



The Hoffman Centre for Integrative Medicine

Celiac Disease, Gluten Sensitivity and Gluten Testing Explained

Patient Handout

Description

Wheat Classification:

- Wheats (*Triticum* spp) are members of the cereal grass family (Gramineae). Two wheat species, common (*Triticum aestivum* L.) and durum wheat (*T. turgidum* L. var. durum), are the two major cultivated species. Common or bread wheat comes in two forms – soft and hard – according to its protein content. Hard wheat has high protein content (10-17%) and soft wheat low-protein content (6-10%).
- Gluten, one of the major wheat proteins, has the high elasticity needed for bread making. Hard wheat gives flour with a high gluten content and is good for bread making and grows best in drier areas. Soft wheat is used in pastries, cakes and biscuits and grows in wetter regions. Durum wheat, although high in gluten, does not make good bread and is used in making pasta. About 80% of durum wheat is grown in the Middle East and North Africa region.

Hybridization and GM Wheat:

- There is a big difference between a hybrid and a GM wheat. When a plant is hybridized, the basic plant DNA is not mixed with the DNA of another, unrelated plant species or the DNA of animals or bacteria--all of which is happening with genetic modification/engineering (GM/GE). Selection and hybridization of plants has been going on since the dawn of agriculture. Most of the plant foods we consume everyday are hybridized. Hybridization typically occurs through selection of desirable and inheritable characteristics. In the case of wheat, high-gluten strains have been favored leading to modern wheat being much higher in gluten than wild, nonhybridized strains (e.g. einkorn wheat).
- The majority of the wheat in the US is hard-wheat (high-gluten), and as mentioned above, it has been further bred to have even higher levels of gluten. The idea was to make more connected baked goods and increase the protein content. Success! The problem that many in naturopathic/functional/alternative/integrative medicine are suspecting is that higher levels of gluten are generally more inflammatory, and the inflammation begets leaky gut which lets more of the high-gluten into circulation and causes all the associated problems with greater alacrity than low gluten wheat would. It really does seem to hold water because many patients feel a lot better when they restrict or avoid wheat/gluten.
- On the question of GE/GM wheat. I don't (yet) have reason to think that GE/GM was a problem regarding gluten. However, on May 30, the USDA announced that it was investigating the spread of GE wheat into the world. The careless fools thought it was a good idea to field test GE wheat. This was Monsanto's Glyphosphate (Roundup) resistant wheat, and it appears to be spreading in 16 states. http://www.aphis.usda.gov/newsroom/2013/05/ge_wheat_detection.shtml
- There have been many other GE/GM "advances" in wheat (pest, fungus, viral resistance, etc.), and the particular advances in US wheat may well be what makes a difference. I don't think that the bacteria, viral, tomato, (or penguin, or god knows what other borrowed DNA they are haphazardly plugging into the wheat genes) genes/proteins are the problem with GM/GE foods so much as the *identical* nature of the gluten and other proteins.
- Here is my personal suspicion: beyond the paleolithic camp's compelling notions that grains are simply not a natural staple food for hominids, by their very "nature" GE/GM foods lack the natural variability that might give our mammalian GI tracts just enough room immunologically to have some predictable degree of peaceful tolerance.¹

Gluten Testing:

- Not all gluten sensitivity testing is the same. The gluten protein is like a tree with branches and unless you check for immune responses with all the different branches of the tree you may not have a complete gluten sensitivity evaluation. The protein structure of gluten is actually made of a sticky portion called glutenin and a protein structure called gliadin.

Gliadin:

- Gliadin is further broken down into alpha, omega, and gamma protein fractions. The problem with most laboratories is that they do not test all these different branches of gluten. They only test the alpha branch of gluten that is most commonly associated with Celiac Disease.
- Even worse they do not report that in the test results. They reports usually state “gliadin” antibody, but it does not specify that it is only the alpha branch. This means most people are having incomplete gluten sensitivity testing and may not be diagnosed properly. Researchers have shown that unless all the branches of the gluten protein are tested then gluten sensitivity can be missed. [ii] This happens all the time. A patient is screened with an isolated alpha gliadin test and has no reaction they assume they can eat gluten and further deteriorate. They finally get the other branches of gluten tested and they should severe gluten sensitivity reactions.

Glutenin:

- The other problem with gliadin sensitivity testing it is only part of the gluten structure and gluten is made up of gliadin with its various branches and glutenin which is the sticky portion of the gluten structure. Most labs do not test glutenin because it was thought not to be an immune reactive portion of wheat, but that is been disproven.[iii] Many people will severe reactions to the glutenin part of wheat but will have a normal test for the basic gliadin antibody.

Deaminated Gliadin:

- Besides adequate testing requiring all the different branches of gliadin and glutenin to evaluate entire protein structure of gluten immune responses to gluten can be only to the food processed portion of gluten called deamidated gliadin. In these cases a patient will not show abnormal responses to gluten or gliadins, but only show an immune response to deamidated gliadin. Remember demaidation of gliadin is the product of acid or enzymatic treatment of gluten used the food-processing industry. This is accomplished because gliadins are soluble in alcohol and cannot be mixed with other foods (like milk) without changing the foods qualities. However, deamidated gliadin is soluble in water and much easier to combine with foods in the food processing industry. The bad news is that there is a severe immune response to the processed deamidated gliadin.[iv] Many people will never test for the conventional gliadin antibody test but have profound immune reactions to deamidated gliadin. Gluten antibody testing conducted today by most labs only capture part of the picture unless all the various branches of gliadin (alpha, omega, and gamma) as well as the other portion of gluten called glutenin, and the processed protein of gliadin called deamidated gluten.
- This may seem like a lot of things, but unfortunately there is a few more things you need to know. Many people that react to wheat products, do not react to the protein portion of wheat called gluten, but they react to the lectin portion of wheat.

Lectins and Wheat Germ Agglutinins:

- Lectins are substances that attach sugars and carbohydrates together and in wheat they are called wheat germ agglutinin (WGA). Many people have immune reactions to the lectin portion of wheat and not to the protein portion of wheat. WGA is found in highest concentration in whole wheat or the sprouted form that is so popular with health enthusiasts.
- Unfortunately, WGA can pass through the blood-brain barrier and attach to the protective coating on nerves known as the myelin sheath and inhibit nerve growth factor that is a critical chemical for neuron growth and health.[v] Many people have WGA sensitivity and have it missed unless the have a complete panel that evaluates for these reactions wheat germ agglutinin (WGA). WGA is the lectin compound of wheat. . Many people have immune reactions to the lectin portion of wheat and not to the protein portion of wheat WGA is found in highest concentration in whole wheat or the sprouted form that is so popular with health enthusiasts. Many people have WGA sensitivity never have abnormal gluten protein antibodies, but the consumption of grains may create severe inflammatory and destructive responses to neurons.

Gluteomorphins- Opioids.

- Lastly, there is another gluten-brain issue related to opioid reactions generated by gluten that are different than gluten, glutinin, or wheat germ agglutinin immune responses.[vii] [viii] The immune response to grains may include immune responses to the neuroactive opioid peptides to gluten measured as antibodies to gluteomorphin and prodynorphin. Gluteomorphin is an opioid peptide that is formed during digestion of gluten. Prodynorphin is an opioid that is the basic building block of endorphins. If a person has elevated antibodies to these compounds they may have severe neurochemical reactions to gluten and also create what is called a “gluteomorphin withdrawal response”. This is a response that causes a patient to have significant reactions such as depression, mood swings, abnormal bowel activity when they go off gluten. It is similar to withdrawal that occurs when an individual goes off opioid stimulating drugs such as heroin. If this occurs the person must hang in there for a couple of weeks being gluten-free and deal with the withdrawal symptoms.

Transglutaminase:

- There is one last issue to discuss with gluten immune reactions and testing and that is the laboratory evaluation of transglutaminase. Transglutaminases are enzymes found within the body and if someone has immune reactions to transglutaminase it indicates that a person has autoimmunity. There are three major transglutaminases TG2, TG3, and TG6.
- TG2 is found in the intestinal tract and elevated TG2 has a high degree of correlation with abnormal intestinal biopsy findings of intestinal lining destruction called villous atrophy.[ix]
- TG3 is found in the skin and associated with gluten triggered immune outbreaks.[x]
- TG6 is found in the nervous system and is associated with gluten triggered neurological destruction.[xi]
- The problem with labs today and transglutaminase testing is they only test TG2. As a matter of fact most labs only measure TG2 and list the test results as “transglutaminase” and never specify that it is only TG2 or intestinal. If you are a person has neurological concerns possibly from gluten you also need to have TG6 evaluated.

Summary:

So in summary a complete gluten screen should include alpha gliadin, omega gliadin, gamma gliadin, deamidated gliadin, gluteomorphin, prodynorphin, wheat germ agglutinin, transglutaminase-2, transglutaminase -3, and transglutaminase - 6. This is the panel I conduct in my patients and it has found countless overlooked issues with gluten sensitivity. This panel is only available by Cyrex Labs (cyrexlabs.com) and it is called the Wheat/Gluten Proteome Sensitivity and Autoimmunity Panel.²

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Reference

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