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Gluten Cross-Contamination is More Common Than We Realize. Are Digestive Enzymes Helpful?

This newsletter addresses two issues that should be of interest to most microscopic colitis patients:

- 1. The ubiquitous nature of gluten cross-contamination**
- 2. The effectiveness of enzymes designed to prevent gluten reactions**

Avoiding gluten is not as simple as most of us would like to believe.

Have you ever ordered a follow-up gluten antibody test after you've been meticulously avoiding gluten for a couple of years or more? And after the test result arrived, did you stare at it in disbelief, because it indicated that your antibody level was still much higher than you expected? That surprising turn of events seems to happen in most cases when a follow-up test is ordered. So what's going on here?

In a perfect world,

Celiac patients could cut gluten out of their diets, and promptly (and reliably) recover from celiac disease. In a perfect world, microscopic colitis (MC) patients could eliminate gluten and all of their other food sensitivities from their diets, and promptly (and reliably) recover from MC.

Unfortunately, it's not a perfect world,

and some of us seem to live in a less perfect world than others. In the world in which we live today, eliminating gluten from our diets is actually much more difficult than most of us realize. The sad truth is that even though we believe that we're doing everything humanly possible to keep gluten out of our diet, it somehow manages to sneak in, anyway. Consequently, the road to recovery from either

celiac disease, or MC, is often long and frustrating for many of us. And remission, once it's achieved, can be tenuous, and difficult to maintain. So how does gluten evade our radar? Fortunately, the answer to that question can be found in published research.

According to research data on the diets of celiac disease (CD) patients, reviewed by Wieser, Segura, Ruiz-Carnicer, Sousa, & Comino, 2021)¹,

. . . at least one-third of patients with CD are exposed to gluten, despite their best efforts at dietary modifications. It has been demonstrated that both natural and certified gluten-free foods can be heavily contaminated with gluten well above the commonly accepted threshold of 20 mg/kg. Moreover, meals from food services such as restaurants, workplaces, and schools remain a significant risk for inadvertent gluten exposure . . .

The critical factor is the total amount of gluten ingested per day.

Although the US Congress approved a 20 parts per million (ppm) (20mg/kg) upper limit for foods legally labeled as “gluten-free”, the researchers point out that an individual’s total daily intake of gluten should not exceed 10 mg. Obviously, the accumulated amount of gluten consumed in a day will depend upon the types of food, and the amounts of each of these foods, eaten.



Do the current U.S. gluten limits allowed on labels accomplish that goal?

According to the United States Department of Agriculture (USDA) records from 2011, Americans each ate an average of 1996 pounds that year, almost a ton. This amounts to about 5 1/2 pounds of food per day, which is about 2495 g. If all of that food contained the legal limit of 20 ppm (20mg/kg) of gluten, then the average individual would be consuming approximately 50 mg of gluten per day, five times the recommended limit ((2495 g x (20/1,000,000))*1,000 mg/g). Although we hope that all, or most of our food contains less than that, we don't know that for sure. And how can we be sure that some of it doesn't contain more than 20 ppm, in view of the research noted above? For most of us, it's relatively easy to see how, in certain cases where the diet is composed of certain types of food, that 10 mg limit could easily be exceeded.

Consider Australia's treatment of gluten-free labeling.

Australian labeling laws dictate that if a product is to be labeled as “gluten free”, it must have zero detectable gluten. Since the current reliable level of gluten detection is generally considered to be 3 ppm, (3 mg per kilogram) that implies that the legal gluten upper limit for a gluten-free label in Australia, is 3 ppm (3 mg per kilogram). Although this is an excellent policy for safeguarding the health of celiac patients, such strict limits tend to cause increased problems for processors. And unfortunately, similar to the problems encountered by China due to their “zero-tolerance” goal for Covid-19 cases, product recalls because of label violations are rather common, due to contamination or unlisted ingredients.

Supermarkets and their suppliers are in business to make a profit.

Shelf space in supermarkets is so competitive that manufacturers have to pay for it, and combined with the competitive nature of the grocery business, in general, a situation made worse by the current supply chain problems, consistently supplying quality products at a competitive price requires that many things must fall into place during the production process. The bottom line, which is rigidly enforced by the stockholders of these corporations, is “profitability trumps everything”, so it's not surprising that ingredient glitches might arise from time to time.

The FDA has relaxed the labeling laws due to the pandemic.

In May of 2020, the FDA issued a guidance proclamation that effectively relaxed the labeling laws to allow manufacturers to make minor ingredient substitutions without making label changes for ingredients that may be difficult to source during the Covid 19 pandemic. Theoretically, this shouldn't affect any labeling laws that are associated with the declaration of allergens, but it remains to be seen whether this will hold true in the generally relaxed current prevailing atmosphere.

And ingredient substitutions bring with them an increased risk that some of those substitutions will be cross contaminated with gluten, especially since they aren't as likely to be carefully screened for contamination due to time restraints, and in some cases, limited access to alternative options. For most consumers, those ingredient substitutions are usually irrelevant, but for those who have food sensitivities issues, or food allergies, ingredient changes, or cross-contamination, can have serious consequences.



But foods labeled as “gluten free” are normally not the primary problem.

The biggest problem, as pointed out by the researchers mentioned above, is foods that are normally gluten-free, and therefore are assumed to be safe, but contain amounts of gluten that exceed the legal limits for gluten. Foods in this category initially enter the

food chain naturally free of gluten, but during handling or processing, they become cross contaminated with gluten.

In the study cited above, 22 products containing grains, seeds, and flours that are naturally gluten-free, were purchased in the US and then tested twice for gluten contamination. 32% of the samples exceeded the 20 ppm (20 mg per kilogram) label limit. Notably, in another study, five of eight labeled breakfast cereals exceeded the label limit of 20 ppm (20 mg per kilogram). This degree of contamination is unacceptable for most of us, especially those of us who are still trying to achieve remission. The researchers pointed out that contaminated naturally gluten-free foods appear to be a greater risk (due to generally higher levels of contamination) than certified gluten-free products that are specifically labeled to meet the needs of celiac patients.

Is organic food, or food sold by health food stores safer?

We can only guess at the correct answer to this question, because research data are not available. Interestingly, though, compared with typical supermarket brands, the higher priced brands sold at health food stores are rarely recalled. Although this observation may simply be a coincidence due to the comparatively lower volume of organic sales volume compared with the volume of conventional product sales. Until actually disputed by specific research, though, it does appear that the higher priced brands might be safer for individuals who have food sensitivities or food allergies.



Do enzyme supplements that target gluten actually help?

There are now a number of commercial products claiming to degrade gluten (glutenases) and thereby reduce or eliminate the risk of intestinal damage for celiacs or anyone else who is sensitive to gluten, when exposed to gluten-contaminated meals, provided that the product is properly taken before or during the meal. Do they work? Although some users insist that they do, scientific testing proves that they're typically incapable of actually accomplishing the claims made on their labels.

In a study of those products, Krishnareddy, Stier, Recanati, Lebwohl, and Green, (2017), found that the 14 commercially available products that they investigated have not been demonstrated (by published proof) to be capable of degrading the toxic derivatives of gluten in the acidic environment of the human stomach.² Most of the efficacy claims are made based on testing of these products in a test tube environment at a neutral pH. However, their ability to digest the toxic gluten fractions are severely impaired in an acidic setting. That means they are ineffective at the pH levels normally found in the human stomach.

Note that this study did not involve the actual testing of these products. Instead, the researchers searched the literature for published proof of efficacy, and were unable to find any evidence of actual effectiveness of the products within the human digestive system. However, the study included numerous research articles, and their findings were noted. In one cited article, for example, Janssen and research associates actually tested five products and found that none of them were able to break down the immunogenic amino acid sequences known to trigger reactions when gluten is ingested (Janssen, et al., 2015)³. The researchers found that the products left the toxic sequences completely intact. The other articles cited reached a similar conclusion, that the claims made on the labels of the products tested were inaccurate, at best.

Note that gluten degradation must take place in the stomach, because if these toxic gluten fractions are not degraded before they reach the intestines (where the pH is raised to a near-normal level), attempting to degrade them at that point would be ineffective, because an immune system reaction against gluten would have already been initiated.

So how can the labels of these products make such lofty claims?

The answer is simple — The FDA is specifically prohibited by congressional law (Dietary Supplement Health and Education Act (DSHEA) of 1994) from regulating the introduction of supplements into the market (FDA, n.d.)⁴. So the manufacturers of these products

don't have to submit any evidence of effectiveness to the FDA.



But that's not the end of the story.

The previously discussed research study did not include the consideration of a product known as Tolerase G. This supplement is based on *Aspergillus niger* prolyl endoprotease (AN PEP). The enzyme was originally available in a product called Clarex, used by brewers to clarify beer (Bettenhausen, 2016, May 30)⁵. As beer is chilled, it develops a haze, as proteins fall out of solution. When added to beer fermentation tanks, along with yeast, the enzyme breaks down any proline protein residues. It is these

proline protein fractions that contain the immunogenic portions of the gluten molecule that trigger reactions among celiacs and MC patients.

Recently, a product known as GliadinX has been introduced in the US by a Dutch company, DSM, presumably the manufacturer of Clarex. Since the product is labeled as a food supplement, it's not regulated by the FDA, so proof of efficacy is not officially verified. But because it contains a relatively high level of AN-PEP (335 mg per capsule), and it's been proven to work better in an acidic environment, there certainly is at least a possibility that it might be effective against cross-contamination by gluten. Although we're not able to endorse this product at this point, since it hasn't had time to prove itself in the marketplace, we'll note that it's available, if anyone wishes to give it a try.

Summary

So what's the best way for MC patients to deal with this paradox?

We should do our own cooking, and avoid the use of commercially processed products as much as possible, especially when those products have more than a few ingredients. We should take our own food along, if we have to eat away from home. And if we find it necessary to eat in a restaurant, high-end restaurants are usually much safer choices than fast food restaurants. At fast food restaurants, according to research, breakfasts are usually safer than midday lunches, and lunches are usually safer than meals served later in the day. When on vacation trips, traveling is usually much safer if we can stay at a place with private kitchen facilities.

Enzyme supplements

Don't rely on enzyme supplements to counteract a gluten reaction if you choose to eat out. While some of them may help a little, none have been shown to be effective. And while AN-PEP based supplements, such as GliadinX might eventually prove to be helpful, at this point we can only conclude that they might help — the jury's still out.

References

1. Wieser, H., Segura, V., Ruiz-Carnicer, Á., Sousa, C. & Comino, I. (2021). Food Safety and Cross-Contamination of Gluten-Free Products: A Narrative Review. *Nutrients*, 13(7). Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8308338/>
2. Krishnareddy, S., Stier, K., Recanati, M., Lebwohl, B., & Green, P. H. R. (2017).

Commercially available glutenases: a potential hazard in coeliac disease. *Therapeutic Advances in Gastroenterology*, 10(6), 473-481. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5424869/>

3. Janssen, G., Christis, C., Kooy-Winkelaar, Y., Edens, L., Smith, D., van Veelen, P., & Koning, F. (2015). Ineffective degradation of immunogenic gluten epitopes by currently available digestive enzyme supplements. *PLoS One*, 10(6), e0128065. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/26030273/>

4. FDA (U.S. Food and Drug Administration). (n.d.). Questions and Answers on Dietary Supplements. Retrieved from <https://www.fda.gov/food/information-consumers-using-dietary-supplements/questions-and-answers-dietary-supplements>

5. Bettenhausen, C. (2016, May 30). What's gluten-reduced beer, and can celiac patients drink it? Retrieved from <https://cen.acs.org/articles/94/i22/s-stuff-gluten-reduced-beer.html>