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RESEARCH REVIEW

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ARE PROBLEMS CONSUMING GLUTEN REALLY GLYPHOSATE SENSITIVITY?

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Since the 1990's, rates of Celiac disease and gluten allergies have increased approximately 5-fold. This has correlated with the increased use of glyphosate and glyphosate GMO crops. In 2012, it was estimated that 127,000 tons of glyphosate were used in the U.S. and approximately 700,000 tons worldwide. The new practice of spraying crops with glyphosate before harvest or crop desiccation has become more common leading to an increase in pesticide residues specifically on wheat.

The cellular damage seen in Celiac disease is similar to the harm caused by glyphosate. They both show a significant disruption in the intestinal microbiome leading to a cascade of pathologic changes in the body. With the increasing incidence of both Celiac disease and use of glyphosate, it makes sense to examine whether there is a correlation between the two.

Research on fish exposed to glyphosate supports this correlation. Fish exposed to glyphosate develop digestive problems that are reminiscent of celiac disease (Senapati). Digestive enzymes in the intestine are decreased and the intestinal walls show disruption of the mucosal folds and the microvilli similar to Celiac disease. In addition, this study found the breakdown of complex proteins compromised leading to larger fragments of undigested proteins persisting in the GI tract. These proteins were found to induce inflammatory responses in the intestine similar to Celiac disease.

Glyphosate mechanism of action

Glyphosate (n-phosphonomethylglycine) is a chemical that suppresses the enzyme EPSP synthase involved in the synthesis of the aromatic amino acids tryptophan, tyrosine, and phenylalanine. By decreasing the activity of this enzyme, glyphosate disrupts the shikimate pathway, which exists in plants, fungi, and bacteria but not in animals. Because this pathway is absent in animals, the product was deemed to be safe for humans. The fault in this theory is that the ecosystem in our digestive tract is dependent on bacteria that are destroyed by glyphosate.

As we learn about the critical importance of a healthy microbiome for our immune system, it is easy to see why harming the bacteria in our digestive tract leads to profound consequences. Lactobacillus and Bifidobacteria are both critical bacteria in our microbiome. Glyphosate harms both of these probiotic bacteria. Clostridium species and salmonella are less affected, leading to increases in these organisms and subsequent dysbiosis. Soil based organisms are also harmed by glyphosate leading to gut dysbiosis in our livestock.

In the gastrointestinal system, glyphosate interferes with the breakdown of complex proteins by harming the actions of protease, lipase, and amylase. Larger fragments of proteins from wheat remain in the digestive system triggering an immune response leading to wheat allergies and in susceptible people, autoimmune antibodies to wheat.

The herbicide, glyphosate, also interferes with our Cytochrome P450 detoxification enzymes.

Impairment of these enzymes decreases our ability to remove harmful environment chemicals. These enzymes are also critical for activating vitamin D3, so it can be utilized by the body. Additionally, it is involved in bile acid production and supplying the critical nutrient sulfate throughout the body.

Nutritional deficiencies are another problem arising from glyphosate use. The chemical chelates the minerals iron, cobalt, molybdenum, and manganese from tissues. Since part of its mechanism of action is to decrease synthesis of aromatic amino acids, it also depletes these amino acids. Decreasing levels of tryptophan and tyrosine lead to lowering levels of methionine and selenomethione. Methionine is a critical component of the methylation pathway, meaning that a reduction of methionine has multiple negative consequences for metabolism. Ultimately, the disturbance in amino acids results in sulfate depletion in the body.

Celiac disease pathology

Classic Celiac Disease is characterized by symptoms of weight loss, diarrhea, poor growth in children, and fatigue. Chronic losses and malabsorption lead to anemia and nutrient deficiencies. Often patients exhibit signs of depression and skin rashes. Unexplained infertility can also be a result of Celiac Disease.

Evidence of dysbiosis or an abnormal shift in the microbiome exists in Celiac disease. Reduced levels of the beneficial bacteria Bifidobacteria and Lactobacillus are

present with an overgrowth of pathogenic gram-negative bacteria and Clostridium bacteria. Celiac often has other digestive issues such as non-alcoholic fatty liver disease, gall bladder dysfunction, pancreatitis, and eosinophilic esophagitis (EE). Many of these digestive issues can develop from impairment of the detoxification CYP enzymes leading to decreased bile acid flow. Reduction in bile flow causes a depletion in sulfate resulting in inflammation to multiple organs.

Conclusion

With the increasing incidence of Celiac and other food reactions we need to find ways to lessen the development of these issues. If we have an herbicide that is altering the bacteria in our microbiome contributing to these illnesses, we need to be aware of this impact so we can avoid exposure as much as possible. With our food supply, it appears that full avoidance is probably not possible but gives us another reason to eat organic and non-GMO foods.

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