

The Doctor's Guide to Delayed Food Sensitivities



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DIAGNOSTICS

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About the Author

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Introduction to Food Sensitivities

Food sensitivities and related diseases affect at least 100 million people worldwide. In the USA alone about 50 million people suffer from food sensitivities at a cost of 18 billion dollars per year. In general, the prevalence of food sensitivities has increased to more than 50% in adults and more than 70% in children in the past few years. Food-related reactions cause a wide variety of illnesses ranging from skin rashes and headaches to chronic intestinal diseases. Although the symptoms of food sensitivities may differ, antigens from food, food additives or environmental sources cause the production of antibodies (IgM, IgA, IgG, IgE and IgD) or interact with the mucosa or epidermis and stimulate T-cells. Food sensitivities are classified into four types (I, II, III, IV) based on Gell/Coombs system. The FIT Test measures both Type II and III delayed-type reactions mediated by IgG antibodies and Complement bound to immune complexes. IgG antibodies in the blood binds to soluble antigens or antigens which have deposited in tissues and form immune complexes. Immune complexes then activate Complement which becomes bound to the immune complex lattice. Activation of Complement causes tissue inflammation and the symptoms associated with food sensitivities. The FIT Test measures both IgG antibodies and Complement fragments. Other assays measure only IgG resulting in reduced sensitivity.

Differentiation of Food Allergies, Food Sensitivities and Food Intolerance

Comparison of Food Sensitivity, Food Allergies and Food Intolerance modified from Custom Fit Nutrition

Parameter	Food Sensitivity The FIT Test	Food Allergies	Food Intolerance
Body Organs Involved	May affects any organ system	Usually limited to airways, skin, gastrointestinal tract	May affects any organ system
Onset of symptoms	From 45 minutes up to 3 days after ingestion	From seconds to 1 hour after ingestion	From a few minutes up to 3 days after ingestion
Are symptoms acute or chronic?	Usually chronic, sometimes acute	Usually acute, rarely chronic	Usually chronic, sometimes acute
Percentage of Population Affected	20-30%	1-2%	5-10%
Type of reaction by Gell/Coombs	Types II and III: Delayed Hypersensitivity	Type I: Immediate Hypersensitivity	None
Immunologic Mechanisms	Antibodies: IgG, Immune Complexes, C3, C4	IgE	Antibodies are not involved
Non-Immunologic Mechanisms	None	None	Toxic, pharmacologic
How much food is needed to trigger a reaction?	From small amount to large amount; often dosage and frequency dependent	As little as one molecule of food needed to trigger reaction	From small amount to large amount; often dosage and frequency dependent

Food Allergies: Type I, Immediate Hypersensitivity

Overview

Both IgE and IgG antibodies are produced in response to proteins, sugars or other types of molecules collectively called “antigens” that may enter the body via inhalation, ingestion or contact with the skin surface. The generation of antibodies in response to antigens is called **adaptive immunity**. The initial contact with antigen results in T Cells processing the antigen and presenting it to B Cells which generate IgM antibody. Upon a second exposure to the same antigen the B Cell switches the class of antibody to IgE or IgG or other classes of antibodies such as IgA or IgD. The exact reason why B Cells preferentially switch to one class of antibody or another is not known but there does seem to be some dependence on the type of antigen and route of antigen entry on the class of antibody produced. In addition, the genetic composition of an individual has been shown to affect the class and amount of antibody produced. Structurally, IgE and IgG are similar in that they are “Y” shaped and contain two antigen binding sites and an Fc region which binds to cellular receptors. This is where the similarity ends because IgE and IgG mediate vastly different functions and reactions in the body.

Food Allergies: Generation of IgE and Type I Allergies or Immediate Hypersensitivity

IgE is produced by B Cells and subsequently binds to Mast Cells and Basophils via IgE receptors on the surface of these cells. Upon second exposure to the antigen, the antigen cross-links the IgE on the Mast Cells and Basophils and the cells degranulate and release histamine and proteases which causes an immediate reaction. **This reaction is referred to as immediate hypersensitivity or Type I allergy because the onset of symptoms is generally within a few minutes.** B Cells tend to be localized at mucosal surfaces or lymph nodes near the entry of the antigen. As a result, many times the reaction tends to be localized initially and then as the IgE enters the blood stream, the response spreads to other areas in the body. Type I allergy is characterized by rapid onset of symptoms which may result in life-threatening anaphylaxis. Typical antigens causing Type I allergy include: peanut, bee sting venom or pollen. The former antigens from peanut and bee venom tend to cause anaphylactic reactions which may be life threatening whereas, pollen causes asthma or hay fever which tends not to be life threatening.

The FIT Test does not measure Type I, Immediate Hypersensitivity mediated by IgE

Food Sensitivities: Types II & III, Delayed Hypersensitivity

IgM antibody is produced by the first exposure of B Cells to a particular antigen. Upon second exposure to the same antigen, the class of antibody switches and the B Cells produce IgG. Other antibodies such as IgA and IgD may also be produced by B Cells but this discussion will be limited to IgG. There are four classes of IgG (1-4) that can be produced by B Cells but only one class of IgG is produced by each individual clone of B Cells. The net result is that B Cells produce one or more classes of IgG antibody when responding to a particular antigen. The antibodies are released into the blood stream and bind to antigens that are soluble in the blood or that have deposited in various tissues and form Immune complexes (IC). IgG 1 and 3 activate complement and, as a result, are the main cause of Types II, III and IV delayed-type hypersensitivity (DTH) reactions. By contrast, IgG 2 and 4 antibodies show very weak or no ability, respectively, to activate complement and play a very reduced role in causing DTH. **These reactions are termed DTH because the time between exposure to the antigen and display of symptoms is generally greater than 12 hours.** A wide variety of antigens will generate IgG antibodies ranging from bacteria and viruses to food antigens. The entry of these antigens into the body also ranges widely from skin to mucosal surfaces of the mouth, airways and gut.

Type II/III delayed-type reactions are mediated by IgG antibodies which bind to antigens and form Immune complexes (IC). The formation of IC results in the activation of complement and the generation of inflammation which causes the symptoms associated with food sensitivity. Complement is a system of proteins that comprise the **innate immune system** which will be summarized in a separate monograph. In general, Type II DTH is directed against cell surface or tissue-associated antigens, Type III DTH results from deposition of antigens or IC in blood vessels or tissues whereas, Type IV DTH is a cellular response that results from antigens applied directly to the skin or injected intra-dermally. The generation of an inflammatory response starts when antigens gain entry to the circulation resulting in the production of IgG antibodies in the lymph nodes. The IgG antibody is secreted into the blood stream and binds to antigens to form IC, which may deposit in tissues. Tissue-associated IC then activate complement, which causes inflammation and the symptoms associated with food sensitivities. In other cases, antibody binds to antigens that have already deposited in the tissues. Upon binding to the antigen an in-situ IC is formed which then activates complement on the surface of the tissue resulting in inflammation. Delayed reactions usually take hours or days to present symptoms and manifest themselves in chronic diseases such as IBS or eczema.

The FIT Test measures Types II and III, Delayed Hypersensitivity mediated by IgG

The FIT Test does not measure Type IV, Delayed Hypersensitivity mediated by a Cellular Response

Food Intolerance Causes: Enzyme deficiency, Food Additives, Damage to the Gut Lining, Chemicals & Toxins

Food intolerance is a condition where the body reacts to foods because there is a lack of an enzyme, damage to the gut lining from disease or antibiotics or the food contains certain chemicals **but is not mediated by antibodies.**

In general, there is a genetic component that predisposes a person to food intolerance. Food intolerance occurs in most races and ranges in frequency from a low of 15% in Caucasians to a high of 90% in Orientals whereas, Mediterranean and Blacks are in the mid-range at about 50%. Common symptoms of food intolerance include: abdominal cramping and diarrhea which may be accompanied by weight loss or skin reactions, vomiting or even headaches. The onset of symptoms can be rapid (minutes) or develop over days after ingestion of a specific food. Often times it is difficult to distinguish food intolerance from either food allergy (IgE) or food sensitivity (IgG/Immune complexes) because both the onset of symptoms and the symptoms themselves are very similar.

The FIT Test does not measure Food Intolerance

Food Intolerance: Enzyme Deficiency

Lactose intolerance is caused by the lack of the enzyme: Lactase. Lactase breaks down the sugar lactose found in milk and the associated products made from milk. The inability to enzymatically break down lactose causes food intolerance and the resulting symptoms. Lactose intolerance is thought to occur because of un-digested lactose that resides in the gut and causes the osmotic movement of water from the tissues into the lumen of the gut resulting in abdominal pain and diarrhea. In addition, the gut bacteria consume the lactose resulting in the production of gas that results in bloating. Avoidance of foods containing lactose is quite effective in halting this type of intolerance but in practice total avoidance is impractical. A common way to alleviate most of the symptoms is to take a lactase-enzyme supplement which is commercially available. Lactose intolerance can occur in most races of adults and babies and is the most common food intolerance.

Food Intolerance: Food additives

Food additives may also cause food intolerance. The addition of sulfites, nitrates and food colorings to foods enhances the appearance, flavor profile and may reduce bacterial growth so the shelf life is extended. However, sulfites have been shown to cause asthma attacks in certain people but is generally not life-threatening. Sulfite sensitivity occurs gradually and is exacerbated by foods containing high concentrations of this ingredient. Additives such as MSG and Nitrates cause headaches, hives or other skin reactions which are generally not serious and clear up relatively quickly. Food colorings such as carmine (red) or annatto (yellow) are linked to anaphylaxis which is a very serious condition which occurs within minutes and is life-threatening.

Food Intolerance: Damage to the Gut Lining

Damage to the gut lining from bowel diseases such as Celiac disease or Irritable Bowel Disease (IBS), surgery, antibiotics or even infection results in a drop or total loss of lactase production. The net result is that a person becomes lactase-enzyme deficient (see above) and cannot digest lactose in milk and milk products and acquires an intolerance. Generally, the loss of lactase production is transient after a course of antibiotic treatment. The most common symptom of damage to the gut lining is diarrhea. The lining of the small intestine heals over time and lactase production is restored. The use of a probiotic supplement restores the normal gut flora and tends to accelerate the healing process.

Food Intolerance Causes: Chemicals & Toxins

Chemicals or even toxins are normally found in the food we eat and ultimately cause food intolerance. For example, coffee, tea, chocolate or even cheese contain biogenic amines which cause headaches. Uncooked beans may contain aflatoxin and fish which has not been stored properly may contain high concentrations of histamine. In either case the net result is skin reactions, intestinal problems, nausea and vomiting. Salicylates are found in many common foods and generate intolerance after ingestion. Salicylates are present in the majority of fruits, citrus fruits, vegetables, spices, herbs, tea, flavor additives (processed foods), tomato sauce and berries.

The Food Inflammation Test (FIT Test) Format

A plastic ELISA plate is coated with a set of food antigens. Each well in the ELISA plate is coated with a different food. The serum sample is diluted, added to each well and allowed to incubate. During incubation, IgG antibodies and immune complexes (IC-C3d) from the sample bind to the food antigen(s). Then each well is washed to remove unbound antibody followed by addition of a conjugate, which contains both anti-IgG and anti-C3d-HRP. The conjugate simultaneously binds to IgG plus IC-C3d containing immune complexes. The wells are washed to remove unbound conjugate. A substrate is added to visualize the signal generated by both IgG and IC-C3d. There is also a standard curve with controls on the plate to ensure that the results are accurate and the test is functioning properly. The data from each set of foods is analyzed and confidence limits are set that ensure a probability of $\geq 95\%$ that a sample is either positive or negative for a particular food antigen. The results are displayed according to food groups in an easy to understand bar graph. The relative reactivity of each positive food is ranked from Red (4+) to Light Green (1+) or Dark Green which is a negative reaction.

Comparison of the FIT Test with other available tests

There are four basic types of food sensitivity tests:

- 1) The FIT test **is the most sensitive test on the market** because it is the only test that simultaneously measures both IgG (1-4) plus Complement (C3d) bound to immune complexes which results in a test that generates two signals: one signal for the IgG plus one signal for the IC-C3d. Since both signals are measured simultaneously, the net result is twice the signal. By comparison, other tests measure only IgG which results in generating only one signal. It is easy to understand that a test which generates two combined signals is more sensitive than a test that generates only one signal.

Comparison of the FIT Test with other available tests, Cont'd

- 2) Tests that measure only IgG antibodies (1-4) generate only one signal compared to the FIT test which generates two signals. These IgG only tests are less sensitive than the FIT Test.
- 3) Tests that measure only IgG₄ generate only one signal compared to the FIT test which generates two signals. These IgG only tests are less sensitive than the FIT test. In addition, IgG₄ is not an indication of sensitivity but rather an indication of tolerance to foods. Tolerance occurs because IgG₄ blocks the reactivity of food antigens so that the body does not produce inflammation.
- 4) There are two types of cellular tests that measure the reaction of white blood cells to food antigens. White blood cells are isolated from the patient's serum and added to a small well with food antigens. In the first cellular test, the cells increase in size and the claim is that an increase in cell size indicates a positive reaction to a given food. In the second cellular test, the cells decrease in size and the claim is that a decrease in size indicates a positive reaction to a given food. It is not certain if either test is correct. Cellular tests are very hard to reproduce and it is not clear that the results are actually measuring anything related to food sensitivity.

Interpretation of the FIT Test Results

The results will be grouped into two lists: Restricted Foods and Allowed Foods. The restricted foods are those foods which test positive and the patient is sensitive to these foods. The restricted foods should be eliminated from the diet *along with foods that have possible cross reactivities* and a suitable replacement for that food should be used. The allowed foods are those foods which test negative and the patient is not sensitive to these foods. These foods can be eaten without any sensitivity issues.

The patient should avoid any food that tests positive, but in any event, the highest positives. In some cases, the patient has low reactivity to several foods which are depicted by bars which are Light Green (1+). In the latter case, the sum of all the 1+ reactivity may be over the threshold of reactivity so the patient experiences some symptoms. In this case, the patient should avoid as many of the low reacting positive foods as possible.

Implementation of the FIT Test Results and Report

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Elimination, Challenge and Rotation Diets based on the FIT Test Results

Phase I: Elimination Diet: The patient should eliminate as many of the positive foods as possible. A dietician can construct the appropriate diet which does not contain the positive foods. The patient should continue this elimination diet for at least six weeks. During this time the symptoms may get worse but will gradually improve.

Phase II: Challenge Diet: After the elimination phase (> 6 weeks) the patient can add foods back into the diet. Re-introduce one food or one food group back into the diet at a time. Typically, the patient would eat a small amount of the "sensitive" food at a given time and then increase the amount slowly over a day or two. Then stop eating the food and see if any symptoms appear. Since these reactions are "delayed", wait about one week after rotating the food back into the diet and keep a record of how you feel.

Select the foods and/or additives that are highest positives (3+ to 4+) and add the food back one at a time. Phase II is an iterative process where additional foods are added back into the diet sequentially until the offending food(s) can be identified. Re-testing periodically will help "visualize" what is going on from a physiological perspective and aid the decision of what to eat or avoid. This is a long-term process and the patient must be committed for the best results. Re-testing the patient serum during the course of the diet is advised. In general, the titers to the eliminated foods will decrease, so you will see bars that were positive become negative or bars that were strong positives become weak positives. Overall, the bars on the graph showing positive foods will decrease in height and move closer to or even below the cut-off line because the titers of antibody and immune complexes (IC) have been reduced. After elimination of a food (antigen) from the diet, antibody titers/IC are reduced about 50-75% in six to eight weeks and after about 6 months the titers are generally about 10% of what they were initially. The bars for the foods may not become totally negative even if the titers/IC are reduced. However, if the bars are reduced in severity (e.g. 4+ to 3+ to 2+ to 1+) generally the overall antibody/IC load is reduced below a threshold that causes symptoms. As a result of lessening antibody concentrations, the patients often will demonstrate or recite that their symptoms have lessened or have been eliminated.

Elimination, Challenge and Rotation Diets based on the FIT Test Results, Cont'd

Phase III: Rotation Diet: After at least six months, the patient can re-introduce foods back into the diet that caused sensitivity and were eliminated in the challenge diet but only once or twice a week spaced out by a few days. By doing this, the antibody/IC titers should not increase and the patient will not experience the return of symptoms. This will help to prevent a sensitivity from returning or a new one from developing. In some cases, the symptoms return even if the food is not eaten frequently and that food must be avoided completely. The goal is to re-introduce as many foods as possible and then rotate the diet so that symptoms do not appear. However, if several foods are re-introduced the sum of antibody/IC produced for each food may increase over a threshold and symptoms can re-appear. This is because each food causes a small incremental increase in antibody associated with just that food but when the antibody response for each food is added together the overall increase in antibody/IC is enough to activate complement and cause inflammation. Patients should be re-tested at 9-12 months after the elimination diet.

Food Sensitivity Testing of the Eight most common Food Groups using The FIT Test

Eight major groups of foods that cause food sensitivities: Egg; Fish; Milk; Peanuts; Tree nuts; Shellfish; Soy; Wheat

I. Testing for Sensitivity to Eggs

The FIT test measures IgG and Immune Complexes to Egg Yolk and Egg White from common hens. The wells in an ELISA plate contain egg yolk and egg white proteins. If a person is sensitive to either egg yolk or egg white, then that individual cannot eat whole eggs. If you test positive to egg yolk alone you may be able to eat products with egg white and likewise, if you are positive to egg white then it may be possible to eat egg yolk without experiencing food sensitivities. In general, it is impossible to completely separate egg yolk from egg white so sensitivity to either may mean abstaining from egg totally.

Overview Egg Sensitivity

Sensitivity to eggs is most common in children and is second only to milk sensitivity. Egg sensitivity is also very common in adults. Most people who are sensitive to hen's eggs have antibodies which react to one of four proteins in the egg white: ovomucoid, ovalbumin, ovotransferrin, and lysozyme; ovomucoid, also called *Gal d 1*, is the most common target of immune system attack. The egg yolk contains several potential antigens: livetin, apovitillin, and vosvetin. A person who reacts only to a protein in the egg yolk may be able to easily tolerate egg whites, and vice versa. Some people will be sensitive to proteins in both the egg white and the egg yolk. People who are sensitive to eggs may develop a sensitivity to chicken or other poultry meats.

Cross reactivity of Eggs from various Species of Birds

Egg white and yolk from Chicken, Turkey, Goose and Duck all contain proteins that are homologous and that have been shown to display antibody cross reactivity. In addition, people who are sensitive to egg have also been shown to be sensitive to the corresponding meat from the bird. In very rare cases a sensitivity to duck and goose eggs has been observed without detectable sensitivity to chicken eggs. Also, in some cases, well cooked eggs have been shown to be tolerated in some people sensitive to eggs. However, once a sensitivity to one species of egg has been confirmed it is recommended that the patient avoid eggs from other species as well.

Cooking without eggs

In cooking, eggs are multifunctional: they may act as an emulsifier to reduce oil/water separation (mayonnaise), a binder (water binding and particle adhesion, as in meatloaf), or an aerator (cakes, especially angel food). Some commercial egg replacers can substitute for particular functions (potato starch and tapioca for water binding, whey protein for aeration or particle binding, or soy lecithin for emulsification). For home use, one-half cup of applesauce can replace one egg in some baking recipes. Most people find it necessary to strictly avoid any item containing eggs, including: cholesterol-free egg substitutes, dried egg solids, dried eggs, eggnog, fat substitutes, mayonnaise, meringue or meringue powder, powdered eggs. Ingredients that sometimes include egg are: artificial flavorings, lecithin, natural flavoring and nougat.

Egg Sensitivity Reactions and Symptoms

Egg sensitivity symptoms usually are manifest within several hours or days after consumption. The symptoms of sensitivity fall under four broad categories.

Skin Reactions

One very common group of symptoms is related to skin reactions. Rashes and eczema which leads to itching is one of the most common complaints. However, these skin reactions show up in almost all food sensitivities, so a proper history is required to pinpoint the exact food.

Oral Symptoms

Redness and swelling, around the mouth and lips area, is very common. This is scientifically termed as angioedema. Sometimes the inflammation is accompanied by itchiness and soreness, which can hinder activities like talking and eating. Oral symptoms are prominently visible, so these are the symptoms that cause the most emotional upset and withdrawal.

Sinus Symptoms

A very common symptom is nasal inflammation, commonly known as rhinitis. Rhinitis causes a runny nose followed by itchy, watery eyes, sneezing, coughing and wheezing. It may also trigger severe 'angioedema' which is the swelling of blood vessels, under the skin, near the hands, face, tongue and genitals. Migraine headaches and nocturnal enuresis are also common symptoms.

Gastrointestinal Symptoms

Belly cramps, nausea, diarrhea and vomiting are common symptoms. Abdominal cramping and indigestion can easily be thought of as symptoms of something else, so these symptoms are often deceptive. Gastrointestinal symptoms are also the culprits for the general lethargy or fatigue that often accompanies an egg sensitivity. It can also cause intense heartburn.

Foods to Avoid

Egg and egg-products are contained in many types of foods and a few of the most frequent are listed below.

Baked Goods

Yeast breads typically do not include eggs, yet there are some yeast breads that do. Brioche bread, sweet rolls, cinnamon rolls and raised doughnuts are all yeast breads that call for eggs. Eggs are usually used when baking quick breads. A quick bread uses baking powder instead of yeast to help it rise. Eggs are also a common ingredient in cake and cookie recipes. A standard pie crust recipe does not use eggs, but the tart pastry does. The egg gives the tart pastry the extra firmness needed to hold a filling without the support of a pie pan.

Desserts

Custards, puddings and ice cream all include eggs. Yet, not all ice cream recipes call for eggs. The eggs help the mixture thicken to the correct consistency. Some recipes call for just the egg yolk or for the eggs to be separated. After the eggs are separated the yolks and whites are beaten separately. Some recipes call for beating the egg whites and then gently folding egg yolks into the whites. Meringue, which is used to top pies and in other desserts, is made from whipped egg whites and sugar.

Sauces and Stuffing

Several sauces call for egg yolks, most famously hollandaise sauce, which is a combination of egg yolks, butter and a hint of lemon juice. Hollandaise sauce is served over eggs Benedict, and can also be used to top vegetables, beef, chicken or seafood. Other sauces that use eggs are mustard sauce and chicken barbeque sauce. Eggs are also used to help bind ingredients, such as in stuffing, meatballs and meatloaf.

II. Testing for Sensitivity to Fish

The FIT test measures delayed food sensitivities caused by IgG and Immune Complexes from a panel of nine types of common fish. The wells in an ELISA plate contain proteins from nine common fish. If a person is sensitive to one or more of the fish tested in our panel, it is very common to be sensitive to other fish that are not in our testing panel. Based on this, it is usually advisable to avoid all fish or fish-containing products.

Testing for Fish causing Food Sensitivities

Many fish and shellfish cause immediate **Type I food allergy caused by IgE** that can be quite severe and life threatening. While fish is easier than many other allergens to avoid, a fish allergy is often quite severe. Fish allergy is linked to an increased risk of severe asthma in adult patients. Fish has been linked with the oral allergy syndrome (in which the mouth itches or tingles after eating an allergen) in people with occupational contact with fish. The greatest risk from fish allergies is anaphylaxis, a severe systemic reaction in which the body releases large amounts of histamine, causing tissues throughout the body to swell. This can cause life-threatening breathing, cardiac, and gastrointestinal symptoms. Anyone with a fish allergy should carry any medication prescribed by their doctor at all times. One allergy that may masquerade as a fish allergy is an allergy to a fish parasite called *Anisakis simplex*. This parasite is considered a major allergen and, like fish allergies, can cause severe allergic reactions including anaphylactic shock. If you have a severe allergic reaction after eating fish but tests come up negative, consider asking your allergist to test you for an allergy to this parasite. Note that while *Anisakis* larvae can be killed by freezing or cooking, they can still trigger allergies after being killed, so people with *Anisakis* allergies should avoid fish and shellfish altogether.

Delayed Food sensitivity generally occurs days after ingestion and are less severe than true fish allergies mediated by IgE. In general, people with food sensitivity to fish should avoid ingesting all types fish and fish products and follow the guidelines that apply to immediate **Type I food allergy** caused by fish.

The FIT test does not measure Type I allergies mediated by IgE.

The FIT Test measures delayed food sensitivities caused by IgG and immune complexes.

Food Sensitivity to Fish

Many commonly consumed fish (Cod, Flounder, Halibut, Salmon, Sea Bass, Snapper, Sword, Trout, Tuna) commonly trigger food sensitivities related to fish. Sensitivity to fish is similar to shellfish sensitivity in that they are more likely than many food sensitivities to start during adulthood and less likely than other food sensitivities to be outgrown.

Cross-Reactivity

There is a high degree of cross-reactivity among different types of fish, meaning that people with sensitivities to one type of fish are likely to have (or to develop) sensitivities to others. This is because of a protein (parvalbumin) that is present in many fish. For this reason, most people who are sensitive to one type of fish are advised to avoid all fish including eel and shark. Some fish, especially tuna and mackerel are considered less problematic than others. If you would like to include some fish in your diet, ask your doctor about arranging additional testing to assess determine if a particular fish might be safe for you.

Parasites and Type I, Immediate Fish Allergies caused by IgE

Fish allergies caused by IgE are one of the "big eight" most common allergens in the United States, fish is covered under the Food Allergy Labeling and Consumer Protection Act (FALCPA). FALCPA requires that manufacturers label any food containing fish. This can be found in either the list of ingredients or the word "contains" after each ingredient on the label. Fish is not a particularly common hidden ingredient and generally appears as its own species but people with fish allergies should learn the names of many different types of fish for maximum safety when reading labels.

Foods Commonly Containing Fish

Caesar salad dressing, Worcestershire sauce, Ceviche (fish or shellfish "cooked" in an acidic citrus marinade), Caviar, Gelatin, Cioppino, *Nam pla* (Thai fish sauce), Bouillabaisse, Fumet (fish stock), Surimi, Pissaladière, Omega-3 supplements (if you would like to take these, look for vegan varieties made from flaxseed or other plant-derived oils) and Caponata.

Eating Out with Fish Type I, IgE mediated Allergies

There are recorded instances of inhalation reactions due to aerosolized fish proteins, so people with fish allergies should avoid hibachi-style communal grill restaurants if fish is on the menu. Seafood restaurants and sushi bars are high risks for cross-contamination due to the close proximity of fish and non-fish items. Another source of potential cross-contamination is frying oil; if fish has been fried in oil, people with fish allergies should avoid eating any other food fried in the same oil.

Living with Fish Allergies

Fish is an easier allergen to avoid than many of the other "big eight" allergens. It is far less pervasive in the Western diet than, for example, wheat, soy or dairy. The major challenges are avoiding high-risk situations for contact with fish and managing the risk of severe asthma (where applicable) and anaphylaxis. Reading labels for fish is reasonably simple in grocery stores. Communication in restaurants is vital and some higher-end restaurants may use small amounts of fish to flavor dishes and may not indicate the presence of fish on the menu.

Managing asthma and anaphylaxis risk both depend on communication with your doctor and keeping any prescribed medication close at hand - a rescue inhaler, in the case of asthma, and injectable epinephrine (EpiPen).

Finned fish can cause severe allergic reactions (such as **anaphylaxis**). People with fish allergy should have quick access to an epinephrine auto-injector (such as an EpiPen®, Auvi-Q® or Adrenaclick®) at all times. This allergy usually is life-long. Approximately 40 percent of people with fish allergy experienced their first allergic reaction as adults. To prevent a reaction, strict avoidance of fish and fish products is essential. Always read ingredient labels to identify fish ingredients.

Salmon, tuna and halibut are the most common kinds of finned fish to which people are allergic. More than half of all people who are allergic to one type of fish also are allergic to other fish, so allergists often advise their fish-allergic patients to avoid all fish. If you are allergic to a specific type of fish but want to have other fish in your diet, talk to your doctor about the possibility of allergy testing for specific fish. Finned fish and shellfish do not come from related families of foods, so being allergic to one does not necessarily mean that you must avoid both.

Labeling Fish Products

The federal **Food Allergen Labeling and Consumer Protection Act (FALCPA)** requires that all packaged food products sold in the U.S. that contains fish as an ingredient must list the specific fish used on the label.

Read all product labels carefully before purchasing and consuming any item. Ingredients in packaged food products may change without warning, so check ingredient statements carefully every time you shop. If you have questions, call the manufacturer.

As of this time, the use of advisory labels (such as "May Contain") on packaged foods is voluntary, and there are no guidelines for their use. However, the FDA has begun to develop a long-term strategy to help manufacturers use these statements in a clear and consistent manner, so that consumers with food allergies and their caregivers can be informed as to the potential presence of the eight major allergens.

It has been estimated that there are upwards of 20,000 species of fish. Although this is not an exhaustive list, allergic reactions have been commonly reported to: Anchovies, Bass, Catfish, Cod, Flounder, Grouper, Haddock, Hake, Halibut, Herring, Mahi-mahi, Perch, Pike, Pollock, Salmon, Scrod, Swordfish, Sole, Snapper, Tilapia, Trout and Tuna. In addition, there are some uncommon products that may contain fish but the consumer must read the label to be certain: Caesar salad and Caesar dressing, Worcestershire sauce, Bouillabaisse, Imitation or artificial fish or shellfish (surimi), Meatloaf, Barbecue sauce and Caponata (Sicilian eggplant relish).

Remember the following:

- Fish proteins become airborne in the steam released during cooking and may be a risk. Stay away from cooking areas.
- If you have seafood allergy, avoid seafood restaurants. Even if you order a non-seafood item off of the menu, contamination with fish is possible.
- Ethnic restaurants (e.g., Chinese, African, Indonesian, Thai, Vietnamese) are considered high-risk because of the common use of fish and fish ingredients and the possibility of cross-contamination, even if you do not order fish.
- Avoid foods like fish sticks and anchovies. Some individuals with fish allergy make the mistake of thinking that such foods don't "count as real fish."
- Many people who are allergic to fish or shellfish are allergic to more than one kind. Get tested and have your allergies confirmed by a physician so that you know for sure which foods to avoid.
- The protein in the flesh of fish most commonly causes the allergic reaction; however, it is also possible to have a reaction to fish gelatin, made from the skin and bones of fish. Although fish oil does not contain protein from the fish from which it was extracted, it is likely to be contaminated with small molecules of protein and therefore should be avoided.
- Carrageenan, or "Irish moss," is from red marine algae that is used in a wide variety of foods, particularly dairy foods, as an emulsifier, stabilizer and thickener. It appears safe for most individuals with food allergies.
- Allergy to iodine, allergy to radiocontrast material (used in some radiographic procedures), and allergy to fish are not related. If you have an allergy to fish, you do not need to worry about cross reactions with radiocontrast material or iodine.

III. Testing for Sensitivity to Milk

The FIT test measures IgG and Immune Complexes to whole Cow and Goat milk and casein from Cow milk. The wells in an ELISA plate contain: 1) whole Cow milk that contains 80% Casein and the remaining 20% is a mixture of Whey proteins such as albumins, globulins and α/β -beta lactalbumins; 2) whole Goat milk and 3) Casein. Goat milk is very similar to Cow milk except there is more α -lactalbumin in Goat milk. Approximately, 92% of patients who are sensitive to Cow milk proteins are also sensitive to Goat milk. However, in rare cases, there have been reports of sensitivity to Goat and Sheep milk without a corresponding sensitivity to Cow milk. If a person is sensitive to Cow or Goat milk but not to Casein then, most likely the person is sensitive to the whey component(s) in milk but not casein. If a person is sensitive to Cow or Goat milk, then most likely Casein is the main sensitizing protein but sensitivity to the Whey component(s) cannot be ruled out. If a person is sensitive to Goat milk but not Cow milk, then α -lactalbumin in Goat milk may be responsible. If one is sensitive to either Cow or Goat milk it is generally not possible to interchange one for the other in the diet without causing food sensitivity because of the close structural correspondence of proteins. In general, if a person is sensitive to milk from one species, then it is recommended that the patient avoid milk from other species as well.

Prevalence of Milk and Dairy Sensitivity

It is estimated that upwards of 75% of the world population suffers from dairy sensitivity. This means that more than seven in ten people cannot tolerate dairy products to one degree or another. It is often something that goes unnoticed and undiagnosed because the symptoms are so varied and are often mistaken for another condition or disease. Milk sensitivity is most common in children and common symptoms are extreme fussiness and excessive spitting-up.

Avoidance or outright abstinence of any form of dairy product or its derivatives would solve the problem for one who suffers from sensitivity or intolerance, but it is often extremely difficult since so many products are made from or contain milk or components of milk. Since dairy products are an abundant source of calcium, this presents another issue if one is avoiding or abstaining from dairy consumption. Consuming replacement foods in one's diet with alternate sources of calcium is important. Oranges, broccoli, almonds, and many other foods contain calcium, but supplementation is often a good idea as well. Eight ounces of skim milk contains about 300 milligrams of calcium as compared to 1 fresh orange which contains about 52 milligrams of calcium. The minimum recommended daily intake of calcium for an otherwise healthy person is 1,000 milligrams.

Milk Proteins

Milk and dairy products containing milk are composed of numerous specific proteins most of which are Caseins which comprise about 80% of milk proteins. Three or four distinct caseins are found in the milk depending on the species and regardless of the species all caseins share structural homology. Comparison of the properties of milk from various species of animals is listed below. All the other proteins in milk are grouped together under the name of whey proteins. The major whey proteins in cow milk are α -lactoglobulin and β -lactalbumin.

The major milk proteins, including the caseins, α -lactoglobulin and β -lactalbumin, are synthesized in the mammary epithelial cells and are only produced by the mammary gland. All of the serum albumin and most of the immunoglobulin and in milk are absorbed from serum and are not synthesized in the mammary gland. A limited amount of immunoglobulin is synthesized by lymphocytes which reside in the mammary tissue and provide the mammary gland with local immunity.

Milk Proteins, Cont'd

Caseins have an amino acid composition that is important for growth and development of the nursing young. This high-quality protein in cow milk is one of the key reasons why milk is such an important human food. Caseins are highly digestible in the intestine and are a high-quality source of amino acids. Most whey proteins are relatively less digestible in the intestine, although all of them are digested to some degree. When substantial whey protein is not digested fully in the intestine, some of the intact protein may stimulate a localized intestinal or a systemic immune response. This is sometimes referred to as milk protein allergy and is most often thought to be caused by β -lactoglobulin. Caseins are composed of several similar proteins which form a multi-molecular, granular structure called a casein micelle. In addition to casein molecules, the casein micelle contains water and salts (mainly calcium and phosphorous). Some enzymes are associated with casein micelles, too. The micellar structure of casein in milk is an important part of the mode of digestion of milk in the stomach and intestine, the basis for many of the milk products industries (such as the cheese industry), and the basis for our ability to easily separate some proteins and other components from cow milk. Casein is one of the most abundant organic components of milk, in addition to the lactose and milk fat. Individual molecules of casein alone are not very soluble in the aqueous environment of milk. However, the casein micelle granules are maintained as a colloidal suspension in milk. If the micellar structure is disturbed, the micelles dissociate and the casein comes out of solution, forming a gelatinous curd. This is part of the basis for formation of all non-fluid milk products like cheese. Casein can be found in everything from foods to industrial products. Lactose is a sugar found in milk and can be in concentrations as high as 8 percent in milk by weight. The substances are a natural part of dairy and are not an issue at all until someone is either intolerant or sensitive to them.

Comparison of Cow, Goat, Buffalo and Camel Milk; Sarah Melamed: www.molecularist.com

Milk Component	Cow	Goat	Buffalo	Camel
Cholesterol	Higher than buffalo or camel milk	Higher than buffalo or camel milk	Lower cholesterol than cow or goat milk	Lower cholesterol than cow or goat milk
Vitamins and minerals	Higher fat and protein than human milk	Low in B6 and B12, higher in calcium than cow milk	Similar to cow's milk, although higher in calcium	3 x higher vitamin C than cow's milk, 10 x higher in iron but less vitamin A and B2
Protein	3.29%	3.56%	4 %	2.2-5%
Cross reactivity of milk protein	Casein antibody cross-reacts with goat and cow. 2-3% infants allergic to milk proteins.	Similar casein structure to human milk and different from cow. Those allergic to cow milk might also be allergic to goat milk in about 25% of the cases	Some protein antibody cross-reactivity with goat and cow. One case of Buffalo milk tolerance when allergic to cow milk	Little or no cross-reactivity between cow and camel milk proteins. Those allergic to cow milk can drink camel milk.
Lactose	4.7%	4.1%	4.8%	4.8%
Fat	1-3%	3-6%	7-8 %	3-5%
Fat characteristic	Needs to be homogenized otherwise fat rises to the top, large fat molecules have a tendency to clump	More small fat molecules than cow milk, Small- softer curd, no cream formation. No agglutinin, so fat molecules do not clump. Easier to digest. more essential fatty acids such as linoleic and arachidonic and higher medium chain fatty acids	Smaller molecules which don't clump together like in cow's milk. Contains lower levels of agglutinin compared to cow's milk but has similar digestibility.	Does not contain enough agglutinin and therefore fat molecules do not clump together. Size of the fat molecules are similar to cows
Butter, cheese making	Contains agglutinin, fat separates easily, butter made by churning, cheese is made using rennet	Lacks agglutinin, difficult to make butter by churning, many soft goat cheeses are made without rennet	Traditionally used to make mozzarella in Italy, better color and texture, yogurt is thick and creamy	Small amount of agglutinin so cream does not separate well. Cheese produced using camel rennet, vegetable rennet has been used with limited success. Easily made into yogurt
Health	Good source of calcium and vitamin D	More easily digested because of smaller fat size and distribution characteristics. It is also alkaline. Better tolerated with those with lactose intolerance.	Low in cholesterol, good source of nutrients such as calcium and other vitamins and minerals	Used to treat type 1 diabetes (contains insulin like molecules), strengthens cellular immune response, high in lactoferrin, which has antimicrobial activity, reduces allergic response in children
Problems	Linked to milk allergies and intolerance ranging from atopic dermatitis, diarrhea, and constipation.	Not appropriate for those who with lactose intolerance, although usually tolerated better than cow's milk	Contains lactose so may be a problem with those suffering with lactose intolerance	Contains lactose, although better tolerated than cow's milk
Flavor	Mild	Flavor can be strong in comparison	Similar to cow milk	Sweeter than other milks

Whey from milk

The major components of milk are water, proteins (casein, beta-lactoglobulin, alpha-lactalbumin, serum albumin and glycopeptides), fat, sugar (lactose), vitamins, and minerals. An enzyme commonly known as rennet is added to the milk and breaks down the casein in the milk forming curd and a milky water solution called whey. The curd will eventually become cheese and the liquid remaining after milk has been curdled and strained is called whey.

Whey is used commercially as an additive in many processed foods, including breads, crackers, commercial pastry and animal feed. Whey proteins consist primarily of α -lactalbumin and β -lactoglobulin. Depending on the method of manufacture, whey may also contain glycopeptides.

From a food sensitivity perspective, milk contains all the proteins that whey contains but whey is basically milk without casein (Table 1.). If one is sensitive (tests positive) to whole milk or whole milk and casein, most likely consumption of whey would be a problem and should be removed from the diet. If one is sensitive to casein but not whole milk, then whey may not be a problem food. Sensitivity to milk and whey can be determined by an elimination diet.

Table 1.

Protein	Found in Milk	Found in Whey
casein	Yes, about 80% of total protein	No
alpha-lactoglobulin	Yes	Yes
beta-lactoglobulin	Yes	Yes
Serum albumin	Yes	Yes
glycopeptides	Yes	Yes

Milk Sensitivity vs. Lactose Intolerance

Milk sensitivity is not the same as lactose intolerance. Lactose intolerance results from a lack of the enzyme lactase and the inability to break down lactose. Dairy sensitivity results in an immune response to milk proteins after the proteins enter the bloodstream through the gut wall. This then triggers the body to produce antibodies in an attempt to fight off the perceived invader causing the sufferer to feel sick with symptoms.

Symptoms of Milk Sensitivity

Though symptoms can be unique to the sufferer, the most common symptoms of dairy sensitivity are: nausea, stomach pain/cramping, bloating, flatulence and diarrhea. These symptoms would, of course, be noticed after consuming a dairy product. If someone is sensitive to dairy products and eats ice cream, then experiences some discomfort, it is likely that the discomfort was caused by the ice cream. If you suspect you have milk protein sensitivity, refrain from ingesting dairy products.

Dairy Products to Avoid

Use this list to check food labels for cow's milk or milk products. The proteins in sheep and goat's milk are similar to those in cow's milk and most of the time will also cause the same sensitivity as cow's milk.

- Butter and butter fat
- Cheese, including cottage cheese and cheese sauces
- Cream, including sour cream
- Custard
- Milk, including buttermilk, powdered milk and evaporated milk
- Yogurt
- Ice cream
- Pudding
- Au gratin dishes and white sauces
- Baked goods -- bread, cookies, crackers, cakes
- Cake mix
- Cereals
- Chewing gum
- Chocolate and cream candy
- Coffee creamers
- Creamed or scalloped foods
- Donuts
- Malted milk

Dairy Products to Avoid, Cont'd

- Margarine
- Mashed potatoes
- Meats: canned and processed, including cold cuts and deli meats
- Nougat, found in some candy
- Salad dressings
- Sherbet
- Artificial butter or cheese flavor
- Casein or caseinates
- Curd
- Ghee
- Hydrolysates
- Lactalbumin, lactalbumin phosphate
- Lactose, lactoglobulin, lactoferrin, lactulose
- Rennet
- Whey or whey products

Tips for Living with Milk Sensitivity

- **Find other ways to get vitamins and minerals.** Dairy products are an important source of calcium, protein, and vitamins D and B12. If you or your child has a milk allergy, foods such as broccoli, spinach, and soy products can help fill the void. A dietitian can help you develop a well-balanced eating plan.
- **Try dairy substitutes.** Drink soy, rice, and almond milk that are fortified with calcium and vitamin D. Look for non-dairy ice cream, chocolate, cheese and yogurt.
- **Be careful with kosher products.** Some may contain milk protein, even those labeled "pareve" which are considered milk-free under kosher guidelines.
- **Ask your pediatrician about safe formula.** If you have a baby with a milk allergy, the doctor may suggest an extensively hydrolyzed, casein-based formula.
- **Avoid milk outside the kitchen.** Check labels on cosmetics, creams, and ointments to see if they contain cow's milk in any form. Some medicines also contain whey, which is made from milk and the frequency of sensitivity is in the range of 30 to 40%.

IV. & V. Testing for Sensitivity to Peanuts and Tree Nuts

The FIT test measures IgG and Immune Complexes against Peanut and Tree Nut proteins. The wells in an ELISA plate contain proteins from peanuts and several commonly eaten Nuts. If a person is sensitive to peanuts or any one of the types of Tree Nuts then, you need to avoid peanuts and/or Tree Nuts or products containing Nuts. The FIT does not test for Type I, immediate allergies caused by IgE antibodies which can be life threatening.

Peanuts and Tree Nut Sensitivity

Delayed and less severe food reactions to nuts are also common. For those known to be suffering from delayed food reactions to nuts there are many alternatives that can be eaten. Some food intolerance problems stem from a combination of food types. Whilst an elimination diet can identify individual food reactions using a process of elimination, it is time consuming and almost impossible to try all the combinations of food types. Most people with tree nut sensitivities are not sensitive to all tree nuts or peanuts. However, there is high cross-reactivity among various families of tree nuts. About 12 percent of people who are sensitive to one tree nut will be sensitive to another tree nut. The strongest probability of cross-reactivity is between walnut and pecan, and between cashew and pistachio; however, many tree nuts have some possibility of cross-reaction between each other and peanuts. For this reason, people who are sensitive to one type of tree nut are generally advised to avoid all tree nuts as a precaution. Peanuts are legumes, and are biologically unrelated to tree nuts. However, there is a high level of cross-reactivity between peanuts and tree nuts, meaning that people with tree nut sensitivities are at increased risk of developing peanut allergies. If you are diagnosed with tree nut sensitivity, your allergist will advise you whether to avoid peanuts as well. Cooks and nutritionists use the general name "Nut" for a variety of common legumes like peanuts and soy, drupes like almonds and walnuts and seeds like pine nuts. Almonds, pistachios, coconuts, hazelnuts, pecans, walnuts, pine nuts, chestnuts, Brazil nuts, cashews and macadamia nuts are all considered edible nuts, whether or not they are true nuts. Some nuts can be pressed for oil or eaten directly, others are processed before being able to be eaten and many processed foods contain nuts or nut extracts. Please also refer to the section on Soy. Immediate and severe allergies to edible nuts are quite common. You can be allergic to some nuts, but not others. A peanut allergy is usually restricted just to peanuts, while a sensitivity to tree nuts, like walnuts, may suggest that someone is sensitive to a range of drupes including almonds and beechnuts. It's confusing, so most people avoid edible nuts altogether. Nut and seed allergens are primarily 'storage' proteins which are present in high quantity as a source of carbon and energy for the growing seedling.

Foods containing Peanuts or Tree Nuts

- Baked goods: Cookies, candy, pastries, piecrusts, and others.
- Candy: Chocolate candies and also nougat and marzipan.
- Other sweets: Ice cream, frozen desserts, puddings, and hot chocolate.
- Cereals and granola
- Chex mix
- Chili and soups: Peanuts or peanut butter are sometimes used as thickeners.
- Grain breads
- High-energy bars
- Honey
- International foods: Nuts are common in African, Asian, Thai, Indian, Mexican and Mediterranean foods.
- Mortadella: This Italian ham may include pistachios.
- Meat-free burgers
- Sauces: May include hot sauce, pesto, gravy, mole sauce, glazes, or marinades.
- Salads and salad dressing
- Nut butters: Almond, cashew, peanut, and others.
- Nut pastes: Includes products like marzipan, almond paste, and nougat.
- Nut oils: Includes cold-pressed or expressed peanut oil, and others.
- Hydrolyzed plant or vegetable protein: These can have peanuts in them.
- Peanut flour
- Nut extracts, like almond extract.
- Cross-contamination: Foods that don't contain peanuts or tree nuts can get contaminated if they are prepared in the same place or using the same equipment. Foods sold in the U.S. must say this on the label. Cross-contamination also occurs in ice cream parlors because of shared scoopers and equipment.
- Check the label each time you buy a product. Manufacturers will sometimes change recipes.
- Look for peanuts outside the kitchen. In addition to foods, nuts can be in lotions, shampoos, and pet food.

Nuts in Alcoholic Beverages

Because alcohol is not covered under FALCPA, you should call the manufacturer if you are unsure about the ingredients of a beverage. Ingredients such as "natural flavoring" may include nuts.

These liquors are made from nuts:

- Amaretto (almond)
- Charbay Nostalgie (black walnut)
- Frangelico (hazelnut)
- Kahana Royale (macadamia nut)
- Nocello (walnut)
- Gin: Some gins use almonds in processing

Generally safe for people with nut sensitivities: Check with your doctor before consuming.

- Pumpkin seeds
- Sunflower seeds
- Butternut squash
- Nutmeg or mace (seed of a tropical plant)
- Water chestnuts (a tuber)
- Coconut: There is conflicting evidence about whether people with allergies or sensitivities to tree nuts should avoid coconut. While coconut is not a common allergy or sensitivity, there are cases of people with nut allergies/sensitivities also having reactions to coconut. Ask your doctor if you should avoid coconut.

Skin Reactions

One very common group of symptoms is related to skin reactions. Rashes and eczema which leads to itching is one of the most common complaints. However, these skin reactions show up in almost all food sensitivities, so a proper history is required to pinpoint the exact food.

Oral Symptoms

Redness and swelling, around the mouth and lips area, is very common. This is scientifically termed as angioedema. Sometimes the inflammation is accompanied by itchiness and soreness, which can hinder activities like talking and eating. Oral symptoms are prominently visible, so these are the symptoms that cause the most emotional upset and withdrawal.

Sinus Symptoms

A very common symptom is nasal inflammation, commonly known as rhinitis. Rhinitis causes a runny nose followed by itchy, watery eyes, sneezing, coughing and wheezing. It may also trigger severe 'angioedema' which is the swelling of blood vessels, under the skin, near the hands, face, tongue and genitals. Migraine headaches and nocturnal enuresis are also common symptoms.

Gastrointestinal Symptoms

Belly cramps, nausea, diarrhea and vomiting are common symptoms. Abdominal cramping and indigestion can easily be thought of as symptoms of something else, so these symptoms are often deceptive. Gastrointestinal symptoms are also the culprits for the general lethargy or fatigue that often accompanies a nut sensitivity. It can also cause intense heartburn.

VI. Testing for Sensitivity to Shellfish: Mollusk and Crustacean

The FIT test measures IgG and Immune Complexes against proteins found in a variety of Shellfish. The wells in an ELISA plate contain Shellfish proteins. If a person is sensitive to a given type of Shellfish, then you need to avoid Shellfish-containing products. Some of the most common shellfish include: crustaceans such as crabs, shrimp and lobsters, and mollusks such as oysters, clams and snails. The FIT does not test for Type I, immediate allergies caused by IgE antibodies which can be life threatening.

Sensitivity to Shellfish

Shellfish sensitivities are most commonly seen in adults, particularly those living in regions where they are often eaten. Researchers have estimated that 75% of individuals who are allergic to one type of crustacean (shrimp, lobster, crawfish or crab) are also allergic to other types. As crustaceans and mollusks (oysters, squid, scallops) contain the same type of proteins some people may react to both groups of foods. Symptoms range from itching and swelling of the mouth and throat (oral allergy syndrome) to life threatening reactions. Symptoms most often occur when the seafood is ingested, but can also occur when raw seafood is handled and even after inhaling steam while crustaceans such as shrimp is being cooked. Cooking does not appear to destroy the allergens in crustaceans and mollusks.

Shellfish allergens are usually found in the flesh and are part of the muscle protein system, whilst in foods such as shrimp, allergens have also been found in the shells. There are two kinds of shellfish: crustacean (such as shrimp, crab and lobster) and mollusks (such as clams, mussels, oysters and scallops). Reactions to crustacean shellfish tend to be particularly severe. If you are allergic or sensitive to one group of shellfish, you might be able to eat some varieties from the other group. However, since most people who are allergic or sensitive to one kind of shellfish usually are allergic or sensitive to other types, allergists usually advise their patients to avoid all varieties. If you have been diagnosed with a shellfish allergy or sensitivity, do not eat any shellfish without first consulting your doctor. It is very important to read the labels on foods carefully to avoid products containing shellfish components.

List of common shellfish:

- Abalone
- Clams (cherrystone, littleneck, pismo, quahog)
- Cockles (periwinkle, sea urchin)
- Crab
- Crawfish (crayfish, écrevisse)
- Lobster (langouste, langoustine, coral, tomalley)
- Mollusks
- Mussels
- Octopus
- Oysters
- Prawns
- Scallops
- Scampi
- Shrimp
- Snail
- Squid (calamari)
- Sushi

The following foods and ingredients may indicate the presence of shellfish proteins:

- Seafood flavoring, such as clam or crab extract
- Surimi

Skin Reactions

One very common group of symptoms is related to skin reactions. Rashes and eczema which leads to itching is one of the most common complaints. However, these skin reactions show up in almost all food sensitivities, so a proper history is required to pinpoint the exact food.

Oral Symptoms

Redness and swelling, around the mouth and lips area, is very common. This is scientifically termed as angioedema. Sometimes the inflammation is accompanied by itchiness and soreness, which can hinder activities like talking and eating. Oral symptoms are prominently visible, so these are the symptoms that cause the most emotional upset and withdrawal.

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Belly cramps, nausea, diarrhea and vomiting are common symptoms. Abdominal cramping and indigestion can easily be thought of as symptoms of something else, so these symptoms are often deceptive. Gastrointestinal symptoms are also the culprits for the general lethargy or fatigue that often accompanies a food sensitivity. It can also cause intense heartburn.

VII. Testing for Sensitivity to Soy

The FIT test measures IgG and Immune Complexes against whole Soy proteins. The wells in an ELISA plate contain Soy proteins. If a person is sensitive to Soy, then you need to avoid Soy or Soy-based products. Soy is found in many different types of foods. There is a lot of controversy today because most of the Soy is genetically modified (GMO) which has been linked to increased food sensitivities.

Soy Sensitivity and GMO

Soy that is a GMO variety has modified DNA which enables it to be resistant to a variety of chemicals. The issue is that by modifying the natural DNA the end result is that many of the natural Soy proteins are altered which may make the GMO variety cause more food sensitivities. One known soy allergen, trypsin inhibitor, was increased 7 times in the GMO variety whereas, another study demonstrated the presence of an unexpected protein in GMO Soy and the suggestion was that this protein may cause food sensitivities.

Foods containing Soy

Soy is contained in many types of foods. If you have a food sensitivity to Soy, read the labels carefully. Especially look for GMO which should be listed on the label. Some of the common foods containing Soy are listed below.

Whole Soybeans: As soybeans mature in the pod, they ripen into a hard, dry bean, similar to other legumes. Most mature soybeans are yellow, but some are brown and black. Whole soybeans are an excellent source of protein and dietary fiber. They can be cooked and used in sauces, stews, and soups. Whole soybeans that have been soaked can be roasted for snacks and are available in natural food stores and some supermarkets. When grown without chemicals, they are referred to as organically grown soybeans.

Edamame: These soybeans are harvested when the beans are still green and sweet tasting. They can be served as a snack or a main vegetable, after boiling in slightly salted water for 15 to 20 minutes. They are high in protein and fiber and contain no cholesterol. Edamame can be bought shelled or in the pod in the supermarket produce section or frozen food aisle.

Meat Alternatives: Meat alternatives, containing soy protein or tofu, are used to imitate meat, such as burgers, sausages, bacon and hot dogs. Generally, they are cholesterol-free and lower in fat than meat. They are excellent sources of protein, iron and B vitamins.

Miso: Miso is a rich, salty soy paste used in Japanese cooking. The Japanese make miso soup and use miso to flavor a variety of foods such as sauces, dressings and marinades. Miso paste should be refrigerated. Miso contains minimal soy protein and is high in sodium.

Soymilk: Soybeans that are soaked, ground fine and strained produce fluid called soybean milk. Plain, unfortified soymilk is an excellent source of high quality protein and B vitamins, but lacks calcium and vitamin D. Fortified versions, however, are available. Soymilk can be found in non-refrigerated containers or in the dairy case at the supermarket. It also is sold as a powder to be mixed with water. Soymilk is an excellent milk substitute for people who are lactose intolerant and can be used as a beverage or in place of milk in cooking.

Soy Nuts: Roasted soy nuts are whole soybeans that have been soaked in water and then baked until browned. Soy nuts come in a variety of flavors. They are high in protein and isoflavones, and similar in texture and flavor to peanuts.

Soy Sauce: Soy sauce is a dark brown liquid made from soybeans that have undergone a fermenting process. Soy sauce contains minimal soy protein and is high in salt. Shoyu is a blend of soybeans and wheat. Tamari is made only from soybeans and is a by-product of miso. Another sauce containing soy sauce is teriyaki sauce. It contains soy sauce and other ingredients such as sugar, vinegar and spices.

Tempeh: Tempeh is a chunky, tender soybean product. Whole soybeans, sometimes mixed with another grain such as rice or millet, are fermented and pressed into a cake or bar with a smoky or nutty flavor. It can be sliced, marinated and grilled, and added to soups, casseroles or chili. It is found in Asian and health food stores.

Textured Soy Protein: Textured soy protein (TSP) refers to products made from textured soy flour, textured soy protein concentrates and spun soy fiber. Textured soy flour contains about 70 percent protein and retains most of the bean's dietary fiber. Textured soy flour is sold dried in granular and chunk style. When hydrated, it has a chewy texture. It is widely used as a meat extender. One of the more popular brands is called Textured Vegetable Protein.

Tofu: Tofu, also known as soybean curd, is a soft, smooth soy product made by curdling fresh, hot soymilk with coagulant. Tofu has a mild flavor and easily absorbs the flavors of marinades, spices and other ingredients. Tofu is rich in high-quality protein and B vitamins, and low in sodium. There are two main types of tofu:

- Water-packed tofu comes in extra-firm, firm and soft varieties. This tofu is dense and solid and holds up well in stir fry dishes and soups, on the grill or anywhere you want tofu to maintain its shape.
- Silken tofu comes in extra-firm, firm, soft and reduced-fat varieties. This tofu is made by a slightly different process that results in softer product. Silken tofu works well in pureed or blended dishes.

Skin Reactions

One very common group of symptoms is related to skin reactions. Rashes and eczema which leads to itching is one of the most common complaints. However, these skin reactions show up in almost all food sensitivities, so a proper history is required to pinpoint the exact food.

Oral Symptoms

Redness and swelling, around the mouth and lips area, is very common. This is scientifically termed as angioedema. Sometimes the inflammation is accompanied by itchiness and soreness, which can hinder activities like talking and eating. Oral symptoms are prominently visible, so these are the symptoms that cause the most emotional upset and withdrawal.

Sinus Symptoms

A very common symptom is nasal inflammation, commonly known as rhinitis. Rhinitis causes a runny nose followed by itchy, watery eyes, sneezing, coughing and wheezing. It may also trigger severe 'angioedema' which is the swelling of blood vessels, under the skin, near the hands, face, tongue and genitals. Migraine headaches and nocturnal enuresis are also common symptoms.

Gastrointestinal Symptoms

Belly cramps, nausea, diarrhea and vomiting are common symptoms. Abdominal cramping and indigestion can easily be thought of as symptoms of something else, so these symptoms are often deceptive. Gastrointestinal symptoms are also the culprits for the general lethargy or fatigue that often accompanies an egg sensitivity. It can also cause intense heartburn.

Foods to Avoid from the Soy Protein Board

Many foods contain Soy-based products which may not be obvious at first glance. Food manufacturers recognize soy protein as a versatile food ingredient with functional and nutritional properties that greatly enhance the value of finished foods in every consumer category. Let us guide you through the types of products where food manufacturers often add soy protein, and scroll down below for a chart demonstrating the functional benefits of these choices.

Baked Goods: Soy protein is used in the manufacturing of breads, cookies, crackers and other baked goods. Soy protein improves texture; holds moisture; creates cake richness; whitens bread; extends shelf-life; reduces breakage and crumbling; enhances nutrition; improves manufacturing, handling and machine ability; and improves mouth feel and overall quality as perceived by the consumer.

Breakfast Cereals: Soy protein is used extensively as an ingredient in hot cereal mixes and breakfast bars to boost protein value and quantity.

Pasta: Pasta products can be fortified with soy protein to increase nutritional value. For instance, the U.S. National School Lunch Program uses soy-fortified pastas with 15 to 17 percent protein content.

Beverages and Toppings: Soy isolates are used in coffee whiteners, liquid whipped toppings and pre-whipped toppings. They also are used in sour cream dressings to emulsify fat, control viscosity and provide textural characteristics. Instant beverages used as meal replacements often contain soy concentrates and soy isolates as a source of protein.

Meat, Poultry and Fish Products: Processed and whole meat products can be improved by adding soy protein, which provides the product flexibility and cost stability consumers demand. Adding soy protein to meat and poultry products can enhance moisture holding, texture, binding and cohesion, product yield, juiciness, protein quality, appetizing color and appearance, longer shelf-life, palatability and total nutrition.

Dairy-Type products: A number of dairy analog products have been developed with soy protein, including imitation milk, imitation cheese, non-dairy frozen desserts, coffee whiteners, yogurt and others. Soy protein lowers cost, improves nutrition and reduces allergenic response.

Milk Blends: Many companies produce soy and milk protein blends for food manufacturing, combining the two to offer protein content similar to milk in a non-fat dry milk form. The different blends are used as a complete or partial replacement for non-fat dry milk in baked goods, sauces, meat products and other foods.

SOY PROTEIN'S FUNCTIONAL CHARACTERISTICS

Functional Property	Protein Form Used	Food System
Emulsification		
Formation	Flour, isolates and concentrates	Frankfurters, bologna, sausages, breads, cakes, soups, whipped toppings, frozen foods
Stabilization	Flour, isolates and concentrates	Frankfurters, bologna, sausages, soups
Fat absorption		
Promotion	Flour, isolates and concentrates	Frankfurters, bologna, sausages, meat patties
Prevention	Flour and concentrates	Doughnuts, pancakes
Water absorption		
Uptake	Flour and concentrates	Breads, cakes, macaroni, confections
Retention	Flour and concentrates	Breads, cakes
Texture		
Viscosity	Flour, isolates and concentrates	Soups, gravies, chili
Gelation	Isolates	Simulated ground meats
Chip and chunk formation	Flour	Simulated meats
Shred formation	Flour and isolates	Simulated meats
Fiber formation	Isolates	Simulated meats
Dough formation		
	Flour, isolates and concentrates	Baked goods
Film formation		
	Isolates	Frankfurters, bologna
Adhesion		
	Concentrates and isolates	Sausages, lunch meats, meat patties, meat loaves and rolls, boned hams
Cohesion		
	Flour and isolates	Baked goods, macaroni, simulated meats
Elasticity		
	Isolates	Baked goods, simulated meats
Color control		
Bleaching	Flour	Breads
Browning	Flour	Breads, pancakes, waffles
Aeration		
	Isolates	Whipped cream, chiffon mixes, confections

VIII. Testing for Sensitivity to Wheat and Gluten

The FIT test measures IgG and Immune Complexes to whole wheat proteins and gluten from wheat and other grains. The wells in an ELISA plate contain: 1) whole wheat that contains 10 % gluten and the remaining 90% is a mixture of wheat proteins such as albumins and globulins; 2) pure gluten protein; 3) whole grains which contain glutes and other proteins such as Oat, Rye, Barley and Millet and 4) Rice which does not contain Gluten. If a person is sensitive to whole wheat or the other grains but not gluten, then most likely the person is not gluten sensitive. If you test positive to gluten alone or to both gluten and whole wheat or other grains, then most likely you are sensitive to gluten. We employ whole wheat because many people are sensitive to the other 90% of proteins found in wheat or the other grains but not to gluten. If one is sensitive to gluten then products containing whole wheat, and maybe other whole grains that contain gluten, should not be consumed. Similarly, if one is sensitive to whole wheat and grains (except Rice) generally gluten-containing grains are removed from the diet. In the latter case, after a restriction diet with wheat/gluten removed, it may be possible to re-introduce gluten-containing products without causing any symptoms. Rice is a good substitute for wheat and gluten-containing grains unless a person is sensitive to Rice alone.

Wheat Sensitivity

Food sensitivities to wheat and related grains adversely affect at least 50 million people in the USA and another 100 million people in Europe. Food sensitivities arise when wheat-containing foods are ingested and gluten, a major protein found in wheat, cannot be digested. The inability to properly digest gluten leads to gluten sensitivity which can start with a variety of low-grade symptoms: eczema, chronic fatigue syndrome, headaches and joint swelling and pain. In many cases, the symptoms get worse over time and many people develop intestinal problems such as Irritable Bowel Syndrome (IBS) or Coeliac (Celiac) Disease (CD) which can be quite severe. It is worthy to note that other proteins found in wheat such as albumins and globulins may also play a role in many of the observed symptoms. The good news is that most if not all of these problems will subside if wheat gluten and glutes from related grains are removed from the diet. Since wheat and glutes are in a wide variety of processed foods, removing glutes from the diet is especially challenging. Generally, the designation of Gluten-free applies to foods that *do not contain* seed storage proteins derived from wheat found in the tribe Triticeae. A major issue confounding Gluten-free foods is that many foods are processed using equipment that has been used to process wheat-containing foods. For example, oat or rye originating from grain elevators that once stored wheat or processing lines that previously processed wheat products may become cross-contaminated with wheat proteins. The net result is cross-contamination of foods un-related to wheat. The FDA is attempting to regulate food processing but totally removing cross-contamination remains elusive.

Wheat glutes are storage proteins found in the seeds of grasses in Triticeae and related grains. Glutes are a mixture of prolamins and glutenins found in seeds. Similar glutes: hordeum, secalin and avenin are found in seeds from Barley, Rye and Oats, respectively, but the concentrations of these glutes and other subcomponents are generally much lower than in wheat. Glutes give dough its characteristic stretchy and sticky properties allowing it to rise before it is baked into bread-like products or pastas. Because of the sequence similarity of glutes from Triticum with the related tribes: Secale, Tritico-secale, Hordeum, Aegilops and Agropyron, gluten sensitivity and Coeliac Disease are primarily caused by these grass seeds. Gluten sensitivities may also extend to glutes from related grass seeds of Aveneae (oats) because about 5% of gluten sensitive individuals are also sensitive to oats. As mentioned above, cross-contamination of oats with glutes from Triticum during processing may be the real issue.

Adoption of a wheat-free/gluten-free diet requires careful inspection of product labeling. Whole wheat and/or partially purified gluten are incorporated into many different foods in addition to the usual breads and pastas. Careful inspection of the label will indicate which packaged foods are wheat/gluten-free. Manufacturers must label any food that contains wheat or is processed in a facility where the particular food may contact other wheat-containing products. Make sure that the label states wheat and gluten free. A product can be wheat free but contain “glutes” from other grains that may be a problem. Foods such as fruits or meats generally are gluten free but beyond this, inspect the label carefully for “hidden” wheat or gluten. Most companies go to great lengths to make it apparent that a given product is gluten free but other companies are not so clear with their labeling.

Products Containing Gluten and Alternative Choices to Gluten-Containing Foods

Breads and Starches

Most processed breads and starches contain wheat gluten, including wheat and flour tortillas, chips and pretzels, crackers and cereal. Wheat-intolerant eaters may choose to dine instead on rice-based bread and pasta products, corn tortillas or some homemade baked vegetable chips in olive oil. Additionally, anyone suffering from gluten intolerance should avoid all foods made from or with wheat flour, barley, spelt, oats, rye, kamut and triticale.

Dairy Products

Many dairy products contain wheat gluten and can cause a steady onset of intolerance symptoms -- not to be confused with lactose intolerance. Dairy culprits include chocolate drink mixes, ice cream, yogurt, processed cheese, pudding and malted beverages. Check all labels for specific wheat-based ingredients.

Processed Foods

Many common meat products contain wheat gluten. Most of these sources are processed in some way, including deli meats, breaded meats, casseroles containing pasta or rice, imitation meats, hot dogs and canned meats, such as corned beef or canned sausages. Other wheat-containing foods include beer, malt liquor, pickled foods, some instant coffees, candy and even some herb seasonings. Some people with extreme sensitivity are surprised to find that gluten intolerance symptoms continue on a gluten-free diet due to the presence of wheat gluten in non-foods such as mouthwash, vitamins and medicines.

Thickening Agents

Any product that contains a gelatin or thickening agent is likely to contain wheat gluten. Avoid products such as jellies, jams, seasoning mixes, syrups, steak sauces, soups made from bouillon or dry soup mixes and chip or vegetable dips. Another good rule of thumb is to avoid foods thickened or made with flour, such as gravy, fruit pies, cookies and cakes.

Related Grains

Individuals with Celiac Disease are not only limited to restricting the wheat from their diet, but also rye and barley. This makes finding grains and starchy foods which are gluten-free difficult. Using oatmeal, corn, potatoes and rice can expand the daily meals to add carbohydrates. Several cereal companies label their products so that you can avoid wheat in oat, corn or rice cereals. Rice can be used as a substitute in meals where one might typically consume a wheat product such as bread or noodles. Rice can be consumed as a side dish with cooked meat or vegetables, and served with a variety of different sauces to add flavor or spice.

Safe Foods

Most unprocessed or low-processed foods such as meats, fruits, vegetables, dairy products and eggs are generally gluten and wheat-free naturally. An easy approach to grocery shopping is to try a wholesome approach toward what you select; the fewer steps your food takes from the farm to the store, the less likely it is to contain wheat. When preparing food, don't accidentally introduce wheat by using seasonings that may be cross-contaminated with wheat.

Alternatives

There are several recipes that use lesser-utilized products such as fava bean flour, tapioca flour, potato starch or rice flour as a substitute for wheat flour. If you don't want to prepare the substitution mixes yourself, some companies produce packaged mixes for gluten-free pizza dough, pancakes, all-purpose flour and breads. In addition to on-line companies, many grocery stores offer gluten-free products and you also can check at health-food stores for gluten-free foods.

Food Sensitivity Testing of Other Foods, Additives and Microbial components

Food Sensitivity: Benzoic Acid

Benzoic acid is a derivative of benzene, also known as sodium benzoate or the salt of benzoic acid. The acid is a preservative and examples of foods that contain high amounts of this salt include sauces and pickles. In addition to its use as a food additive, manufacturers use benzoic acid in the production of artificial flavors, fragrances and as a pH adjuster. As a food additive, you can use benzoic acid to preserve different kinds of foods including fruit juices, soft drinks, pickles, barbecue sauces and salad dressings. Most processed foods have acids added artificially. The acid inhibits the growth of mold, yeast and bacteria. The U.S. Food and Drug Administration, however, considers acids approved for use as food additives safe for humans when consumed in small amounts. According to the book, "A Consumer's Dictionary of Food Additives," the average level of benzoic acid found in foods is between 0.05 and 0.1 percent.

Many cosmetics and pharmaceutical products including medicated face washes and creams commonly use benzoic acid as an ingredient. Additionally, you will find benzoic acid used as a preservative in mouthwashes, deodorants, body cleansers, toothpastes, aftershave lotions and sunscreens. Externally, cosmetic products use benzoic acid to help prevent infections caused by bacteria. Specifically, benzoic acid can help to treat skin irritation and inflammation caused by burns, insect bites, eczema and fungal infections such as ringworm.

A number of foods contain benzoic acid. It naturally occurs in berries and other fruits such as cranberries, prunes, plums, cloudberry. Additionally, cinnamon and cloudberry contain high amounts of benzoic acid. In fact, you can store cloudberry for long periods of time without bacterial or fungal spoilage. As a preservative, you will find benzoic acid in beer, chewing gums, sweets, ice cream, jams, jellies, maraschino cherries and margarine. You will also find benzoic acid used in processed foods such as cheeses and meats.

Benzoic acid does have several side effects associated with its use. The highest risk groups for experiencing these side effects include children, individuals sensitive to aspirin and individuals with liver conditions such as hepatitis. Side effects of benzoic acid include gastrointestinal irritation, asthma, rashes and itching and irritation of your skin and eyes. (Jessica Jacobs: livestrong.com).

Food Sensitivity: Candida and related Yeast

The FIT test measures IgG and Immune Complexes against proteins found in three different Yeast. Two of the yeast, Brewer's and Baker's yeast are used for commercial production of brewed and baked products. The third yeast, Candida inhabits the skin, mucous membranes and intestine. The wells in an ELISA plate contain Yeast proteins. If a person is sensitive to Yeast, then you need to avoid Yeast-based products which are found in many different types of foods. If a person is reactive to *Candida albicans* this is an indication that proteins from this organism have entered the blood stream through the gut wall which happens when the gut becomes leaky due to food sensitivities from other foods or direct injury. Healing the gut by avoiding foods causing food sensitivities will decrease the entry of Candida. In some cases, the use of antibiotics which kill the normal flora (of the gut) and will enable Candida to over grow and become a problem.

Yeast Sensitivity

Baker's and Brewer's yeast are common causes of food sensitivities that are very difficult to remove from our diets due to their pervasiveness. My suggestion is that if you are prone to yeast infections or feel that due to antibiotic use in the past you might have yeast overgrowth, then sensitivity to yeast in your diet is very possible. Here is a basic list of foods that contain yeast. Try to remove these foods and you will find that your energy will improve, your mind will clear and headaches will be reduced significantly.

Candida albicans vs Yeast Sensitivity (modified from eHow)

Candida albicans is a fungus that is naturally present in the human body on the skin and in the mouth, intestines, and in the case of women, the vagina. When yeast multiplies rapidly, it can lead to minor infections and sometimes even more serious infections in those with certain immune disorders, such as AIDS.

As many as one in three Americans suffer from yeast-related illness from *C. albicans* which is known as chronic candidiasis, candidiasis hypersensitivity, yeast syndrome or "yeast allergy." Individuals who are allergic or sensitive to yeast--such as that found in bread, beer and wine--experience feelings of fatigue and feeling "slow." Yeast "allergies" purportedly account for symptoms such as fatigue, irritability, mood swings, depression, anxiety, weight gain, difficulty with concentration, sugar craving, menstrual problems and muscle and joint pain. Such food sensitivities are allegedly confirmed if an individual is "tired" or experiences any of the above symptoms after consuming bread products or alcohol. Eliminating all foods containing yeast is recommended to determine if there is an improvement in the symptoms. If symptoms of tiredness return with reintroduction of yeast products, a yeast sensitivity is indicated and foods and beverages containing yeast should then be eliminated from the diet.

A List of Foods Containing Yeast

Foods containing yeast should be avoided by people who have irritable bowel syndrome, food sensitivities, chronic yeast infections or who experience gastrointestinal problems, as suggested by the Women to Women website. People with ulcerative colitis and Crohn's disease should not eat these types of food either. Avoiding these foods can be sometimes difficult, because many foods that contain yeast are not obvious culprits.

Alcoholic Beverages

Beer and wine contain yeast; it is part of the fermentation process. Alcohol is produced by the yeast fermentation of different plants and therefore, all alcoholic beverages contain yeast and should be avoided.

Vinegar or Foods Containing Vinegar

Foods that contain vinegar are mustard, barbecue sauces, salad dressing, pickles and mayonnaise. Avoid foods that may contain some form of vinegar products such as deviled eggs or potato salad.

Bakery Goods

Cookies, cake items, pastries, sweet rolls, pretzels, rolls and breads.

Food Supplements and Vitamins

Avoid B-complex vitamins, and selenium products, unless the label states that the product is "yeast-free".

Commercially Prepared Foods

Products include natural root beer, soy sauce, olives, sauerkraut and apple cider. Also, be sure to read the nutrition labels on packages of potato chips, soups and dry roasted nuts, as these may contain yeast.

Cheese

Avoid any aged or ripened cheese. Inquire if you suspect a casserole or entrée has this type of cheese.

The following foods should be avoided by those trying to avoid yeast for allergy:

Breads Flour enriched with vitamins from yeast
Crackers Rolls, homemade and canned
Pastries Canned Ice Box Cookies
Pretzels Milk fortified with vitamins from yeast
Hamburger and Hot Dog Buns Meat fried in cracker crumbs
Cake and Cake Mix Cookies

Other Yeast-Containing Foods because of their nature or their manufacture or preparation:

Mushrooms, Tomato Sauce
Truffles, Chili Peppers
Cheese of all Kinds, Mince Pie
Buttermilk, Gerber's Oatmeal
Cottage Cheese Barley Cereal
Vinegar, Whiskies
Apple Beers
Gin Wines
Pear Brandy
Grape Rum
Distilled Vodka
Catsup, Root beer
Mayonnaise Malted Products:
Olives, Cereals
Pickles, Candy
Sauerkraut, Malted Milk Drinks
Condiments Frozen, Canned Citrus Fruit Juices
Horse Radish, French Dressing
Salad Dressing, Barbecue Sauce
Many vitamin products are derived from yeast

Foods that Always Contain Yeast

These foods always (or almost always) contain yeast. For example, it is possible to make bread without yeast, but most bread that you see in the store is made with yeast.

Bagels, Beer, Breads, Bread rolls, Cider, Fruit skins, Grape juice, Malt beverages, MSG (yeast extract), Pretzels, Sake, Sourdough bread, Wine

Foods that May Contain Yeast

After reading this partial list of foods containing yeast products you now have a better idea of the formidable task ahead. It is imperative while on the rotary diversification and avoidance diet that you review all labels on canned and packaged foods and consult the list above or you will continue to suffer the consequences of allergic reactions.

- Cakes, Doughnuts, Over-ripe fruit, Soup, Soy Sauce, Vitamin B supplements, Chocolate

Yeast-Free Foods

If you are doing your own cooking, it is relatively easy to avoid yeast. This is a general description of foods you can eat since most basic ingredients are easy to find.

Meat

All meat is yeast-free (unless spoiled, in which case you will get food poisoning as well as a possible dose of yeast). As long as you cook with fresh meat, you have nothing to worry about.

Vegetables

All vegetables are safe. If parts of a vegetable go rotten, cut it out. The rest of the vegetable is fine. As long as it is firm and not discolored, it should be perfectly yeast-free. Foods commonly referred to as vegetables, such as bell peppers and eggplant, are actually fruits.

Fruits

You have to be more careful with fruit than meat or vegetables because the high sugar content of most fruits may promote yeast growth. Also, dried fruit often contains yeast. The following list applies only to fresh fruit.

Some fruits have yeast on the skin. Remove the skin of a fruit (fresh and unspoiled) then you can eat what's left.

The following fruit are fine, as long as they are fresh and free of spoilage:

- Apple, Apricot, Avocado
- Bell pepper (Green red yellow etc.), Bitter melon, Blackberry, Boysenberry
- Cherry, Chokeberry, Chokecherry, Cloudberry, Coconut, Crabapple
- Dewberry, Durian
- Eggplant
- Grapefruit, Guava
- Hot pepper
- Kiwifruit
- Lemon, Lime, Loganberry, Longan, Lychee
- Mango, Mangosteen, Melons
- Nectarine
- Olallieberry, Orange
- Papaya, Peach, Pear, Pineapple, Pomegranate, Prickly pear
- Quince
- Rambutan, Raspberry
- Squash, Star apple, Strawberry
- Tangerine, Tayberry

Nuts and Seeds

- All nuts and seeds are yeast-free

Common Symptoms of Yeast sensitivity

A yeast sensitivity may cause the following symptoms: sneezing, diarrhea, irritability, constipation, abdominal swelling, mood swings, fatigue, difficulty in breathing, dizziness, osteoporosis, difficulty in concentrating, muscle and joint pain, respiratory and ear problems, menstrual problems, infertility, weakness and bladder infections. Diagnosis of a yeast sensitivity can be done using a food elimination diet.

Food Sensitivity: Corn

The FIT test measures IgG and Immune Complexes against proteins found in Corn. The wells in an ELISA plate contain Corn proteins. If a person is sensitive to Corn, then you need to avoid Corn or Corn-based products. Corn is found in many different types of foods. There is a lot of controversy today because most of the Corn is genetically modified (GMO) which has been linked to increased food sensitivities. The FIT does not test for Type I, immediate allergies caused by IgE antibodies which can be life threatening. Type I reactions to Corn are rare but have been known to occur.

Corn Sensitivity

Sensitivity to Corn can be a problematic for patients because many food products contain corn-based products. In addition to getting allergic reactions from eating corn on the cob, patients may feel ill after ingesting foods that contain high-fructose corn syrup or using skin care products that contain corn ingredient additives. In addition, products such as Corn oil contain very little corn-protein but may be a problem for those people who sufferer with corn sensitivities. Read the product labels carefully to avoid reactions to corn. Corn allergy symptoms usually arise and pass within a few hours without lingering effects. In rare instances, however, anaphylactic reactions can cause patients to lose consciousness and organ function. Sensitivity to Corn is difficult to detect because many products contain corn-based ingredients and symptoms vary widely from person to person. The FIT test followed by an elimination diet is a useful way to find out whether corn is responsible for your symptoms.

Genetically Modified (GMO) Corn and Corn Sensitivity

Studies confirm that several GMO crops engineered to produce built-in pesticides provoke immune responses in animals. One study showed a significant increase in three types of blood cells related to the immune system: basophils, lymphocytes, and total white cell counts. This heightened reactivity to GMO-Corn may result in increased food sensitivities to Corn. It is important to read the labels and determine if GMO-Corn components are present in the foods you eat.

The following foods and products generally contain corn-based components:

- Baking powder
 - Caramel
 - Cereals
 - Confectioner's (powdered) sugar (many contain corn starch)
 - Corn-based ingredients
 - Dextrin or maltodextrin
 - Dextrose, glucose, or fructose
 - Golden syrup (treacle)
 - Gluconic delta lactone
 - High-fructose corn syrup
 - Invert sugar, invert syrup
 - Zein (protein from corn, sometimes used in time-released medications)
 - Malt, malt syrup, malt extract
 - Modified food starch (may be corn)
 - Mono- and di-glycerides
 - Monosodium glutamate (MSG)
 - Polenta
 - Sorbitol
 - Starch, food starch
 - Sucrose (may derive from corn)
 - Vanilla extract
 - Vegetable mixes (may contain corn)
 - Xanthan gum
- Use the following substitute foods or ingredients in recipes calling for corn:
 - Featherweight® baking powder
 - Arrowroot

Skin Reactions

One very common group of symptoms is related to skin reactions. Rashes and eczema which leads to itching is one of the most common complaints. However, these skin reactions show up in almost all food sensitivities, so a proper history is required to pinpoint the exact food.

Oral Symptoms

Redness and swelling, around the mouth and lips area, is very common. This is scientifically termed as angioedema. Sometimes the inflammation is accompanied by itchiness and soreness, which can hinder activities like talking and eating. Oral symptoms are prominently visible, so these are the symptoms that cause the most emotional upset and withdrawal.

Sinus Symptoms

A very common symptom is nasal inflammation, commonly known as rhinitis. Rhinitis causes a runny nose followed by itchy, watery eyes, sneezing, coughing and wheezing. It may also trigger severe 'angioedema' which is the swelling of blood vessels, under the skin, near the hands, face, tongue and genitals. Migraine headaches and nocturnal enuresis are also common symptoms.

Gastrointestinal Symptoms

Belly cramps, nausea, diarrhea and vomiting are common symptoms. Abdominal cramping and indigestion can easily be thought of as symptoms of something else, so these symptoms are often deceptive. Gastrointestinal symptoms are also the culprits for the general lethargy or fatigue that often accompanies a food sensitivity. It can also cause intense heartburn.

Food Sensitivity: Meats: General Considerations

If a person has meat sensitivity it is possible to have a food sensitivity to meat proteins from animals of the same or dissimilar species of animals because of the similarity (homology) among the various proteins which causes cross reactivity. For example, proteins with homology among different animals are mainly the albumins, immunoglobulins and occasionally actin, myosin, tropomyosin and α -parvalbumin. Based on this, it is possible to establish 3 models of cross reactivity:

1) Cross reactivity between proteins from related species: meat from one animal may show reactions to meat from other similar species. The net result is that sensitivity to chicken may generate in sensitivity to meat from duck or turkey.

2) Cross reactivity between proteins of animals of dissimilar species origin. Patients showing sensitivity to bovine milk proteins may also be sensitive to meat proteins from goat, pork or lamb. Patients sensitive to meat proteins from goat, pork or lamb may also be sensitive to bovine milk proteins. Patients sensitive to poultry meat frequently exhibit bird-egg syndrome: sensitivity to poultry meat results in sensitivity to the egg from the same or similar birds.

Food Sensitivity: Meats: General Considerations, Cont'd

3) Cross reactivity between meat proteins and dander (proteins) from animals of a different species. Albumins show significant homology among different species of animals and are found in meat, skin and milk. Exposure to albumins from bovine milk results in cross reactivity and a sensitivity to meat from another species such as pork. Pork or lamb meat sensitivity may result in a sensitivity to cat albumin in dander (J Invest Aller Clin Immunol 2011; Vol. 21(3): 162-170).

Food Sensitivity: Meats: Bacon vs Pork

Bacon is processed with nitrites (NO₂) which alter the structure of proteins. For example, nitrosyl adducts of myoglobin through Fe (iron) or other proteins through S (sulfhydryl) or N (amines) causes a change in protein conformation and may make the altered proteins immunogenic and cause the production of antibodies. This does not occur in natural meats or unprocessed meats, especially pork. The net result is that a person can be sensitive to Bacon or Pork or both Bacon and Pork in the FIT Test. It has been demonstrated that over cooking meats treated with nitrites favors the production of nitroso amines adducts of proteins which have been implicated in causing cancer. The upside of nitrite is that it inhibits bacteria which prevents spoilage, enhances the flavor and color and inhibits lipid oxidation which prevents a rancid taste from developing. Also, other types of meats are processed with nitrites which may present a problem.

Food Sensitivity: Meats: Lamb

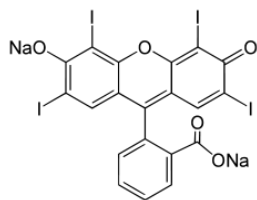
The FIT Test measures IgG and immune complexes against meat from lamb. For the most part, meat is digestible but sometimes certain people may have difficulty in digesting meat protein and the result is the undigested meat can cause a sensitivity when undigested proteins cross the gut wall. Sensitivity to meat can develop at any point in your life and last a short time or be lifelong. If a person has lamb sensitivity it is possible to have a food sensitivity to meat proteins from other animals because of the similarity (homology) among the various proteins which causes cross reactivity.

Food Sensitivity: Pigments

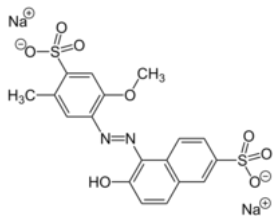
Many pigments used as food colorings share homologous chemical structures. For example, a six-membered phenyl ring or substituted phenyl ring and various side chains are common. Phenyl rings or aromatic rings along with various substitutions give pigments distinctive colors. These compounds may act as haptens and generate antibodies which can be involved in food sensitivities. Because of the similarity in the structures, there may be cross reactivity among the antibodies produced by one pigment against another similar structure. Red #3, #40 and Yellow #6 are similar in structure. If an antibody is generated against Red #3, one could expect a cross reactivity with pigments that have a similar structure. In addition, cross reactivity may occur between pigments and some spices and additives which share structural homology.



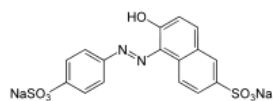
Phenyl Ring (unsubstituted without side chain)



Red #3: Erythrosine



Red #40: Allura Red



Yellow #6: Sunset Yellow

Food Sensitivity: Polysorbate 80

The FIT test measures IgG and Immune Complexes against Polysorbate 80 (Tween 80, TW80). The wells in an ELISA plate contain Polysorbate 80 which is a detergent-like molecule. If a person is sensitive to Polysorbate 80 then you need to avoid products containing this molecule. Polysorbate 80 is common in foods and pharmaceuticals and is used as an emulsifier which serves to keep proteins and other compounds in solution or suspension. Many formulations of drugs are proprietary so the exact amounts of polysorbate in a particular drug is hard to determine but it is fairly common to find the excipient polysorbate in both liquid and tablet formulations of drugs or vaccines. In addition, polysorbate is common in ice cream, yogurt or even almond or coconut milk. Other Polysorbates or Tweens are common in many products. Both TW20 and TW65 are smaller molecules but contain the same components as TW80 and should be avoided along with any product containing polysorbate 80.

If you test positive for Polysorbate it is possible that it may be responsible for at least some of your food sensitivities. Based on this, foods with TW80 or smaller tweens such as TW20 and TW65 should be avoided during the elimination phase for 4-6 weeks and then you can eat a food with TW and record your symptoms for the next week to see if TW is a food responsible for some of your symptoms. It has been reported that TW80 causes problems in patients with Crohn's Disease.

Food Sensitivity: Pomegranate

The FIT test measures IgG and Immune Complexes against proteins found in Pomegranate. The wells in an ELISA plate contain Pomegranate proteins. If a person is sensitive to Pomegranate, then you need to avoid Pomegranate or Pomegranate containing juice products.

Several groups have looked at the homology of proteins and the corresponding cross reactivity of pomegranate with nuts, fruits, grains and other vegetables. This work has established that pomegranate contains a complex assortment of small molecular weight pathogenesis-related proteins, collectively called PR proteins from 17 groups which share 70-100% homology with proteins found in nuts, fruits, grains and other vegetables. These proteins fall into two groups: Lipid Transfer Proteins of the class PR-14 (LTP, 9-16Kd) and PR-4 proteins (Chitinases having a barwin-type c-terminal domain, 4Kd) that are acid stable and resistant to proteolysis. The LTPs of pomegranate share homology with corresponding proteins in hazelnut, peanut, peach (Prunus), cabbage (Brassica) and grape (Vitus) whereas, PR-4 type proteins share homology with corresponding proteins in wheat, barley, apple, soy, turnip, tomato, potato and corn. It has been well established that antibodies generated against Pomegranate LTP (PR-14) and PR-4 proteins cross-react with homologous proteins found in afore mentioned nuts, fruits, grains and vegetables. The implication for food sensitivities in general is that people who generate IgG antibodies against foods containing nuts, fruits, grains and vegetables will quite likely also test positive for pomegranate as a result of antibody cross-reactivity of homologous proteins found in otherwise unrelated foods.

Food Sensitivity: Quinoa

Quinoa (keen-wa) is a nutritious food that has been cultivated by the Inca in the Andes mountains since 3,000 BC. The seeds are very nutritious and resemble millet and are very versatile in cooking. Quinoa flour is ground from whole seeds and very nutritious and is gluten-free which makes it safe for those persons having gluten sensitivities. Quinoa has become increasingly important as a source of food because it does not contain gluten but is high in fiber, protein vitamins and minerals. Quinoa seeds contain saponin that protects them from birds and insects, oxalic acid which may be a problem in patients with kidney problems and beneficial anti-oxidants.

Anti-oxidants

Quinoa is high in the flavonoid's quercetin and kaempferol which are anti-oxidants that have been shown have anti-viral, anti-inflammatory, anti-depressant and anti-cancer properties.

Saponin

Saponin is a component of the pericarp of Quinoa seed and is a known toxic glycoside with a bitter taste. Saponin can be found in the pericarp of several other species such as Alfalfa, Hops, and Soybean and is easily identified by production of a soapy lather when placed in water.

Oxalic Acid

Quinoa contains oxalic acid which is eliminated in urine but can also complex with calcium and generate kidney stones in some people. Persons with a history of kidney stones or on a low oxalate diet should consult a physician if quinoa is going to be included in the diet.

Specific Allergens

No specific allergen proteins have been reported for quinoa.

Gluten Sensitivity and Food Sensitivities

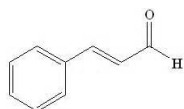
Quinoa does not contain gluten coupled with the fact that more and more people are trying to avoid gluten. This makes Quinoa a go to product for these people with gluten sensitivity and many studies have been undertaken to see if it can be used as an ingredient in pasta and bread. However, some types of quinoa contain substances called prolamins, which could trigger an immune response in people with celiac disease. Most types of quinoa do not contain prolamins but more studies are needed to verify this observation. Quinoa was well-tolerated by celiac patients when it was included as part of a gluten-free diet. Still other people have reported developing an intolerance or food sensitivity which may be caused by saponins, specific proteins or even oxalates found in the quinoa seed. Saponin is a toxin that can cause irritation and in some people.

Food Sensitivity: Spices and Additives

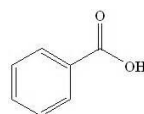
Many spices and additives share homologous chemical structures. For example, a six-membered phenyl ring or substituted phenyl ring and various side chains are common. Phenyl rings or aromatic rings along with various substitutions give spices distinct odors and flavors. These compounds may act as haptens and generate antibodies which can be involved in food sensitivities. Because of the similarity in the structures, there may be cross reactivity among the antibodies produced by one spice or additive against another similar structure. Cinnamon and Benzoic acid are very similar in structure. If an antibody is generated against Benzoic Acid, one could expect a cross reactivity with Cinnamon or some of the other structures listed below. In addition, cross reactivity may occur between some pigments which share structural homology with spices and additives.



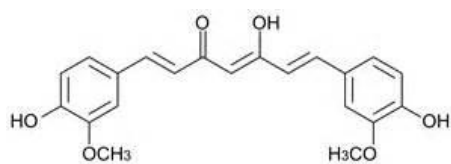
Phenyl Ring (unsubstituted ring without side chain)



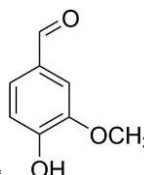
Cinnamon (phenyl ring + side chain)



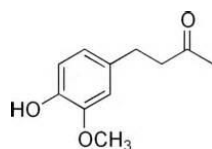
Benzoic Acid (phenyl ring + side chain)



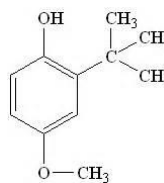
Curcumin (substituted phenyl ring + side chain)*



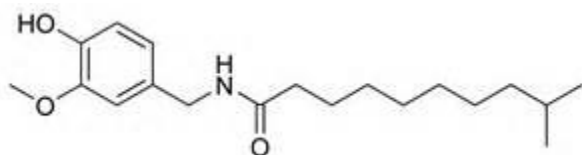
Vanilla (substituted phenyl ring + side chain)*



Ginger (substituted phenyl ring + side chain)



BHA (substituted phenyl ring + side chain)*



Capsaicin (substituted phenyl ring + side chain)

*Curcumin, Vanilla, Ginger, Capsaicin and BHA have bulky methoxy group R-[OCH₃]

Food Sensitivity: Spirulina

Spirulina is a blue-green alga used as a natural food which is grown commercially in huge algae ponds or tanks. Spirulina may be one of the most nutritious food that exists and is thought to contain almost every nutrient required by the human body. Spirulina is added to a lot of health foods and supplements because of the nutritional properties. Spirulina is used as alternative feed source for various land animals and in aquaculture. Spirulina is used as feed for poultry, pigs, rabbits, lambs and cattle, including buffalo. Spirulina is also used as an alternative feedstock in a wide variety of fish and shellfish: cultured striped jack, carp, red sea bream, tilapia, catfish, yellow tail, zebrafish, shrimps and abalone. Based on this a person can be exposed to spirulina directly via supplements or through consumption of foods that were derived from animals that were fed spirulina and may contain various components associated with spirulina. If the patient does not consume spirulina as a supplement or foods derived from animals fed spirulina yet tests positive for spirulina, then we are probably looking at a cross reactivity.

Food Sensitivity: Butternut Squash and Zucchini

Butternut Squash and Zucchini. The FIT Test measures antibodies and immune complexes against Butternut Squash and Zucchini. Both Butternut Squash and Zucchini are closely related species in the squash family so it is common for a person to be sensitive to both simultaneously. However, it is also possible to be sensitive to Butternut Squash and not to Zucchini because each vegetable contains different proteins which may cause a sensitivity to one squash but not the other. However, if one is sensitive to either then during the elimination phase (6-8 weeks) the patient should remove all closely related vegetables that fall into the Squash family (Cucurbitaceae).

Food Sensitivity: Cane Sugar

The FIT test measures delayed food sensitivities caused by IgG and Immune Complexes to Cane Sugar. The wells in an ELISA plate are coated with Cane Sugar which also contain small amounts of proteins in addition to the actual sugar (sucrose). True sugar sensitivity is difficult to diagnose because of its prevalence in most foods. If you have a true sugar sensitivity, most likely it is from proteins that are contained in refined sugars. If you feel unwell after eating sugar these adverse symptoms may also be related to sugar intolerance. The main question is: are the symptoms localized to the gut or are the symptoms more generalized? Sugar intolerance is the inability to digest fructose which mainly causes problems in the intestine, whereas sugar sensitivity causes more diffuse symptoms: headache, eczema and skin rashes or generalized tired feeling.

Food Sensitivity: Tea

The FIT test measures delayed food sensitivities caused by IgG and Immune Complexes to Black Tea. Wells in the ELISA plate are coated with Tea which also contains small amounts of proteins. We recommend that if you are sensitive to Black Tea that you avoid Green Tea and vice versa. The FIT uses organic Black Tea as the test antigen in this test. There is an interesting article attached

A Comparison of Black and Green Tea

http://EzineArticles.com/?expert=James_Kinsella

Tea is the common name for the evergreen *Camellia sinensis* plant, found widespread throughout Asia, as it has been for many thousands of years. Tea has many forms, but the most widespread variation of tea is 'Green Tea', this is one of the least processed variations which gives a fresher beverage. Although Green Tea is more widespread, western cultures adapted Black Tea after Tea was introduced to the west in the 1800's. Black tea is the most highly processed form and thus has an overall lower quality when compared to Green Tea. Black Tea does have health benefits though, in fact almost all of the health benefits you can find about Green Tea are available in Black Tea, just in a diminished quantity which further lessens with the addition of milk. A recent study proved that people who regularly consume tea have a lower decline in cognitive function when compared to non-tea drinkers. As one major comparison of the health differences between Green and Black Teas, the International Agency for Research on Cancer (IARC) currently lists Black Tea but not Green Tea as a Group 3 Carcinogen. Black Tea is produced by oxidizing tea leaves during fermentation which may produce un-desirable break down products. To add to this, Black Tea is mixed in as a bulking agent, which results in a brown/yellow tea, sometimes with only a slight hint of green, or in other cases, not a hint of what you would expect from a Green Tea. Many supermarket brand teas source their Green Tea from China and to minimize the price the older and lower quality leaves are used. For a guarantee of high-quality tea, you want to look for a Japanese Tea Store. In general, Green Tea will cost more but the overall quality is very high. Sencha is the most common type of tea in Japan and is of high quality.

A high-quality Green Tea product should result in a cloudy dark green color, with a fresh taste and sweet aroma. If the end result is Yellow / Brown / Black, or tastes too bitter then one of two things have occurred: the quality of the tea is not good, or you have tried to brew Green Tea as if it were Black Tea. The flavor produced from Black Tea is less likely to spoil if you brew it incorrectly, whereas Green Tea needs to be brewed correctly or an off flavor is produced.

Brewing Tea

Black Tea:

1. Boil the water in the kettle.
2. Put the teabag into the cup.
3. Pour boiling water over the teabag.
4. Serve with milk/sugar.

Green Tea (Sencha):

1. Boil the water in the kettle and leave for 30 seconds.
2. Pour the water into your cups and leave for 30 seconds.
3. Pour from the cups into the teapot and leave for 30 seconds.
4. Pour back into the cups.
5. While leaving the water in the cups for 1 minute 30 seconds (up to 2 minutes 30 seconds) add a heaping teaspoon of Sencha into the teapot, per cup.
6. Add water from the cups and steep for 1 to 3 minutes (premium grade Sencha can take as little as 40 seconds).

This does the following things:

- Preheat both the cups and teapot before the tea starts to steep, meaning that there are no quick temperature changes which would otherwise spoil the taste.
- Cool down the temperature of the water, as boiling water will scald the leaves and result in a bitter yellow tea.

Food Sensitivity: Turmeric

Turmeric contains a very high concentration of the poly phenol curcumin (see Spices and Additives section above). Turmeric (*Curcuma longa*) is in the ginger family Zingiberaceae. Curcumin is found in herbal supplements, cosmetics, food flavorings and food colorings. The herbal supplements are used in an attempt to reduce inflammation. However, bioavailability of curcumin is extremely poor and it is doubtful that any real effects on reducing inflammation actually occurs.

Food Sensitivity: Vanilla

The FIT test measures delayed food sensitivities caused by IgG and Immune Complexes to Vanilla. Wells in the ELISA plate are coated with Vanilla which also contain small amounts of proteins in addition to the actual Vanilla which is an organic molecule. Overall, the percentage of patients showing reactivity to Vanilla is very low and in the neighborhood of 2%. Vanilla is a mixture of phenols that have many chemical substitutions but the key one is the aldehyde group (R-CHO). Aldehydes are very reactive and will chemically react with Nucleophiles such as amine (R-NH₂) groups on proteins. The end result is that the “self-proteins” become altered now are seen as foreign by the immune system. A brief review of the literature indicates that vanilla-type compounds can cause dermatologic reactions such as eczema or hives when applied to the skin. However, when ingested there is some suggestion that vanilla can cause stomach problems but the exact mechanism is not understood. Vanilla is used in many types of beverages, baked goods and other foods such as ice cream which makes it difficult to completely remove from the diet. Read all food labels carefully as this ingredient should be listed.

Food Sensitivity: Whey

Please see: Testing for Sensitivity for Milk and Whey, pages 11-14.

Food Cross-Reactivity

Foods are composed of many different types of proteins, sugars or chemicals that can be quite similar even among very different food groups. Antibodies which are produced are highly specific in that they react with specific parts of a protein (peptide) or even a chemical. However, dissimilar foods are quite often composed of very similar peptides which results in an antibody that was produced against specific food but also reacts with a different food because of the similarity in a certain peptide. A good example is the cross reactivity of wheat and coffee proteins which are similar. In addition, antibodies against small chemicals such as the additive Benzoic Acid may cross react with food colorings such as Red 3 or Red 40 because they all share a similar phenyl ring. A list of the 132 foods and additives tested in the FIT Test and possible cross-reactivity can be found below. The various foods are arranged in tables which correspond to food groups found in the FIT Test.

Possible Cross-Reactivity and Alternatives/Substitutes

There is an important concept in both allergy and food sensitivities: Cross Reactivity. Epitopes on homologous proteins share the same or similar sequence and 3-dimensional structure resulting in antibody cross reactivity.

The net result is that closely related animals and plants, especially at the genus and species level, share significant homology in proteins and in fact many of the proteins can be virtually identical in sequence and 3-dimensional structure. It is also well established that even dissimilar foods that contain homologous proteins, especially structural proteins and enzymes, will contain similar epitopes resulting in antibodies that cross react. Based on this, there is a high likelihood that if one is sensitive to a particular food (protein) then a closely related food may contain a homologous protein that also causes the sensitivity because it contains the same epitopes. The net result is that antibodies will be produced against an epitope from the food that was consumed and also against the same epitopes on a food “that may be consumed”.

During an elimination diet it is essential not to consume the food that tested positive and it is equally essential not to consume “similar” foods for 6-8 weeks. During this time, antibody titers to the food (epitopes) decrease substantially. The challenge phase is where you challenge with the same food or a *similar food* to confirm the sensitivity. If it is confirmed that a person is sensitive to the *original food and a similar food*, then there are alternatives/substitutes suggested in the table.

ADDITIVES

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Aspartame	NA	Chewing Gum, Desserts, Medicine-cough drops/vitamins, Pudding, Soft drinks, Yogurt	Equal, Nutra Sweet E951, Amino Sweet Sanecta, Twin Sweet	Sucralose, Sugar
Benzoic Acid	Food Colorings	Acidic foods: juice, sparkling and soft drinks, pickles Bleached flours	Benzoyl Peroxide Benzoate of soda Sodium Benzoate	NA
BHA	BHT	Bacon, Baked goods, Beer, Butter, Candy, Canned fruits/vegetables, Cereals, Chewing gum, Creamers, Dry beverage mixes Dry dessert mixes, Fried foods, Gelatin, Instant mashed potatoes, Lard, Margarine, Nuts-roasted, Peanut butter, Potato Chips, Powdered soups, Preserved meats, Salad dressing, Shortening, Spices, Whipped topping	Butylated hydroxy anisole	Vitamin E
MSG	Glutamic acid	Bouillon, Canned soups, Chinese food, Corn starch, Crackers, Frozen dinners, Meats, Powdered milk, Salad dressing, Soy sauce	Monosodium glutamate	Aged cheeses, Braggs Liquid Amino Acids, Dairy concentrates, Fish sauce, Herbs, Potassium chloride, Sea salt, Spices
Polysorbate 80	Polyethylene glycols, Macrogol 4000	Frozen custard, Chewing gum, Gelatin, Ice cream, Ice milk, Sherbets	Alkest TW 80 Canarcel, E433, Pegasorb/Tween 80	NA
Red #3	Red #40	Sausage casings Maraschino cherries, Candies Baked goods, Fruit cocktail	Erythrosine E124	Natural plant dyes
Red #40	Red #3	Baked goods, Beverages Dessert powders, Candies, Fruit cocktail, Cereals	Allura Red	Natural plant dyes
Saccharin	Sulfonamides	Chewing gum, Canned fruit Baked goods, Soft drinks Jams/jellies	Sweet N' Low Sweet Twin Nectar Sweet	Sugar Sucralose
Yellow #6	Yellow tartrazine (E102)	Baked goods, Cereals Carbonated beverages, Candies Gelatin, Sausages Cheese, Lemonade	Sunset Yellow E 110	Natural plant dyes

BEANS

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Cocoa	Chocolate (Cacao) Cocoa butter Cola nut	Baked goods Hot chocolates Candies	Dutch processed cocoa	Carob
Coffee	Wheat	Coffee beverages		Tea, Herbal Teas
Kidney	Alfalfa, Alfalfa sprouts Beans- Fava/Green/Lima/Mung/ Navy/Pinto/Soy/String/Tonka Carob/Carob syrup, Chickpea, Fenugreek, Gum acacia Gum tragacanth, Jicama, Kudzu, Lentil, Licorice Peanuts/Peanut oil, Red clover Peas-Black eyed/Green, Senna, Soy flour/grits/lecithin/ oil/milk, Tamarind	Chili Red beans and rice Rajma Salads Dips	Red peas Cannellini bean Caparrones Common beans	Pink beans Pinto beans Red beans
Lentils	Alfalfa, Alfalfa sprouts Beans- Fava/Green/Lima/Mung/ Navy/Pinto/Soy/String/Tonka Carob/Carob syrup, Chickpea, Fenugreek, Gum acacia Gum tragacanth, Jicama, Kudzu, Lentil, Licorice Peanuts/Peanut oil, Red clover Peas-Black eyed/Green, Senna, Soy flour/grits/lecithin/ oil/milk, Tamarind	Soups/stews Mujaddara Dal	Red lentils green lentils French lentils Brown lentils Black beluga lentils	Split peas
Navy Beans	Alfalfa, Alfalfa sprouts Beans- Fava/Green/Lima/Mung/ Navy/Pinto/Soy/String/Tonka Carob/Carob syrup, Chickpea, Fenugreek, Gum acacia Gum tragacanth, Jicama, Kudzu, Lentil, Licorice Peanuts/Peanut oil, Red clover Peas-Black eyed/Green, Senna, Soy flour/grits/lecithin/ oil/milk, Tamarind	Baked beans Soups/stews	Haricot Pearl haricot White pea bean Pea bean	Northern beans Flageolet beans
Pinto Bean	Alfalfa, Alfalfa sprouts Beans- Fava/Green/Lima/Mung/ Navy/Pinto/Soy/String/Tonka Carob/Carob syrup, Chickpea, Fenugreek, Gum acacia Gum tragacanth, Jicama, Kudzu, Lentil, Licorice Peanuts/Peanut oil, Red clover Peas-Black eyed/Green, Senna, Soy flour/grits/lecithin/ oil/milk, Tamarind	Brazilian/Mexican dishes Portuguese/Spanish dishes	Carioca, Re-fried beans, Speckled bean, Strawberry bean	Other beans
Soybean	Alfalfa, Alfalfa sprouts Beans- Fava/Green/Lima/Mung/ Navy/Pinto/Soy/String/Tonka Carob/Carob syrup, Chickpea, Fenugreek, Gum acacia Gum tragacanth, Jicama, Kudzu, Lentil, Licorice Peanuts/Peanut oil, Red clover Peas-Black eyed/Green, Senna, Soy flour/grits/lecithin/ oil/milk, Tamarind	Textured vegetable protein in many imitation meat products Tofu Tempeh Soy sauce Fermented bean paste Soy milk Natto Edamame Miso/miso paste Soy bean oil Vegetable oil Infant formulas Soy yogurt Soy cheese Meat from animals fed a soy based feed	Large bean Edamame	Green peas Fava beans Lima beans Adzuki bean miso Seitan made without soy sauce Cow's milk, yogurt cheese Rice milk, yogurt, cheese Almond milk, yogurt, cheese Goat milk, yogurt, cheese Hamburger Quinoa Bulger Safflower oil Canola oil Olive oil Coconut oil

DAIRY

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Egg, Chicken Egg Yolk Egg White	Chicken Peafowl Pheasant Quail	Cakes, Biscuits Egg in prepared meals Egg pasta, Glaze on pastry Sponge fingers, Quorn Nougat, Milky Way Mars Bar, Chewitts Egg in some gravy granules Meringue, Lemon curd Quiche, Scrambled egg Boiled egg, Fried egg Omelet, Poached egg Hollandaise sauce, Egg custard Pancakes, Yorkshire pudding Mousse, Mayonnaise Fresh ice cream, Sorbet Royal icing, Horseradish sauce Tartar sauce	Albumen Egg yolk Lecithin E322 Ovoglobulin Dried egg Egg white Livetin Ovovitellin Egg powder Frozen egg Ovalbumin Vitellin Egg protein Globulin Ovomucin	Whole egg replacer, Ener-G egg replacer Loprofin egg replacer, Loprofin egg white replacer Egg free mayonnaise, Egg free cakes and muffins Egg free omelet mix Alternative binding agents: Soya dessert, Soya Custard, Soya Cream Soya milk, Mashed banana, White sauce Substitute for 1 egg: 1 tbs gram/chickpea flour+ 1tbs soya flour 1 tbs arrowroot, 1tbs soya flour+ 2 tbs water 2tbs flour + ½ tbs shortening + ½ tsp baking powder + 2 tsp water 50g tofu blended with liquid portion of recipe ½ mashed banana 50 ml white sauce Whole egg substitute (as above) Tips on raising agents: Self-rising flour: Add extra oil + raising agent Use about 2 heaped tsp baking powder per cake ¾ bicarb soda and 1 tsp cider vinegar instead of baking powder Sieve flour + gently fold in liquid to trap air
Milk, Cow Casein	Buffalo Goat Lamb Sheep Wheat/gluten	Butter, Spreads Fromage Frais, Yogurt Cheese, Ice cream Cream, Cakes Doughnuts, Waffles Pancakes, Bread, Pizza Chocolate, Confectionary Instant mashed potatoes Creamed soup, Ready meals Processed meats, sausages Packet snacks, Custards Puddings, Sauces	Casein, Caseinate Calcium caseinate Demineralized whey Fat replacement Lactoglobulin Milk powder Skimmed milk powder Milk solids Non-fat milk Non-fat milk solids Sodium caseinate Sweet whey powder Whey protein conc. Whey solids Lactalbumin	Goat's milk Sheep/Buffalo milk Rice/Soya milk Oat/Potato milk Almond/Coconut milk Nut cream instead of cream (almond, cashew) Replace butter with Tahini/cold pressed olive oil Other calcium rich foods: Soya, cod liver oil, vegetable oil, whitebait, sardines, salmon (with small bones), nuts, red meat, green leafy vegetables esp. spring greens, watercress, spinach, and broccoli, rhubarb, figs, mushrooms, oranges, apricots, prunes, pumpkin seeds, legumes
Milk, Goat	Buffalo Cow Lamb Sheep	Yogurts Butter Cheese Tarts/quiches Chocolate milk	Chevre (French) Rocmadour Montrachet	Sheep/Buffalo milk Rice/Soya/Oat milk Potato/Almond/Coconut milk Nut creams instead of cream (almond, cashew) Tofu instead of fromage frais Replace butter with Tahini/cold pressed olive oil

EXTRACTS & MISCELLANEOUS FOODS

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Agave	Mescal Pulque Tequila	Tequila, Mezcal Cereal, Teas Sugar/syrup substitutes	Maguery American Aloe Honey water	Sugar Maple syrup Honey
Canola Oil	Peanut oil may become cross contaminated during processing	Salad dressing Many restaurant-prepared dishes Baked goods	Rapeseed 00	Butter, Applesauce Olive/Coconut/Vegetable oil Sunflower/Safflower/Grapeseed oil
Mushroom	Truffle, Morel, Puffball Baker's/Brewer's yeast Nutritional yeast Citric acid Molds in certain cheeses	Stuffed mushrooms Pizza, Soups, Stir-fry's Japanese/Chinese dishes	Agarics, Chanterelles, Oyster, Shitake, Many other types	Tofu has the same texture and can be flavored or spiced, Vegetables such as olives or zucchini
Spirulina	Spinach	Smoothies	Blue-green algae, Dihe, Tecuitlatl	Acai, Chlorella
Sugarcane	Bamboo shoots, Barley Barley malt, Maltose Corn, Corn meal Corn oil, Corn starch Corn sugar/syrup Hominy grits, Popcorn Sweet corn, Kamut Lemongrass, Citronella Millet, Oats, Oatmeal Rice, Rice flour, Rye Sorghum grain/flour Spelt, Triticale Cane sugar, Raw sugar Molasses, Teff Wheat, Wheat bran Bulgur, Wild rice Wheat flour/gluten Graham, Whole wheat Wheat germ	Beverages, Breads, Candy, Canned fruit, Cakes, Cereals, Cookies, Dried fruits, Gravy, Ice cream, Jams/Jellies, Pastries, Pies, Rum, Sauces, Soda, Syrups	Sugar Sucrose	Artificial sweeteners, Natural sugars: Agave, Beet, Coconut, Date, Maple, Stevia
Tea, Black	Green tea, Red wine (tannins)	Brewed/Iced or Sweet tea	NA	Herbal tea, Coffee
Wine, Red	Grapes Vinegar, Raisins Grape juice, Tea (tannins)	Sangria Reductions in meat-based dishes Italian dishes/sauces	NA	White wine Vinegar Chicken, beef or vegetable stock

FISH

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Bass (Sea)	Many whitefish Catfish, Cod, Haddock, Hake, Pollack, Whiting etc.	Barbecue sauce, bouillabaisse, Caesar salad, fish gelatin, fish oil	Many: Black/blue/California/ Chilean/European/ Giant/Japan; Hapu' upu' u	Branzino Sole, flounder, Tilapia
Codfish	Cusk, Haddock, Hake Pollack, Whiting Toadfish, Allies, Coley	Fish and chips, Baccala Soups/stews, Chowders	Scrod	Crabmeat, Flounder, Scallops, Sole Skate, Tilapia, Halibut
Flounder	Dabs, Halibut, Plaice Sole, Turbot	Fried dinners, soups, stew	Blackback, Fluke, Grey Sole, Sand dab	Sole, Orange roughy Cod, Haddock
Halibut	Dabs, Flounder Plaice, Sole, Turbot	Ceviche, Cioppino Chowders	Petrable sole, Sand dab, Starry flounder	Cod, Turbot, Dogfish, Haddock Striped bass, Fluke, Flounder
Salmon	Trout, Char Grayling, Whitefish	Sushi/sashimi, Gravlox, Lox Smoked/Canned salmon	Many types	Swordfish, Mahi mahi, Arctic char Trout marlin, Striped bass, Yellowfin tuna
Snapper	Many Fish	Stews/chowders	Pacific perch, Rockfish	Black sea bass, Branzino, Flounder Rainbow smelt, Tilapia Rainbow trout, Whiting
Swordfish	Many Fish	Mostly as a steak	Broadbills	Shark, Tuna, Halibut, Marlin
Trout	Salmon, Char Grayling, Whitefish	Fried dinners	Char, grey trout, Siscowet, Touladi, Tounge	Black sea bass, Branzino, Flounder Rainbow smelt, Red snapper Tilapia, Whiting
Tuna (albacore)	Bonitos, Mackerel Spanish mackerels, Yellowfin	Sushi, Sashimi, Tartars Canned fish, Tuna salad Casseroles, Nicoise salads	Albie, Albic, Long-finned tuna, Tombo	Halibut, Snapper, Mahi mahi, Salmon Swordfish, Pollock, Canned chicken

FOWL

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Chicken	Cornish hen/Pheasant/ Quail peacock and eggs from above	Soups/stews, Fried chicken Chicken wings, Pot pies Broiled, baked, roasted, grilled Chicken dishes and salads Chicken stock/broth/bouillon	Capons, Pullets	Turkey, Pork Duck, Tofu
Duck	Goose Duck and Goose Eggs	Roast duck, Turducken, Foie gras Chinese/French dishes	Mallard duck Peking duck	Turkey Chicken
Turkey	Turkey eggs	Turducken Roast turkey, Deli sandwiches	NA	Chicken, Duck, Pork, Ground beef Tofurky

FRUITS

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Apple	Quince, Pear, Rosehips	Baked goods, Applesauce Apple cider/vinegar Apple pectin, Jams/jellies	NA	Banana, Pear
Avocado	Cinnamon Sassafras	Guacamole, Desserts, Sushi Mexican, Central American, Peruvian, Chilean dishes	Alligator pear	Nuts, Olive oil, Mayonnaise, Coconut oil
Banana	Plantains	Baked goods Smoothies	Dessert Banana	Canned pumpkin, Avocados, Silken tofu Other high potassium foods: Legumes, Dates, Potatoes Raisins, Prunes, Spinach
Blueberry	Cranberry Wintergreen	Baked goods, Smoothies Cereals, Jams/jellies	NA	Bilberry, Black huckleberries Black currants, Blackberries, Raspberries Cranberries, Red grapes, Cherries
Cantaloupe	Mush melon Honeydew /Sweet/ Rock /Persian melon Spanspek, Gamut	Smoothies	Muskmelons Rock melon	Honeydew melons, Mango Papaya, Peaches
Cherry	Peaches, Plums Nectarines, Apricots	Cherry juice, Baked goods Cereals	NA	Raspberries, Strawberries, Blackberries Peaches, Plums, Nectarines, Apricots
Cranberry	Blueberry Huckleberry Wintergreen	Cranberry sauce, Baked goods Salads, Cranberry relish Juices, Jams/jellies	Craisins	Cherries, Raspberries, Raisins, Blueberries Blackberries, Currants, Lingonberries
Grape, White	Raisins, Dried currants Cream of tartar, Brandy, Champagne, Wine vinegar	Juice, Cereals Wine, Wine vinegar Champagne, Baked goods	NA	Kiwi fruit Blueberries Cranberries
Grapefruit	Citrus fruits: Lemon, Lime, Orange Clementine, Tangerine Kumquat, Citron	Juice Jellies/jams	Bioflavonoids Citrus/Citrus peel extract Grapefruit seed extract	Clementine, Orange, Blood orange Star fruit, Tangerine, Lemons Limes
Honeydew melon	Cantaloupe/ Zucchini Cucumber, Gherkin Persian melon Watermelon Crenshaw, Casaba Pumpkin Squash: Acorn/ Buttercup/Butternut/ Boston/Caserta/ Cocozelle/Crookneck/ Straight neck/Hubbard/ Pattypan/Spaghetti	Chilled soups Salads Juices/smoothies	White Antibes	Green grapes Avocados Cantaloupe Crenshaw melon Persian melon Starfruit Papayas
Lemon	Citrus fruits: Grapefruit, Lime Orange, Clementine Tangerine Kumquat Citron	Salad dressings, Marinades Baked goods, Juices Jams, Lemonade Soft drinks, Marmalade Apples, Bananas, Avocados, Lemon liquor	Many types	Limes, Oranges, Clementine Tangerine, Citron, Grapefruit Kumquat, Vinegar, White wine
Lime	Citrus fruits: Grapefruit, Lime Orange, Clementine Tangerine, Kumquat Citron	Baked goods, Juices Guacamole, Margaritas Gimlets, Salsas Mexican dishes Thai dishes	Many types	Lemons, Oranges, Clementine Tangerine, Citron, Grapefruit Kumquat, Vinegar, White wine

FRUITS CONT'D

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Olive, Green	Olive oil	Olive tapenade	Drupes, Table olives	Capers/caper berries, Lupin beans Cocktail onions, Sundried tomatoes
Onion, White	Garlic, Chives Scallions, Shallots Leeks	Soups, Marmalades, Relishes Salsas Italian/Mexican/Spanish Dishes Chinese/Japanese Dishes	Bulb onion, Common onion, Many types	Garlic, Leeks, Shallots, Chives Scallions, Fennel
Orange	Citrus fruits: Lemon, Grapefruit Lime, Clementine Tangerine, Kumquat Citron	Juices, Smoothies, Marmalades Jams/jellies, Salad dressings	Navel/Valencia oranges caracara oranges Moro (blood) oranges	Grapefruit, Clementine, Tangerine Kiwifruit, Mango, Papaya
Peach	Plum, Prune, Apricot Cherry, Almond Nectarines	Jams/jellies, Juices Smoothies, Chutneys	Nectarine	Plums
Pear	Apple Quince	Apple cider/vinegar Juices, Jams/Jellies	NA	Apple, Celery root, Peach, Plum
Pineapple	Avocado, Bananas, Kiwis, Mango, Papaya, Peach	Juices, Jams/jellies, Marinades	Pina, Ananas, Nanas	Orange, Grapefruit, Mango
Plum	Prune, Apricot, Cherry Almond, Nectarines Peach	Jams/jellies, Juices Prune juice	Prunes	Peach Nectarines
Pomegranate	Apple, Corn, Hazelnut, Olive, Peach, Peanut, Rice	Grenadine syrup, Juice Marinades	Grenada, Grenade	Pineapple Strawberries
Raspberry	Strawberry, Blackberry Boysenberry, Dewberry Wine berry, Logan berry Black raspberry	Jams/jellies Juices	NA	Strawberry Blackberry
Strawberry	Blackberry, Dewberry Boysenberry, Wine berry Logan berry, Raspberry Black raspberry	Jellies/jams Juices Dressings	NA	Blackberry Raspberry Cherries
Watermelon	Cantaloupe Honeydew melon Cucumber, Gherkin Persian melon Crenshaw, Casaba Pumpkin/Acorn/ Buttercup/Butternut/ Boston marrow/ Caserta/Cocozelle/ Crookneck/ Hubbard/Straight neck/Pattypan/ Spaghetti squash Zucchini	Juices Marinades Smoothies	Many Types	Grapefruit Honeydew melon Cantaloupe

GRAINS

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Barley	Barley, Corn, Millet, Rice, Malt, Oat, Rye, Wild Rice, Brown cane sugar, Bamboo, Sorghum	Bread, Beer, Whiskey, Barley water, Mugisha (Japan, Korea) Soups, Stews (Eastern Europe) Coffee substitutes	Pot barley Dehulled barley Pearl barley	Buckwheat, Corn, Millet, Oats, Potatoes, Rice, wild rice, Rye, Spelt, Sweet potatoes, Quinoa, Tapioca, Wheat
Millet	Barley, Corn, Rice, Malt, Oat, Rye, Wild Rice, Brown cane sugar, Bamboo, Sorghum, Wheat	Oat flour/bran, Oat groats, Quick cooking oats, Oatmeal, Rolled oats, Porridge, Oatcakes, Oatmeal cookies, Muesli, Granola, Beer, Oatmeal stout	See: Where to find it	Barley, Buckwheat, Corn, Potatoes, Rice, wild rice, Rye, Spelt, Sweet potatoes, Quinoa, Tapioca, Wheat
Oats	Barley, Corn, Millet, Rice, Malt, Oat, Rye, Wild Rice, Brown cane sugar, Bamboo, Sorghum	Oat flour/bran, Oat groats, Quick cooking oats, Oatmeal, Rolled oats, Porridge, Oatcakes, Oatmeal cookies, Muesli, Granola, Beer, Oatmeal stout	See: Where to find it	Barley, Buckwheat, Corn, Millet, Potatoes, Rice, wild rice, Rye, Spelt, Sweet potatoes, Quinoa, Tapioca, Wheat
Gluten (from wheat)	Barley, Corn, Millet, Rice, Malt, Oat, Rye, Wild Rice, Brown cane sugar, Bamboo, Sorghum	Same as for wheat, barley, oats	Gliadin	Corn, Millet, Potatoes, Quinoa, Rice, wild rice, Sweet potatoes, Tapioca
Rye	Barley, Corn, Millet, Rice, Malt, Oat, Rye, Wild Rice, Brown cane sugar, Bamboo, Sorghum	Crispbreads, Crackers, Pumpernickel bread, Rye flour/bread/beer/whiskey, Some vodkas	Rye berries Rolled rye	Buckwheat, Corn, Millet, Oats, Potatoes, Rice, wild rice, Spelt, Sweet potatoes, Quinoa, Tapioca, Wheat
Rice	Bamboo, Barley, Brown cane sugar, Malt, Millet, Oats, Rice bran, Rye, Sorghum, Wheat, Wild rice	White, brown, black rice Basmati rice, Brown rice syrup, Chinese/Indian/Japanese dishes, Jasmine rice, Puffed rice, Rice cakes/crackers, Rice flour/noodles/porridge Rice Krispies, Rice wine, Rice bran oil	Congee, Jook	Buckwheat, Corn, Millet, Oats, Potatoes, Rye, Spelt, Sweet potatoes, Quinoa, Tapioca, Wheat
Wheat	Bamboo, Barley, Brown cane sugar, Corn, Malt, Milk and Milk Products, Millet, Oat, Rice, Rye, Sorghum, Spelt, Wild Rice	White/brown/Whole meal flour Bread: White/brown, Whole meal, Ciabatta, Croissants, Granary, Malt loaf, Pita, Rye, Rolls/buns Cakes, Crisps Cereals: Weetabix, Shredded Wheat, Special K, Muesli Biscuits, Pastry (filo, puff, short), Pies, Pizzas, Burgers, Sausages, Salami, Scotch eggs, Meat/fish in breadcrumbs, Corned beef, Pates/spreads, Commercial sauces, Ham with breadcrumbs, Gravy, Stock cubes Tinned Foods: Baked beans, Spaghetti, Soups Ice cream Powdered drinks Chocolate bars Liquorice Desserts/puddings Alcoholic drinks: Beer, Stout, Lager, Most spirits Processed foods Convenience/fast foods	Amp-isostearoyl hydrolyzed wheat Binder Bleached flour Breadcrumbs Bulgar wheat Cereal binders Edible Starch Hydrolyzed wheat protein Modified Starch Plain flour Puffed wheat Wheatgerm extract Wholegrain Food starch Whole meal flour Cracked wheat Kibbled wheat Wheat grains Wheat berries	Breads: Ener G white or brown rice bread, Glufin wheat-free bread and rolls, Rice/oat cakes, Glutano “Whole-wheat” (rice and corn), Glutano crackers, Orgran crackers, Glutafin crackers, Rye bread/crispbreads, Ryvita Pasta: Barilla Gluten Free pasta Pastariso brown rice pasta Orgran pasta, Glutafin pasta Rice noodles Cereals/grains: Rice Krispies Corn Flakes, Porridge, Oat flakes, Brown/white rice, Wild rice, Soya bran, Tapioca, Sago, Buckwheat, Polenta, Quinoa, Pearl or pot barley, Corn (Maize), Popcorn, Millet, Rice, Oat/oatmeal, Rye, Wild rice Flours for home-cooking: Corn flour, Brown rice flour, Glutafin wheat-free baking powder, Buckwheat/Potato/Tapioca flour, Glutafin flour mixes, True Free flour mixes, Biscuits and Cakes: Glutafin biscuits, Oat cookies, Rite-Diet biscuits and cakes, Potatoes, Sweet Potatoes
Wheat, Bran	Barley, Corn, Millet, Rice, Malt, Oat, Rye, Wild Rice, Brown cane sugar, Bamboo, Sorghum	Cereals, Breads, Pancakes, Biscuits, Waffles, Cookies, Muffins, Soups e.g. Borscht	Bran	Same as for wheat
Wheat, Bulgar	Barley, Corn, Millet, Rice, Malt, Oat, Rye, Wild Rice, Brown cane sugar, Bamboo, Sorghum	Pilafs, Soups, Bakery goods, Stuffing, Tabbouleh salad, Kibbeh, Indian/Turkish food, Mid-Eastern/Mediterranean food	Cracked wheat Bulghar Bulgar Bulghu;	Same as for wheat
Wheat, Durum	Barley, Corn, Millet, Rice, Malt, Oat, Rye, Wild Rice, Brown cane sugar, Bamboo, Sorghum	Pasta: Dried/Fresh Whole meal, Semolina, Couscous, Canned tomato sauce	Durum	Same as for wheat

MEATS

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Beef	Beef suet, Gelatin Rennet, Sausage casings Veal, Buffalo, Goat Sheep, Lamb, Mutton Bison Milk prod. from beef, buffalo, goat, sheep, lamb, bison	Meat products from bovines Beef jerky, Corned beef Sweetbread, Tripe, Tartar Bresaola, Corned beef, Biltong Milk products: milk, yogurt, ice cream, cheese from bovines	Many types	Lentils, Tofu, Ground turkey Ground chicken, Bison, Ground pork Venison, Ostrich
Bacon	Hog (pork or pig) Ham, Lard Pork gelatin/sausage Scrapple, Gammon	Sandwiches, Salads Bacon wrapped foods Pizza, Hamburgers Pasta dishes, Soups Egg dishes, Bacon bits British and Southern US dishes cooked in bacon grease	Pork belly Pancetta	Turkey bacon Vegetarian bacon Macon Lamb bacon
Lamb				
Pork	Bacon, Ham, Lard Pork gelatin/sausage Scrapple, Gammon	Chorizo, Salami, Hot dogs Charcuterie, Spam, Antipasto Chinese/Eastern Asian dishes	Canadian bacon Spam Prosciutto	Chicken, Tempeh Smoked turkey, Beef, Lamb Chicken sausage, Tofu

MICROBIAL

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Candida	Yeast, Baker's/Brewer's	Found naturally in the human body	Yeast <i>Candida albicans</i>	This is an organism found on or in the Human body.
Yeast, Baker's	Mushrooms, Truffle Morel, Puffball, Brewer's yeast Nutritional yeast, Citric acid	Bread, Pizza, Pasta Baked products-cakes/muffins, rolls	Active dry yeast (<i>Saccharomyces</i> sp.)	Yeast free bread Yeast free pizza dough Baking soda and lemon juice Double acting baking powder
Yeast, Brewer's	Mushrooms, Truffle Morel, Puffball, Baker's/Nutritional yeast Citric acid	Beer, Homemade wine Malt vinegar Barley malt Hard cider	(<i>Saccharomyces</i> sp.)	NA

NUTS

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Almond	Plum, Apricot, Cherry Nectarine, Peach, Prune Wild cherry, Sloe	Almond oil/butter/milk/flour Marzipan, Nougats Baked goods, Tarrone	Marcona almond	Peanuts, Pumpkin seeds Peanut butter, Dairy milk, Soy milk Wheat flour
Cashew	Mango Pistachio	Cashew butter/oil, Soups/stews Indian milk desserts, Curries	Cashew apples	Peanuts Sunflower + Pumpkin seeds
Coconut	Coconut milk/oil/meal Dates, Date sugar Sago starch Palm cabbage	Desserts, Candies, Curries Coconut chips/butter/water Coconut milk/oil, Palm wine Indonesian/Vietnamese dishes Indian/Philippine dishes	Copra, Drupe (not a real "nut")	Butter, Olive/Avocado oil Almond/Cashew/Dairy milk Wheat/Almond flour Macadamia/Brazil nuts
English Walnut	Black walnut, Butternut Hickory nut, Pecan	Baked goods	Walnut Persian/Royal walnuts	Hazelnuts, Pine nuts
Hazelnut	Almond, Brazil, Cashew, Coconut, Pistachio	Praline, Nutella, Frangelico Chocolate truffles/candies Hazelnut oil, Baked goods Coffees, Turkish cuisine	Filbert Cobnut	Beechnuts, Almonds, Walnuts Pecans, Brazil nuts, Macadamia nuts
Peanut	Alfalfa, Alfalfa sprouts Fava/Lima/Mung beans Navy/String/Pinto beans Kidney/Green beans Green/Black eyed peas Carob syrup, Chickpea Fenugreek, Gum acacia Gum tragacanth Jicama, Kudzu Licorice, Lentils Peanut oil, Red clover Senna, Soybeans Soy lecithin/grits/ Flour/milk/oil Tamarind, Tonka bean	Peanut oil Peanut butter Peanut flour Candies Stir fries Trail mixes Peanut soup Foods cooked in peanut oil	Ground nut Monkey nut Goober Goober pea	Cashews Almonds
Pecan	Black/English walnut Butternut, Hickory nut	Baked goods, Pralines, Breads Ice cream, Pecan pie	Drupe (not a real "nut") Hickory nuts	Walnuts

SEEDS

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Dill	Angelica, Anise, Carrot Caraway, Carrot syrup Celeriac, Celery, Chervil Celery seed/leaf, Cumin Coriander, Dill, Fennel Lovage, Parsley, Parsnip Sweet cicely	Gravlax, Borscht, Pickles Salads, Soups, Omelets Sour cream sauces and dressings Potato and Fish based dishes	Shilu (China)	Caraway seeds Celery seeds Fennel seeds
Flax	Seeds: Mustard, Poppy Rape, Sesame, Sun flower	Flax seed oil, Breads, Crackers Indian dishes, Oatmeal Frozen waffles, Muffins Cookies, Pizza dough Smoothies/health shakes	Golden linseeds	Chia seeds Wheat germ Hemp meal Egg substitute
Quinoa				
Sesame	Sesame oil Tahini, Flax	Baked goods, Bagels, Buns Asian dishes, Tahini, Sushi Middle Eastern candies, Adobo Hummus, Breads, Mole Cookies	Benne seeds Goma	Pumpkin seeds Poppy seeds Finely chopped peanuts/almonds/cashews
Sunflower	Cardoon, Chamomile Chicory, Coltsfoot Costmary, Dandelion Endive, Escarole Globe artichoke Jerusalem artichoke Artichoke flour Goldenrod, Lettuce Pyrethrum, Romaine Safflower oil/seeds Sunflower oil/meal Tansy, Tarragon French endive	Sunflower butter Sunflower oil Bagels Breads Granola bars Salads Trail mixes	Cypsela (a fruit) Many types	Pine nuts Pumpkin seeds Almonds Peanuts

SHELLFISH

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Clam	Cockle, Mussel Oyster, Scallop	Clam sauce, Fried/Stuffed clams Steamed clams, Chowders Japanese/Italian pasta dishes	Razor clams Little necks Cherrystones	Mussels
Crab	Crayfish, Lobster Prawn, Shrimp	Steamed/boiled claws and legs Crab cakes/dip Soups/stews/bisques Sushi, Bouillabaisse	Snow crab King crab Blue crab Soft shelled crab	Lobster, Shrimp, Cod Surimi (imitation crab meat) Salmon Flounder Monkfish
Lobster Homarus (Northern)	Crayfish, Crab Prawn, Shrimp	Lobster rolls/Casseroles Soups/stews/bisques Lobster-Steamed/boiled Thermidor/Newburg Baked stuffed/Cioppino	Clawed/Slipper/Spring /Squat Langosta (Spanish) Lowng Sha (China)	Crab Shrimp Monkfish Walleye pike Sheepshead
Scallops	Clam, Cockle Mussel, Oyster	Casseroles, Sashimi/sushi Smoked scallops, Fried seafood	escallop	Shark meat, Cod cheeks, Monkfish, Sole Skate, Lobster, Crab, Flounder, Shrimp
Shrimp	Crayfish Crab Lobster Prawn	Sushi/sashimi, Jambalaya Soups/stews/bisques/salads Pasta dishes, Ceviche, Paella Shrimp paste/stock/cocktail Mediterranean dishes, Curries	Prawn (fresh water) Shrimp (salt water)	Scallops, Dublin Bay Prawns, Lobster Crab, Imitation seafood, Chicken

SPICES

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Basil	Peppermint, Spearmint, Water mint, Horse mint, Lavender oil, Rosemary, Marjoram, Sage, Horehound, Savory, Thyme, Oregano, Lemon balm	Pasta sauces, Pesto Soups/stews, Salads Italian dishes Southeast Asian dishes	Thai basil Sweet basil Lemon basil Holy basil African blue	Parsley Cilantro Mint Tarragon
Cinnamon	Avocado, Bay leaf, Sassafras	Desserts/baked goods, Candies Breads, Cereals, Teas, Pickles, Soups/stews, Turkish/Persian/ Middle Eastern dishes	Cassia	Nutmeg Allspice Cloves Cardamom
Garlic	Onion, Shallot, Leek Chive, Asparagus Aloe Vera, Ramp Sarsaparilla	Soups/stews, Dips Marinades, Salad dressings Infused oils, Aioli's Italian/Asian/African dishes European dishes South/Central American dishes	Black garlic Garlic powder Garlic salt Garlic flakes Granulated garlic Allium <i>sativum</i>	Shallot White onion Chili powder Cumin Celery Fennel
Ginger	Turmeric Arrowroot Cardamom	Teas, Candies, Ginger ale/beer Chinese/Japanese/Korean dishes Vietnamese/Indian dishes Baked goods/desserts	Ginger root	Allspice, Cinnamon, Lemon Nutmeg
Hops		Beer Herbal teas, Soft drinks	Hallertau, Spelt Zatec Noble hop	Yarrow, Mugwort Juniper berries, Tea, Heather
Mustard	Arugula, Broccoli, Bok Choy, Brussel sprouts, Cabbage Cardone, Cauliflower Chinese cabbage, Collards Colza shoots, Curley cress Daikon, Horseradish Kale, Kohlrabi Mustard greens, Radish Rape, Rutabaga Sea collards, Turnip Upland greens, Watercress	Prepared mustard Mustard oil Marinades Salad dressings Mustard greens Pickles Northern Indian dishes	Black mustard Brown Indian mustard White mustard	Horseradish Wasabi White vinegar Egg yolk Hummus
Oregano	Basil, Horehound Marjoram, Mint Peppermint, Rosemary Sage, Savory Spearmint, Thyme Lavender oil, Apple mint Chia seed, Lemon balm	Pasta sauces Casseroles Turkish dishes Italian dishes Greek dishes Lebanese dishes	Wild marjoram	Sage Thyme Basil
Paprika	Eggplant, Pepino, Tomato Chili/Bell/Sweet peppers Cayenne/Banana peppers Pimento, Potato, Tobacco, Tomatillo, Capsicum	Spanish dishes Hungarian dishes Rices Soups/stews Goulash, Sausages	Pimento	Ancho powder Chipotle powder
Pepper, Black Dried-unripe fruit	Peppercorns White pepper: Dried, ripe fruit	Dressings, Marinades, Dips Most restaurant prepared foods	Poivre Noir, Piper nigrum, Maricha, Gulmirch,	Ground papaya seeds, Green peppercorns Nutmeg
Pepper, Chili	Pepino, Pimento, Potato Banana/Sweet peppers Bell/Cayenne peppers Tobacco, Tomatillo Tomato, Capsicum Eggplant, Paprika	Arrabiata/Puttanesca sauce, Paprikash, Curry, Siracha Kung pao chicken, Som tam Mole poblano, Nam phrik Paprykarz szczeciński Hot sauce, Harissa, Chili oil	Chile pepper Many types	Curry powder Cumin Ginger Mustard powder Horseradish
Peppermint	Basil, Horehound, Marjoram, Mint, Oregano, Rosemary Sage, Savory, Spearmint, Thyme, Lavender oil, Apple mint, Chia seed, Lemon balm	Peppermint extract/oil Crème de menthe Peppermint schnapps Candies, Teas, Ice cream Chewing gum, Toothpaste	Mentha, Corn mint, Water mint	Vanilla extract
Rosemary	Basil, Horehound Marjoram, Mint Peppermint, Oregano Sage, Savory, Spearmint Thyme, Lavender oil Apple mint, Chia seed	Prepared stuffing Roasted meats Italian dishes Teas Soups/stews	Anthos	Oregano, Basil Savory, Tarragon Thyme, Sage Lemon verbena
Turmeric	Ginger Cardamom Arrowroot	Curries, Mustards, Gelatins Indian/Thai/Vietnamese dishes Canned beverages, Baked goods Dairy products, Ice cream Yogurt, Yellow cakes Orange juice, Biscuits Popcorn, Prepared sauces	Indian saffron	Ginger Saffron Annatto extract Cumin Curry powder
Vanilla		Baked goods/desserts Ice cream, Yogurt, Milks	Vanilla- bean/paste/extract/sugar	Maple syrup, Almond extract Rum, Brandy

VEGETABLES

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Artichoke	Absinthe, Calomel, Celtuce Jerusalem artichoke Chicory, Dandelion Endive, Escarole Lettuce, Oyster plant Salsify, Sesame seeds/oil Sunflower seeds/oil Vermouth, Ragweed Tarragon, Chamomile Safflower	Artichoke flour Tapenades Italian dishes Herbal teas	Globe artichokes	Hearts of palm Avocado Jerusalem artichokes
Asparagus		Soups/stews, Pickle mixes Asian dishes	Garden asparagus Asparagus officinalis	Leeks Broccoli
Beets	Amaranth, Chard Spinach, Sugar beet Quinoa, Tampala Lambs quarters, Thistle	Borscht, Pickled beets, roasted, salads, soups	Beetroot Candy beets Goosefoot	Golden beets Radish Tomatoes Red cabbage
Broccoli	Arugula, Cauliflower Green cabbage, Kale Brussel sprouts Bok Choy Collard greens Chinese cabbage Curley cress, Daikon Horseradish, Kohlrabi Mustard greens/seeds Radish, Rape Rutabaga, Sea collards Turnip, Watercress	Chinese/Japanese dishes Casseroles/gratins Slaw type salads	NA	Cauliflower Green cabbage
Cabbage	Arugula, Cauliflower Green cabbage, Kale Brussel sprouts Bok Choy Collard greens Chinese cabbage Curley cress, Daikon Horseradish, Kohlrabi Mustard greens/seeds Radish, Rape Rutabaga, Sea collards Turnip, Watercress	Coleslaw Sauerkraut Kimchi Golabki (Stuffed cabbage) Bubble and squeak Pierogi	Green cabbage Purple/red cabbage White cabbage	Kale Arugula Watercress Endive Brussel sprouts Bok Choy
Carob	Alfalfa/Alfalfa sprouts Fava, Lima, Mung beans Pinto, Navy, String beans Kidney/Green beans Green/Black eyed peas Carob syrup, Chickpea Fenugreek, Gum acacia Gum tragacanth Jicama, Kudzu Lentil, Licorice Peanuts/Peanut oil Red clover, Senna Soybeans, Soy lecithin Soy grits/flour/milk oil Tamarind, Tonka bean	Baked goods Juices	St. Johns Bread Locust bean Johannisbrotbaum Alfarroberia Garrofer	Chocolate Cocoa powder
Carrot	Celery, Parsnip, Parsley Cumin, Dill, Fennel, Anise Caraway, Celeriac, Chervil Coriander, Angelica Celery seed	Baked goods, Soups, Salads Stir-fry's Indian/Cajun/creole dishes	Zanahoria (Spanish)	Sweet potato, Yams Pumpkin, Squash, Parsnip
Cauliflower	Broccoli, Green cabbage Brussel sprouts, Arugula Kale, Bok Choy Collard greens Chinese cabbage Curley cress, Daikon Horseradish, Kale, Kohlrabi Mustard greens/seeds Radish, Rape, Rutabaga Sea collards, Turnip Watercress	Indian dishes Soups	Chou fleur	Broccoli Green cabbage

VEGETABLES CONT'D

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Celery	Anise, Angelica, Caraway Carrots, Celeriac Celery seed, Chervil Coriander, Cumin,Dill, Fennel Parsnip, Parsley	Soups Cajun/creole dishes Bloody Mary cocktails Old bay seasoning	Pascal celery	Anise, Bell pepper, Cucumber, Fennel Jicama, Water chestnuts, Zucchini
Collard Greens	Arugula, Bok Choy Broccoli, Brussel sprouts Cabbage, Cauliflower Chinese cabbage, Curley cress Daikon, Horseradish Kale, Kohlrabi Mustard greens/seeds Radish, Rape, Rutabaga Sea collards, Turnip Watercress	Southern style dishes Soups	Chard	Beet greens, Cabbage, Dandelion greens Kale, Mustard greens
Corn/ Maize	Bamboo, Barley Brown cane sugar Oat, Malt, Millet, Rice Rice (wild), Rye Sorghum, Wheat	Tinned sweetcorn, Corn syrup Corn on the cob, Cornflakes Corn flour/oil, Corn crackers Popcorn, Sweetcorn relish, May contain corn syrup: Canned/dried fruit Ice cream, Evaporated milk Fruit dessert, Instant coffee Sweeteners: Corn Sugar, Golden syrup Treachle, High fructose corn syrup , Malt syrup + malt extract Sucrose labeled "from corn"	Maize Corn starch Corn meal Polenta Gruel/porridge	Barley, Buckwheat, Millet, Oats Potatoes, Quinoa, Rice, Rice (wild) Rye, Spelt, Sweet potatoes Tapioca, Wheat
Cucumber	Cantaloupe, Casaba, Crenshaw Gherkin, Melon-Honey Dew/ Persian melon, Pumpkin Squash-Acorn/ Boston marrow/ Buttercup/Butternut Caserta/ Cocozele/Crookneck/ Straight neck Hubbard/Pattypan/Spaghetti, Zucchini, Watermelon	Pickles, Prepared dips Salads, Salsas, Sushi	Pepino	Celery, Jicama, Zucchini
Lettuce (Iceberg)	Absinthe, Artichoke, Calomel Celtuce, Chamomile, Chicory Dandelion, Endive, Escarole Jerusalem artichoke Oyster plant, Ragweed, Salsify Safflower, Sesame seeds/oil Sunflower seeds/oil Tarragon, Vermouth	Salads	Butter head, Crisp head, Celtuce, Loose leaf, Romaine	Arugula, Kale, Spinach, Swiss chard
Pea, Chick	Alfalfa/Alfalfa sprouts Beans-Fava/Kidney Green/ Lima/Mung/ Navy/ Pinto/String/Tonka Carob/Carob syrup, Fenugreek Gum acacia, Gum tragacanth Jicama, Kudzu, Lentil, Licorice, Pea-Green/Black eyed, Peanuts/Peanut oil, Red clover Senna, Soybeans Soy-Flour/Grits/Lecithin/ Oil/Milk, Tamarind	Hummus Falafel Indian dishes Middle Eastern dishes Salads Stews/soups	Bean- Bengal/Garbanzo, Cece, Ceci, Chana	Bean-Butter/Cannellini, Great Northern, Edamame, Lentils
Pea, Green	Alfalfa/Alfalfa sprouts Beans-Fava/Kidney Green/ Lima/Mung/Navy/Pinto/ String/Tonka Carob/Carob syrup, Fenugreek Gum acacia, Gum tragacanth Jicama, Kudzu, Lentil, Licorice, Pea-Green/Black eyed, Peanuts/Peanut oil, Red clover Senna, Soybeans Soy-Flour/Grits/Lecithin/ Milk/Oil, Tamarind	Chinese/Indian dishes, Soups/stews	Field Pea, Garden Pea, Guisantes (Spanish)	Lentils Lima beans

VEGETABLES CONT'D

Food	Possible Cross Reactivity	Where to find it	Other Terms	Alternatives/Substitutes
Pepper, Green	Capsicum, Eggplant, Pepper-Banana/Cherry/Chili/Cayenne/Red/ Sweet/Yellow, Paprika, Pepino, Pimento, Potato's, Tabasco, Tobacco, Tomatillo, Tomatoes	Salads, Soups, Stuffed peppers Chinese/Italian dishes	Bell pepper	Poblano pepper Mushrooms Celery Asparagus Zucchini
Potato, Sweet	Jicama, Yam	Casseroles, Chips Desserts (Sweet potato pie) Fries, Soups/stews	Kumara	Squash-Acorn/Butternut squash, Carrot, Pumpkin
Potato, White (Solanum)	Eggplant, Melon pear Peppers-Bell/Sweet, Paprika, Pimento, Tobacco, Tomatillo, Tomato	Chowders, Gratin, Pancakes Salads, Soups/stews Vodka	Several types: Fabula, Russert, Viking, Yukon Gold, Long/Round white, Round Red	Cassava, Cauliflower, Celery root, Jicama, Parsnip, Squash, Sweet potatoes
Pumpkin	Cantaloupe, Casaba, Crenshaw Cucumber, Gherkin Melon-Honey Dew/ Persian/Watermelon Squash-Acorn/Boston Marrow/ Buttercup/Butternut squash/ Caserta/Cocozelle/Crookneck/ Hubbard/Pattypan/Spaghetti/ Straight neck, Zucchini	Baked goods, Pumpkin seeds/seed oil Soups/stews	Winter squash	Squash-Butternut, Potato-Sweet, Yams
Spinach	Amaranth, Beetroot, Chard Lamb's quarters, Quinoa, Sugar beet, Tampala	Casseroles, Dips, Quiches Salads, Soups/stews	Types: Savoy, Flat-leaf, Semi-Savoy	Arugula, Collard greens, Escarole, Kale Lettuce-Romaine, Swiss chard
Squash, Butternut	Cantaloupe, Casaba, Crenshaw Cucumber, Gherkin Melon-Honey Dew/ Persian/Watermelon Squash-Acorn/Boston Marrow/ Buttercup/Caserta/Cocozelle/ Crookneck/Hubbard/Pattypan/ Spaghetti/Straight neck, Zucchini	Salads Casseroles, Soups/stews	Several types	Pumpkin, Sweet Potato, Yam
Tomato (Solanum)	Eggplant, Melon pear, Paprika Peppers-Bell/Sweet, Pimento Potato, Tobacco, Tomatillo	Italian dishes, Juice, Ketchup, Marinades, Pasta sauce Salads, Salsa, Soups/stews	Many types	Nomato barbeque sauce, Nomato ketchup, Nomato sauce, Radish, Red pepper (fresh/roasted), Watermelon
Zucchini	Cantaloupe, Casaba, Crenshaw Cucumber, Gherkin Melon-Honey Dew/ Persian/Watermelon Squash-Acorn/Boston Marrow/ Buttercup/Butternut squash/ Caserta/Cocozelle/Crookneck/ Hubbard/Pattypan/Spaghetti/ Straight neck, Zucchini	Baked goods/breads Fiori di zucca Ratatouille, Soups	Squash	Celery, Cucumber, Eggplant, Jicama, Squash-Yellow Summer