

The Role of Lectins from Grains and Legumes in the MS Disease Process

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On October 3, our charity, Direct-MS (www.direct-ms.org), sponsored a public presentation by Dr. Loren Cordain of Colorado State University on the topic of “The Paleo Diet and Multiple Sclerosis”. Dr Cordain is a leading researcher in the field of the roles that various nutritional factors play in chronic diseases such as MS. He and I began to correspond in 1996, shortly after he came upon our rather primitive website on the role of nutritional factors in MS. Our website has grown over the past decade and now contains a lot of diverse information including some of Dr Cordain’s research articles. A webcast of Dr Cordain’s presentation is on the website (<http://www.direct-ms.org/presentations.html>) and I invite you to watch it in the comfort of your home. I also recommend going to Dr Cordain’s website at www.thepaleodiet.com. It contains a wealth of valuable information on nutrition and health.

In this column, I want to summarize a number of important points that Dr Cordain made in his presentation. Some of them were new to me and they are most important for understanding why it is essential to avoid eating gluten grains and legumes as well as a few other types of foods including tomatoes. His work has also put the concept of the role of a leaky gut in MS in a new context and this also has ramifications for understanding how potentially problematic food and bacterial-derived protein fragments can cross the intestinal barrier and engage the immune system. Dr Cordain’s presentation is quite technical but to me it is imperative to understand how various proteins derived from foods can be part of the MS disease process on a molecular level. This provides a solid, science-based rationale for WHY it is critical to avoid foods such as legumes and grains if one wants to keep the MS disease process well controlled.

Lectins are a group of proteins that are found in most types of plants and they discourage predation by being harmful to various types of insects and animals that eat plants. Lectins attach themselves to sugar molecules (oligosaccharides) on cells and it is this characteristic that defines them as a specific group of proteins. The good news is that most lectins are not harmful to humans. However, there are a few that are proving to be

problematic and these are the ones that attach themselves to tissue in the gut. Specific ones that do this are found in wheat (WGA), various legumes such as peanuts and soy (PNA, SBA) and tomatoes (TL). Further research may well identify more of these potentially harmful lectins.

To understand how these gut-binding lectins participate in the MS disease process one must understand the basic MS disease process. It is established that MS is driven by the activation of myelin-sensitive T cells in the blood. These immune cells then cross the blood-brain barrier to lead an immune attack on myelin, resulting in the loss of myelin and nerve axons. Such losses translate into the physical symptoms of MS. One big unknown in MS is how the myelin-sensitive T cells get continually activated so that the MS disease process keeps progressing. Dr Cordain's work provides a very reasonable and compelling answer to this fundamental question.

As discussed by Dr Cordain in his presentation, lectins from grains, legumes and tomatoes are important players in the activation of the myelin-sensitive T cells and they accomplish this in a number of ways. It is known that protein fragments derived from various foods such as milk and from gut bacteria can activate myelin-sensitive T cells through molecular mimicry. However, to accomplish this, the foreign protein fragments have to get across the intestinal barrier. One possible way for this to happen is by way of disrupted cell junctures of a "leaky gut". Dr Cordain demonstrated there was another way for the protein fragments to reach circulation and the immune system.

Research has revealed that various lectins can attach themselves to a specific receptor that is expressed on the gut wall (EGF receptor) and pass through the intestinal barrier by that means rather than through disrupted cell junctures. However, that is only part of the story. In the gut, the lectins also attach themselves to various protein fragments derived from foods and gut bacteria and they transport them across the intestinal barrier by means of the EGF receptor. Thus they act like a "Trojan Horse" by bringing the "enemy" past the protection of the gut wall.

Once the lectins and their passengers are across the gut barrier, the transported food and gut bacteria protein fragments have the potential to activate the myelin-sensitive T cells by way of molecular mimicry. Furthermore, some lectins such as tomato lectin also have the capacity to act as immune adjuvants. This means they greatly stimulate the immune system

such that the encounter with the lectin-transported proteins is much more likely to result in T cell activation. If that was not enough, the lectins also cause the upregulation of various proteins associated with the blood-brain barrier (adhesion molecules, MMPs). This action significantly facilitates the entry of the activated, myelin-sensitive T cells into the central nervous system where they lead the attack on myelin. We now have the answer to the question of what causes the frequent activation of myelin-sensitive T cells. It is the daily ingestion of lectin-containing grains and legumes along with other potentially problematic foods such as dairy.

Given all the scientific evidence that relates the action of lectins to MS, it would seem reasonable that persons with MS would want to avoid foods that contain such potentially harmful proteins. As discussed by Dr Cordain, we currently know that legumes, gluten grains and tomatoes can yield such lectins and these foods are best not eaten by anyone with MS. Other grains such as corn may also contain harmful lectins and it seems that rice is safest grain to eat. I would recommend that persons with MS stick with rice products for any grain consumption and that this be in moderation.

In regards to the leaky gut, this phenomenon also likely plays a role in MS by allowing harmful protein fragments to cross the intestinal barrier into circulation by way of disrupted cell junctures. It is important to employ strategies, such as avoidance of allergenic foods, to ensure the integrity of the gut barrier. However, even if one does not have a leaky gut, protein fragments can still get across the gut barrier if one is consuming legumes and/or gluten grains. Thus both strategies – healing a leaky gut and avoiding legumes and gluten grains- are essential to ensure that harmful protein fragments from foods and gut bacteria do not reach circulation and activate myelin-sensitive T cells. We all owe Dr Cordain a debt of thanks for pursuing this research and for taking the time from his busy schedule to make persons with MS aware of it.