

Thesis Part I - For Masters in Nutritional Science

The Role of Nutrition in Treating Celiac Disease

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Celiac disease is a genetically determined condition that results in the inflammation of the internal surface of the proximal small intestine when certain varieties of the protein gluten are consumed (See and Murray, 2006). Alicia (2008) clarifies that celiac disease is an autoimmune response to gluten. As many as 1 in 133 adults in the US have the disease (Alicia, 2008). In the UK this number increases to 1 in 100 (Gay, 2005). The disease is attributable to human leucocyte antigens (HLA), a huge complex of genes. Many of those at the

superlocus, particularly those antigens encoded by specific ones of these genes, are integrally related to an individual's immunity to disease. HLAs can even offer immunity against many devastating conditions. On the other hand, the presence of specific types of HLA antigens can result in a heightened likelihood of individuals developing such diseases as cancer, type I diabetes, ankylosing spondylitis, SLE (Systemic Lupus Erythematosus), Myasthenia Gravis, and celiac disease.

The long term impacts of celiac disease are diarrhea, weight loss, and anemia caused by poor digestion and poor absorption of the nutrients needed to sustain proper health. Although celiac disease cannot be cured, it can be controlled with the elimination of the causative glutens from the diet. Those with the disease, however, have to eliminate these glutens forever or their condition will flare up again.

Gluten, of course, is found in all grains. Those forms found in wheat, barley, and rye, however, are typically the culprit in aggravating celiac disease (See and Murray, 2006). These glutens are commonly thought of by cooks as the "glue" that holds bread dough together (Children's Digestive Health and Nutrition Foundation, 2006). Gluten also acts as part of the leavening that makes bread rise (Children's Digestive Health and Nutrition Foundation, 2006). While glutens are healthy for most humans, for those with celiac disease they are actually

considered toxic (Children's Digestive Health and Nutrition Foundation, 2006).

Celiac disease is something that an individual is born with. In many cases, however, it is not always diagnosed. Interestingly, those infants that have been fed only human breast milk have a much lower incidence of developing immune-mediated diseases such as celiac disease. Breast milk is believed to supply IgA and other immunocompetent cells which are lacking in infants intestinal tracts (Field, 2005). The result is the neutralization of toxins and an inhibition of bacterial infections (Field, 2005). Infant formulas may actually contribute to intestinal damage and decreased intestinal blood flow by acting as a substrate for bacteria that penetrate the bowel wall (Field, 2005).

The immunological benefits of human milk to the developing infant are just now beginning to be more fully understood. Just recently, in fact, we have witnessed significant advances in understanding the bioactive components of human milk as they relate to the strength of the immune systems of infants (Field, 2005). In a study involving infants between birth and one year of age, Field (2005) observes that breast milk serves as a communication vehicle "between the maternal immune system and the infant, a system actively directing and educating the immune, metabolic, and microflora systems within the infant,

while conferring multiple means of protection from pathogens” (p.1).

Because the human embryo is exposed to few antigens in utero it enters the world with a poorly developed immune system (Field, 2005). The mother, in comparison, already has a well developed immune system and can pass part of this immunity on to her child through breast feeding (Field, 2005). This immunity is passed on through a variety of subcomponents of the milk. These include specific subcomponents such as macrophages, neutrophils (to a degree anyway), and lymphocytes but they also include components such as antimicrobial factors and the nutritional benefits discussed above.

It is only when an infant with celiac disease is exposed to something other than his mother’s milk that he might begin to experience complications. Only then, however, will these complications present themselves if the food item contains glutens. Unfortunately for those with celiac disease, wheat, barley, and rye are found in a tremendous percentage of normal food items. They come in a variety of forms as well. The Children’s Digestive Health and Nutrition Foundation (2006), for example, clarifies that not only must the individual with celiac disease avoid barley in its whole form, they must avoid barley malt and extract as well. Wheat bran, wheat germ, and wheat starch must be avoided along with whole wheat and wheat flour.

Less familiar derivatives of wheat, bran, and rye include "bulgur, couscous, durum, einkorn, emmer, farina, faro, graham flour, kamut, matzo flour and meal, orzo, panko, sietan, semolina, spelt, triticale, and udon" (Children's Digestive Health and Nutrition Foundation, 2006). Even such things as vinegar have to be carefully considered before deciding that it is safe. While distilled vinegars are safe, malt vinegars are not (Children's Digestive Health and Nutrition Foundation, 2006)!

Obviously, those with celiac disease must be very careful when deciding whether to consume any type of bread or cereal. Even such food items as pizza, pasta, cake, pies, and cookies have a high probability of containing glutens from wheat, rye, or barley. On the other hand, there are alternatives that can be substituted in many of our food choices. Safe grains and starches include corn, buckwheat, rice, rice bran, and flax as well as nuts, beans, and well as nuts, beans and seeds (Children's Digestive Health and Nutrition Foundation, 2006). Flour can be made from these or they can be eaten in other dishes. The same can be said of arrowroot, amaranth, millet, and a product called montina (Children's Digestive Health and Nutrition Foundation, 2006). Interestingly, starches from potatoes can provide a safe substitute as well. Potatoes can even be used to make flour. Quino, sago, sorghum, soy (soya), tapioca, and teff are safe too (Children's Digestive Health and

Nutrition, 2006). Using such resources, even such favorites as pizza, pasta, and bagels can be made safe for those with celiac disease.

Another potential problem for those with celiac disease is oats. Oats too contain gluten but for most individuals with celiac disease oats are safe to eat. A problem could arise, however, if the oats have become contaminated with wheat gluten through the milling process (Children's Digestive Health and Nutrition Foundation, 2006). It is quite common in the industry, in fact, for one grain to be milled right after another with little or no attention to cleaning the machinery.

A critical step in shopping for food that is suitable for an individual with celiac disease is to read the label that accompanies this food. Thanks to the Food Allergen Labeling and Consumer Act, all food products that are produced and labeled after January 1, 2006 must indicate whether or not they contain eight of the most common food allergens. These labeling requirements pertain to wheat as well as to peanuts, eggs, shellfish, fish, soybeans, milk, and nuts (Children's Digestive Health and Nutrition Foundation, 2006). Unfortunately, as extensive as the requirements are, the Food Allergen Labeling and Consumer Act do not require manufacturers to include barley (malt), rye or oats in their allergen labeling (Children's Digestive Health and Nutrition Foundation, 2006). Those grains

and grain byproducts, if present, should however be listed in the ingredient list of the particular product. Be particularly careful when shopping for such things as lunch meat, imitation bacon, soup bases, stuffing, and marinades, and other sauces (Children's Digestive Health and Nutrition Foundation, 2006).

Another place to exercise particular caution when shopping for the celiac disease individual is when purchasing medicines. Both over-the-counter and prescription medicines can contain glutens that are harmful to those with celiac disease (Children's Digestive Health and Nutrition Foundation, 2006). Even such things as cosmetics and children's play dough can contain these glutens. While there is no through-the-skin transmission of glutens, there is a concern that they might be introduced into the digestive tract when food comes in contact with the gluten containing products either directly or indirectly. Indirect contact between food and bad glutens might occur, for example, if hands are not washed after using the products with the gluten (Children's Digestive Health and Nutrition Foundation, 2006).

As discouraging as shopping from the celiac disease diet may appear on first consideration, there is plenty that can be safely eaten. The produce aisle at the grocery store offers all sorts of fresh fruits and vegetables that do not contain harmful glutens. Dairy products are another safe option. These include

milk, ice cream, cream, butter, margarine, cottage cheese, sour cream, eggs, and cream cheese. Even most yogurts are safe to include in this diet. Just remember to always carefully check the labels.

The meat aisle offers plenty of variety for proteins. Fresh beef, poultry, and pork offer safe alternatives as do canned tuna and chicken. The basic diet formed by these products can be supplemented with aged cheese, white or brown rice, dried beans, lentils, and peas. Even most baked beans offer diversity for a celiac disease diet. Snacks can include corn chips, peanut butter, rice crackers, rice cakes, plain nuts, seeds, and even potato chips. Just use caution to check each product individually as some can contain flavorings that in themselves contain harmful glutens. Sugar can be consumed by those with this disease as can coffee, tea, cocoa, fruit juices, jell-o, and pudding. Salt and pepper are acceptable as are most condiments such as ketchup, mustard, and most salad dressings.

As has been noted above, one of the problems in adhering to a strict celiac disease diet is that some products can be contaminated with a harmful gluten in the production process. Contamination is also a problem, however, once you get your food products home. Consider, for example, the problems that might result with such things as jam, jelly, mayonnaise, and peanut butter once they are in the home. One of the more common uses

of such foods is on bread. While that is okay for the normal individual without celiac disease, the potential is there to contaminate these products with bread crumbs that could later be inadvertently consumed by someone with celiac disease.

Obviously, it takes some effort to maintain safe foods for the celiac diet even in the home. This only requires the same attention to food preparation and usage that one should devote to other types of problems with food contamination. Consider, for example, the problems that are guarded against in the kitchen in regard to salmonella contamination. Whenever chicken is processed care is taken to not use the same knives and cutting boards to process other food. The same type of care must be used to guard against contamination of the celiac disease diet. Children's Digestive Health and Nutrition Foundation (2006) recommends buying separate jars of jams, jellies, mayonnaise, and peanut butter, and clearly labeling them so they will not be contaminated with the crumbs from regular bread. Another recommendation is to actually use a separate toaster for preparing bread for the celiac disease individual. One possibility is to use a toaster oven that can be thoroughly cleaned prior to use or tinfoil could be used on the racks to prevent contamination (Children's Digestive Health and Nutrition Foundation, 2006). Counter tops, cutting boards, cooking utensils, colanders, and pans need to be thoroughly

cleaned as well prior to being used to prepare food for the individual with celiac disease (Children's Digestive Health and Nutrition Foundation, 2006).

Eating out presents even more challenges in terms of maintaining a safe diet. While some restaurants have menu items specially designed for customers with celiac disease, they are the exception rather than the rule. Don't be afraid to call ahead and inquire about how a restaurant's food is prepared. When there, double check to insure that the food preparation people know that food that has been in contact with unsafe glutens can be dangerous for you. Even a breadstick laid atop a salad can introduce glutens into the salad (Children's Digestive Health and Nutrition Foundation, 2006). If a restaurant customarily grills its buns, it is likely that they also grill their meat products on the same grill. The result is potentially a problem for a celiac disease diet.

Another critical consideration in maintaining a diet that is safe for the celiac disease individual is that the individual gets all of the nutrients and minerals that he or she needs to be healthy. At the same time, caution should be employed in regard to consuming other dietary items that even though they won't aggravate the celiac disease are unhealthy. High sodium, high sugar, and high fat items are unhealthy for other reasons. Prior to restoring healthy intestinal function by eliminating

bad glutens from the diet, the celiac disease individual might experience iron deficiency, lactose intolerance, osteopenia, osteoporosis, folate deficiency, vitamin B deficiency, and numerous other problems because the intestines are impeded in terms of absorbing the needed nutrients (Canadian Celiac Association, 2008).

Those with celiac disease may, in fact, experience a number of problems while trying to adjust their diet. Weight gain may be one of these problems. When they were consuming bad glutens, for example, their intestinal system was damaged and thus not absorbing nutrients like it should have been (Children's Digestive Health and Nutrition Foundation, 2006).

When the intestinal tract has healed after the bad glutens have been eliminated from the diet, intestinal function is restored (Children's Digestive Health and Nutrition Foundation, 2006). Consequently, even when the same caloric content is consumed, more of the calories are absorbed and utilized (Children's Digestive Health and Nutrition Foundation, 2006). The result can be weight gain (Children's Digestive Health and Nutrition Foundation, 2006). Another contributing factor to weight gain for these individuals is the water retention associated with the disease (Gay, 2005).

Fortunately, there are some companies out there that help people with celiac disease. These companies are known as health

and wellness communities specializing in all natural foods. The ones I have identified keep certified dietitians on staff, send weekly updates via video emails, newsletters, etc., on new health news and safe recipes. They are Service Foods, Inc. (www.servicefoods.com), Blue Ribbon Foods (www.blueribbonfoods.com), and Southern Foods at Home (www.southernfoodsathome.com). Between them and their certified affiliates, they cover most of the United States (North American Food Safety Institute, 2009).

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