

2012 Lecture Series

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May 11, 2012

Food Allergies vs Intolerance and the Inflammation it Stirs up

Today's lecture is to review food **Allergies** versus **Intolerance**. A story of how some foods can stir up **inflammation**, which predisposes the majority of major illness such as Cardiovascular disease, Autoimmune disease, and Cancer. Food intolerances may also flare other underlying predispositions to common everyday ailments such as Acne, Irritable Bowel Syndrome, Seasonal Allergies, recurrent Sinusitis, recurrent Ear infections, Migraines, Joint pain, and Fatigue. During this lecture we will also discuss in more detail, one of the more common culprits of inflammation-Wheat/Gluten!

Food, while clearly satisfying and enjoyable, is more importantly our source of energy that fuels all that we do. Our bodies are amazingly adaptable at utilizing the fuel it is given, but there are definite differences in the quality of foods and efficiency of which our bodies function run on these fuels without disease. Food in excess leads to obesity, and poor quality leads to disruption of hormonal balance, lack of essential nutrients, inflammation, and disease. We have such a variety of foods now readily available year around thanks to commerce and manipulation of our food sources and production. This is in some ways a luxury, but may also be argued an evolutionary disadvantage. In the past our ancestors had it easier to make good choices. Food sources were locally grown or caught and required energy expenditure (exercise) to acquire and seasonal variability helped to promote a constantly varied diet. In our current culture we have excess cheap grain crops available and access to year around availability of most produce, which is thought to play a role in increasing food allergies and intolerance.

Food Allergy vs. Intolerance

A food **allergy** occurs when your body's immune system mistakenly thinks that a harmless substance (meaning whatever food you happen to be eating), such as cows milk or soy protein, is a threat. In response, the body creates and flags these foods with IgE antibodies releasing a cascade of inflammatory mediators and histamines. These mediators trigger allergic reactions, most commonly seen in the respiratory system or gastrointestinal tract. Symptoms of a food allergy can range from mild to severe, and the amount of food necessary to trigger a reaction varies from person to person. Symptoms of a food allergy may include: rash or hives, nausea/vomiting, stomach pain/cramping, diarrhea, itchy skin, shortness of breath, chest pain, swelling of the airways, anaphylaxis. Typical food allergies include Dairy, Eggs, Wheat, Soy, Peanuts, Tree Nuts, and Fish. An allergic reaction is typically fairly quick within minutes to an hour, whereas intolerance may not present for hours to days later. The true prevalence of food allergy is only about 2% of the adult population. In children, the incidence is higher at 3-7% although the majority of children outgrow food allergies by the time they start school.

Intolerance is typically when your digestive system has trouble processing foods that you've ingested. Food intolerance, on the other hand, is a broader term encompassing all adverse food reactions. A food sensitivity or intolerance is a more generic term, comprehensive of any adverse food reaction, that can be immune-mediated or non immune-mediated. For instance, some people react to the tyramine present in cheeses. This is due to release of histamine, and is not antibody mediated. Lactose intolerance is another common problem caused by the lack of an enzyme that enables the body to digest lactose, a sugar present in milk. These distinctions between the mechanisms of food intolerance are however of little consequence, because the symptoms are often similar and the treatment is elimination.

Symptoms of food intolerance include: headaches, irritable bowel, abdominal pain/cramping, gas/bloating, heartburn, headaches, achy joints, fatigue, fibromyalgia, recurrent sinus/ear infections, ADHD, irritability/anxiety, acne. Common food intolerances include: **Lactose:** This is a sugar in cow's milk that requires the enzyme lactase to be broken down into simple sugars for absorption in the gastrointestinal tract. Estimated to affect 10-15% Northern European, and 80-90% African American. **Sucrose or maltose:** Both are sugars requiring enzymes for digestion into simple sugars for absorption. **Histamine and tyramine:** These are substances created in the fermentation process in aged cheeses, processed meats, beer, wine, vinegars, and soy sauce. They naturally occur in some foods as well. **Salicylate:** This is a salt contained in some foods and is used to make aspirin. **Tartrazine:** This is an artificial food color used in food. **Benzoates, butylhydroxyanisol (BHA), butylhydroxytoluene (BHT), sulfites:** These are preservatives added to foods. **Monosodium glutamate (MSG):** This is a naturally occurring or added flavor enhancer in foods. **Other food dyes:** These are color additives used in food. **Gluten:** This is a protein found in wheat, rye, barley and oats, although the role of the latter is controversial and is currently the subject of research. We will discuss this further in the next section.

How can you tell the difference between a food allergy and intolerance? Food allergies can be triggered by even a small amount of the food and occur every time the food is consumed. People with food allergies are generally advised to avoid the offending foods completely. On the other hand, food intolerances often are dose related. People with food intolerance may not have symptoms unless they eat a large portion of the food or eat the food frequently. For example, a person with lactose intolerance may be able to drink milk in coffee or a single glass of milk, but becomes sick if he or she drinks several glasses of milk. Most food intolerances are found through trial and error to determine which food or foods cause symptoms. Keeping a food diary to record what you eat and when you get symptoms, can be helpful to locate trends. Another way to identify problem foods is to go on an elimination diet such as 'whole 30'. This involves completely eliminating any suspect foods from your diet until you are symptom-free. You

then begin to reintroduce the foods, one at a time. This can help you pinpoint, which foods cause symptoms.

What is leaky gut syndrome?

When the intestinal lining becomes damaged, it can let partially digested proteins into the blood stream. The body does not recognize these foreign proteins and assumes they are invaders. It therefore sends out an immune response, attacking the protein molecules. After several exposures, the body quickly recognizes that particular food foreign and potentially dangerous and in response mounts an attack. This is how leaky gut can lead to food allergies. Leaky gut syndrome can also cause a constant state of inflammation and immune up rise that can lead to other health problems, such as arthritis, eczema, irritable bowel syndrome, and many believe fibromyalgia.

How do you get leaky gut syndrome?

Being our first line of defense against many things trying to enter our bodies, the intestinal lining is well designed. However, it is tricky business, as it is supposed to let nutrients through and shield from harmful invaders or toxic substances. Leaky Gut Syndromes are usually provoked by exposure to substances that damage the integrity of the intestinal mucosa, disrupting the desmosomes which are the glue that bind the cells together and increasing passive absorption or leakage between cells bypassing our built in defenses.

To breach the gut defenses, it usually takes a number of different traumas over a period of time to compromise the intestinal lining to the extent that we develop a leaky gut. Bacteria, fungi, yeast, such as candida, and other parasites can all become overwhelming without checks and balances that maintain a healthy balance among symbiotic organisms and damage the lining. Many drugs can cause harm as well, such as aspirin, ibuprofen, and other pain medications. Antibiotics, indirectly can cause it, by killing the beneficial bacteria in the gut, which leaves a blank slate and allows harmful bacteria, and fungi to flourish and fill in the gaps. Anything that causes inflammation of the intestines can also damage the lining.

Compromised intestinal barrier function can also cause disease directly by increased permeability. This stimulates a classic hypersensitivity response to foods and to components of the normal gut flora such as bacterial endotoxins, cell wall polymers, and dietary gluten. This response can cause "non-specific" activation of inflammatory pathways mediated by complement and cytokines rather than antibodies which are much more "specific" and more easily measured. If you have food allergies, particularly if you developed them later in life and are allergic to more than one food, chances are you also have leaky gut syndrome. If you can heal your leaky gut then you may be able to overcome many of your allergies as well.

Grains, Gluten, and Celiac Disease

Grains were engineered to feed the masses and are relatively new foods to humans in our long history of existence (~0.4% of our existence). Our guts thus have not had nearly as much time to evolve and fully adapt to efficient use of this fuel. Generally speaking, if you have to heavily process a food to make it edible, than it was likely not made by nature for us to consume. Grains have to be processed and cooked to break down their thick shells. These shells built by nature to withstand the gut and pass through the gut undigested to fertilize distant soils. Some people appear to tolerate consumption without obvious ill effect, but many do have real consequences although albeit subtle and often disguised.

Several recent studies show gluten intolerance prevalence estimated between 30-70% in the general population. For some people this manifests as IBS or constipation, for others achy joints or fatigue, but often, vague symptoms that people learn to live with and ignore.

Celiac disease is an extreme adverse reaction to gluten that leads to sloughing of the gut lining and more severe symptoms. It is estimated that currently we are only diagnosing 25% of true Celiac disease, 75% living their lives undiagnosed. People with Celiac disease have an autoimmune reaction in the small intestine. The complex proteins (Gluten/Gliadin) found in wheat, rye, and barley trigger the immune response that attacks the cells lining the small intestine causing sloughing and decreased functional surface area for nutrient absorption. This reaction also creates inflammation and a cascade of reactions that can lead to other autoimmune disorders, osteoporosis, infertility, neurologic conditions, and cancer. Scientist at the University of Maryland have evidence that gluten sensitivity is indeed different from Celiac disease on the molecular level and in the response it elicits from the immune system. This research demonstrates that gluten sensitivity and Celiac disease are part of a spectrum of gluten disorders. Isolating specific biomarkers in the immune response of people with gluten sensitivity could lead to diagnostic tools to help identify this condition with more objectivity.

Grain is a big business in this country. We see commercials preaching heart health, and seals of approval on packaging promoting in the minds of the public health benefits of grain. Fiber does help to reduce cholesterol, cardiovascular disease, and diseases such as diverticulosis. The only benefit from whole grains is the fiber content. Grains lack micro/macronutrients, minerals, antioxidants, and in fact some new evidence suggests components referred to as 'anti-nutrients' that may leach minerals from the other foods we consume with grains. Grains are dense in empty carbohydrates and stimulate insulin and in excess can lead to diabetes an overwhelming epidemic in our society. Grain is not nutrient dense as are vegetables that also happen to be rich in fiber and confer all the same benefits and more. Grains are simple carbohydrates that are rapidly broken down to sugars in our blood and in turn trigger insulin secretion.

Insulin exposure in excess contributes to insulin resistance, metabolic syndrome, and type II diabetes. So even if you are not allergic or intolerant to grains, you would be wise in avoiding these relatively nutrient void and carbohydrate heavy foods.

Increasing Incidence of Food Allergies

There are many theories to explain why we are experiencing higher incidence of food allergies. The 'hygiene theory' of disease, suggests that children are not exposed to enough dirt and bacteria anymore, and therefore do not build up a normal immunity to harmless substances. So when they are exposed, their immune system overreacts and they develop an allergy. In third world countries where parasitic infections are still commonplace, allergies also interestingly appear to be less common. This association between GI parasites and our first line of defense, our gut immunity seems to play a large role in assisting our immune function.

It also follows that the symbiotic relationship between our healthy gut flora and our gut immunity has changed as well. Less children are breast fed, and do not inherit healthy flora and immunity from their mothers. Children born via C-section do not pick up the healthy flora from the birth canal to populate the infants gut and these infants appear to have higher incidence of allergies, eczema, and asthma later in life. Children who undergo numerous courses of antibiotics also have a compromised natural flora, as it takes on average 3 months to replenish our gut flora after a course of antibiotics. There are several theories that the lack of healthy balance between our gut and natural flora may weaken our gut defenses and cause sensitization.

The lack of seasonality of local produce, with constant availability of foods that in the past were only available for limited seasons, also has been proposed to contribute to increased food sensitization. We are also now becoming more knowledgeable and aware of food allergies, thus more are recognized whereas in the past many likely went undiagnosed.

Inflammation

Inflammation is the primary outcome and consequence of food allergies and intolerance. Aside from the symptoms that affect our quality of life, it is the inflammation that takes the silent long-term toll on our health. Much of Western illness is fuelled not only by inflammation but also a sedentary lifestyle, and hormonal imbalance. Hormones are held in delicate balance and are influenced intimately by our lifestyles—by diet, stress, activity level, weight, and sleep. Our diets in turn influence our weight, cholesterol, inflammation, and hormonal balance. These factors are all intertwined and imposing to varying degrees depending on our genetic foundation. If you can afford to choose the more nutrient dense and quality food option, it will be an investment that will pay back in dividends with improved health outcomes in your future.