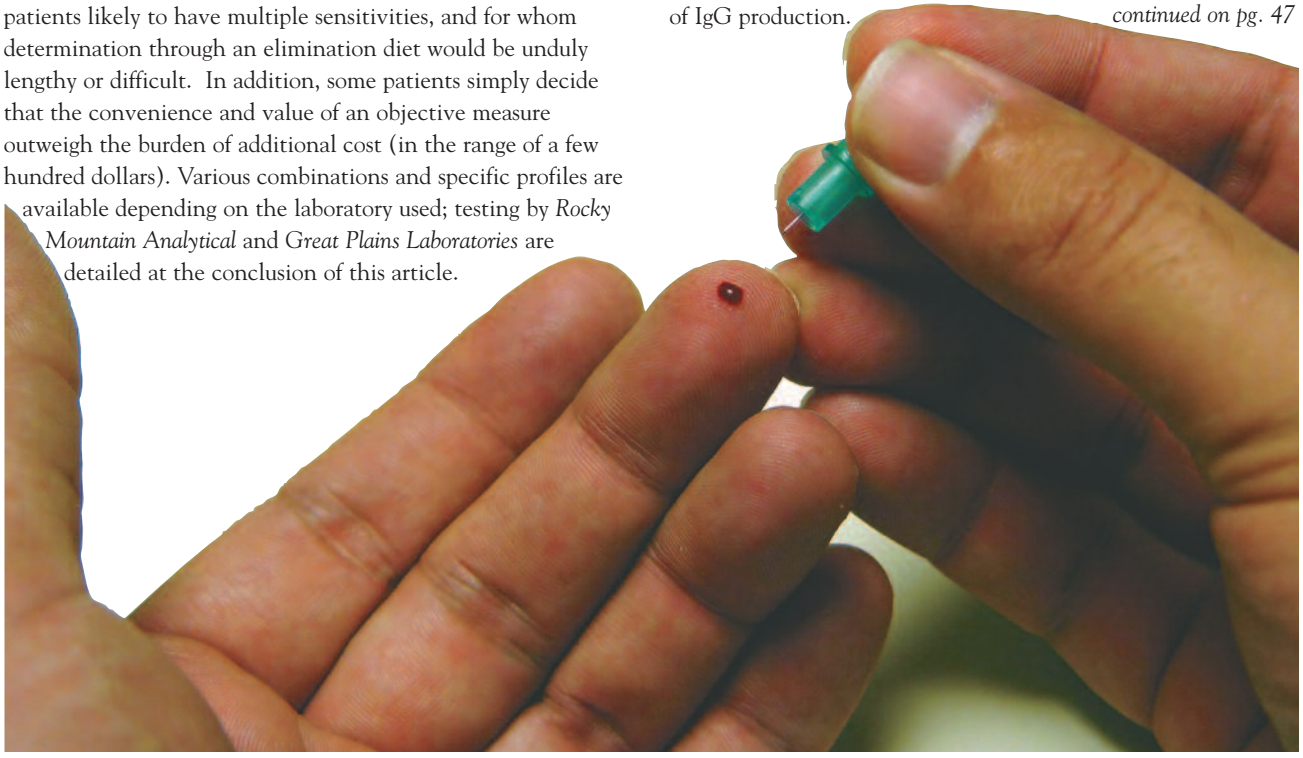

Because IgE responses are typically acute and primarily affect skin, airways, or the gastrointestinal tract, identifying allergenic foods can be easier, versus identifying food sensitivities. IgG reactions have a slower onset and persist for longer than do IgE reactions: the half-life of an IgG antibody is roughly three weeks (versus 1-2 days) (Kuby 2007). It may take up to four weeks for elevated IgG levels to normalize following exposure (Rocky Mountain Analytical 2007).

Proposed Indications for Food Allergy/Sensitivity Testing

Indications for food sensitivity testing include: gastrointestinal conditions such as Irritable Bowel Syndrome (IBS) and Inflammatory Bowel Disease (IBD); atopic conditions such as asthma and eczema; neurological disorders such as ADD/ADHD and Autism; mood disorders; autoimmune conditions such as SLE and Multiple Sclerosis (MS); immune-mediated arthrides such as psoriatic or rheumatoid arthritis ; chronic inflammatory conditions; migraines; and virtually any moderate to severe condition of immune dysregulation has the potential to be abetted or ameliorated when sources of food sensitivity are eliminated (Shaw 2008). Testing for food allergies (IgE) is indicated for unexplained allergic reactions such as hives and unexplained skin rashes. Patients with IBD and IBS have also been shown to have an exaggerated immune response to food allergens (in order of frequency: milk protein, soybean, tomato, peanut, egg white), suggesting a role for IgE testing in these conditions as well (Mekkel 2005).

Applying Food Allergy/Sensitivity in Clinical Settings; Controlled Human Intervention Trials

The most well researched indications for food allergy testing include IBS and atopy. Children with atopy, for instance, have shown elevated anti-food IgG levels more frequently than children without atopy; the most common offending foods were egg whites, wheat/rice mixture, oranges and cow's milk (Eysink 1999).

Elimination diets based on the results of serum IgG testing have been found to significantly reduce severity and frequency of IBS symptoms in multiple studies (Yang 2007, Zar 2005, Atkinson 2004). Zar et al measured titres of IgG4 in 25 patients with IBS and found antibodies to milk, eggs, wheat, beef, pork and lamb to be most commonly elevated (2005). Exclusion of these foods resulted in reduction of pain severity, pain frequency, bloating severity, and improvement in bowel habits (Zar 2005). Yang et al found that the positive rate of serum food specific IgG antibodies was 63.6% in diarrhea-dominant IBS and 43.8% in constipation dominant IBS, both of which represented figures significantly higher than that of controls (2007). Elimination of test-positive foods for eight weeks in these 87 patients resulted in a reduction of symptom frequency from 3.79 to 1.53 (scores on the IBS Quality of Life index); severity was reduced from 3.18 to 1.45 (Yang 2007).

Atkinson et al (2004) performed a study of dietary elimination based on IgG antibodies to food in a group of 150 IBS patients and found similar improvements. Patients were randomized to an IgG based elimination diet that eliminated all foods to which they had raised IgG antibodies, or a "sham" diet (controls). After three months of treatment, the IgG based diet group experienced a 10% greater reduction in symptom scores, with this value increasing to 26% in subjects who were fully compliant. The number needed to treat for the fully compliant group was 2.5, significantly better than that of tegaserod, a drug used for IBS, at 17. It was further observed that patients with a greater number of sensitivities as determined by IgG testing had a relatively greater symptom reduction when they adhered to the IgG based diet.

Drisko et al (2006) studied food intolerances in IBS in an open pilot study of 20 patients positive for IBS according to Rome II criteria, but who did not improve with standard medical therapy. Food intolerances were determined via serum IgE and IgG testing for food and mold panels, and comprehensive stool analysis (CSA). Elimination diets were applied based on results, followed by challenge. Probiotic supplementation was also initiated at challenge. Baseline abnormalities were identified on serum IgG food and mold panels in 100% of the study subjects. Significant improvement was seen after food elimination and rotation diet, particularly with respect to stool frequency and IBS Quality of Life scores. One year follow up found significant continued adherence to the food rotation diet and minimal symptoms of IBS.

Test Considerations

Although blood testing for food allergies is a reliable and objective measure, as with all lab tests, testing conditions may affect reliability. Factors that may obscure results include immunosuppression or poor ability to mount an immune response, leaky gut syndrome, cross-reactivity between proteins, lack of recent exposure, and possible alteration of protein structure, for instance via heat (denaturation). Pharmacological immunosuppression via corticosteroids, cyclosporine, methotrexate, etc, a physiologically weakened immune system, or immunodeficiency may result in false negatives simply because the immune system cannot produce levels of antibody sufficient for detection. Additionally, children under two years of age are not recommended for testing due to the immaturity of the immune system at this stage of development (Rocky Mountain Analytical 2007).

In leaky gut syndrome, translocation or "leakage" of large food derived proteins across the increased cell-cell spaces can lead to elevated IgG levels in response to virtually all foods regularly ingested. Therefore, while leaky gut syndrome may develop from a single food sensitivity originally triggering GI inflammation and destruction of the tight junctions between cells, advanced cases may involve multiple sensitivities. Alternately, non-food related causes of initial inflammation include excessive alcohol consumption, high levels of sustained physical or psychological stress and various pharmacological drugs, such as NSAIDs (Rocky Mountain Analytical 2007).

Cross-reactivity may give rise to false positives on testing through a phenomenon called molecular mimicry. Proteins similar in structure may trigger an immune response by binding to immune cell receptors in a manner similar to another protein, to which the immune system is already "primed." Conversely, protein alteration may lead to false negatives. Protein alteration may occur through application of heat during cooking (denaturation): an individual may be sensitive to cooked eggs, but not to raw eggs, for example, because the structure of the proteins has been changed sufficiently to bind receptor on immune cells. In this case, the form of the food being tested differs from the form the individual is sensitive to (Rocky Mountain Analytical 2007).

A false negative may also occur in the instance of no recent exposure. As described above, the half-life of an IgG antibody is approximately three weeks; it takes between five and seven half-lives for a specific antibody to be cleared from circulation. Ensuring patient exposure in the week immediately preceding testing will minimize the possibility of such a false negative. It is advised that the patient ingest as many different foods as possible in the week beforehand, and ingest target foods at least twice in the same time period. Because the half-life of IgE antibodies is much shorter (1-3 days), it is suggested that ingestion of suspected foods occur within 48 hours of testing, in the absence of an anticipated reaction of anaphylactic severity, of course (Rocky Mountain Analytical 2007).

Finally, it is possible that certain signs and symptoms resembling food sensitivity (bloating, gas, diarrhea, headache, skin rash) be caused by a non-immune mediated mechanism, in which case altered antibody levels will not appear on lab testing. Such mechanisms include: enzyme deficiency (lactase, needed to digest lactose in dairy products; alpha-galactosidase, needed to digest cruciferous vegetables and legumes); effects of food chemicals (histamine, in fish, sauerkraut, cheese; methylxanthine, in cola, caffeine, chocolate, black tea; tyramine in cheese; tryptamine in fermented foods); food contained toxins (aflatoxins in peanuts, cereal grains; saxitoxin in shellfish; ergot in cereal grains; cyanogenic glycosides in stone fruits such as peaches) (Rocky Mountain Analytical 2007).

Food Allergy/ Sensitivity Testing Resources

Specific testing procedures and report of results format varies from laboratory to laboratory. Rocky Mountain Analytical (RMA) offers two popular allergy panels, an IgG panel and an IgG+IgE panel. The IgG panel (AllerGSpot test) tests 96 foods, 48 herbs and spices, 95 vegetarian foods and 16 inhalants; the IgG+IgE tests 96 foods, 48 herbs and spices, 95 vegetarian foods, plus 64 inhalants, for both IgG and IgE reactions. While the IgG test requires only a finger prick equivalent to 25 µL blood (three strips holding eight µL each), IgE testing requires a blood draw and centrifuge, since IgE antibodies are less concentrated in the blood and require a greater sample volume for accurate detection. After centrifuge, serum is transferred to the sample container for transportation and final analysis. Finger prick samples are stable at room temperature for 60 days, while serum is stable for only 14 days. Reactions are reported according to a six grade scale: 0 = no reaction; 6 = extremely high; results are returned within approximately three weeks (Rocky Mountain Analytical 2007).

Great Plains Laboratories (GPL) offers two allergy panels: 1. Comprehensive IgG (serum) test of 93 foods; 2. Comprehensive IgE (serum) tests of 25 foods and food groups. In addition, GPL offers a serum Inhalant Allergy Panel (IgE) of 36 inhalants and inhalant groups (Shaw 2008). ■

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