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**Medical Nutrition Therapy Diet**

**1. Purpose**

 a. Nutrition Indicators

The nutrition indicators of celiac disease are genetic, environmental, or autoimmune factors. It occurs when the intestinal mucosa is damaged. Gluten is found in wheat, barley, rye, malt barley, and a small amount in oats. Patients with celiac disease typically have the genes for the disease. (Nelms, 2011, pg.402). Other theories that are thought to increase risk include the age gluten is introduced, the length of breastfeeding, and the presence of viral infections during infancy. (Marcason, 2014).

 b. Criteria to Assign the Diet

To assign the diet, the patient must have symptoms that are consistent with celiac disease. Symptoms include fatigue, joint pain, depression, seizures, skin rash, chronic diarrhea, and protein-energy malnutrition. These symptoms are consistent with many other gastrointestinal disturbances and thus often misdiagnosed. (Nelms, 2011, pg. 402). If does have celiac disease, the symptoms should subside.

 c. Rationale for Diet

Celiac disease is an allergy or sensitivity to gluten, thus a gluten free diet is a necessity in order to avoid the symptoms of the disease. When gluten is digested, the body sends an inflammatory response. This inflammatory response basically means that your body does not like this invader and wants to kick them out. (Nelms, 2011, pg. 402).

**2. Population**

 a. Overview

According to the Celiac Disease Foundation, celiac disease affects about 1 in 133 Americans, which is about 1% of the population. There appears to be a genetic link in celiac disease patients according to most recent research. Other countries that have experienced celiac disease include Argentina, Italy, Germany, Denmark, and Finland.

 b. Disease Process

Onset of celiac can be due to genetic, environmental, or autoimmune factors. It occurs when the intestinal mucosa is damaged when the small intestine is exposed to the prolamin fraction. Prolamin fraction is the protein components of gluten. Gluten is found in wheat, barley, rye, malt barley, and a small amount in oats. Patients with celiac disease typically have the genes for the disease. (Nelms, 2011, pg.402). Other theories that are thought to increase risk include the age gluten is introduced, the length of breastfeeding, and the presence of viral infections during infancy. (Marcason, 2014). Symptoms of celiac disease include fatigue, joint pain, depression, seizures, skin rash, chronic diarrhea, and protein-energy malnutrition. These symptoms are consistent with many other gastrointestinal disturbances and thus often misdiagnosed. (Nelms, 2011, pg. 402).

 c. Biochemical and Nutrient Needs

Classic clinical symptoms of celiac disease include diarrhea, abdominal pain and cramping, bloating, and gas production. Other symptoms may include bone and joint pain, muscle cramping, fatigue, peripheral neuropathy, seizures, skin rash, and mouth ulcerations. Many patients may also present with iron deficiency anemia. Screening for celiac disease should include: positive family history, chronic fatigue, unexplained anemia, abnormal liver function, autoimmune disorders, Down’s syndrome, Turner’s syndrome, infertility, and epilepsy/ataxia. Screening for these symptoms have shown a significant increase in diagnosis. Nutrition diagnosis can include impaired nutrient utilization and altered GI function.

**3. General Guidelines**

 a. Nutrition Rx

Nutrition therapy consists of prescribing a lactose-free, gluten-free diet. Lactase is often deficient due to the damaged villi and therefore should be avoided. Once the villi begin to heal, lactose may be reintroduced. Unlike lactose, celiac patients must follow a gluten free diet for the rest of their lives. They must avoid all foods that contain wheat, rye, barley, and malt. Oats may be consumed as tolerated; up to 50 grams of oats are generally recognized as safe. Patients must also be aware that many over the counter medications and prescription medications may have fillers that contain gluten. (Nelms, 2011, pg. 403).

Gluten-free athletes must find different sources of complex carbohydrates in order to meet the required energy needs. Some sources could be beans, rice, corn meal, corn flour, nuts, potatoes, sweet potatoes, tapioca, fruits, and other vegetables. Other micronutrients such as iron, B vitamins, vitamin D, calcium, and fiber should be noted as a concern. Patients should look for gluten-free, enriched products as well as natural sources of these nutrients to ensure adequate intake. Gluten-free multivitamin supplements may be recommended.

 b. Adequacy of Nutrition Rx

Upon adherence to a gluten-free diet, symptoms should subside. Patients should no longer experience diarrhea, muscle, or joint pain and should begin to a gain an appropriate amount of weight to meet their ideal body weight. Patients body should return to good health if they comply with the gluten-free diet. Recovery may take up to 2-3 years in adults, but only 3-6 months in children. (NCBI, 2014). Athletes have been shown to have the ability to compete at the highest performance level despite the diet restrictions associated with celiac disease.

 c. Goals

The goals of a gluten free diet are to refrain from consuming gluten in order to minimize the symptoms of celiac disease. This includes avoiding wheat, barley, rye, malt barley, and oat while initially decreasing lactose. Patients may begin to reintroduce lactose once their villi have healed. Another goal would be to find other sources of complex carbohydrates. This would include options such as beans, rice, corn meal, corn flour, nuts, potatoes, sweet potatoes, tapioca, fruits, and other vegetables. Other micronutrients such as iron, B vitamins, vitamin D, calcium, and fiber should also be monitored.

 d. Does it Meet DRI

Typically, a gluten free diet can still easily meet the DRIs for daily values. Micronutrients such as iron, B vitamins, vitamin D, calcium, and fiber should be noted as a concern. Patients should look for gluten-free, enriched products as well as natural sources of these nutrients to ensure adequate intake. Gluten-free multivitamin supplements may be recommended.

**4. Education Material**

 a. Nutrition Therapy

This includes avoiding wheat, barley, rye, malt barley, and oat while initially decreasing lactose. Patients must find other sources of complex carbohydrates. This would include options such as beans, rice, corn meal, corn flour, nuts, potatoes, sweet potatoes, tapioca, fruits, and other vegetables. Other micronutrients such as iron, B vitamins, vitamin D, calcium, and fiber should also be monitored.

 b. Ideas for Compliance

Ideas for compliance would be to keep a food diary to track progress with the gluten free diet. They should also meet with a dietitian regularly as well as visit the Celiac Disease Foundation website for any questions that they may have. Patients should also be introduced to a host of gluten free products in order to keep the most normal diet that they can, further ensuring compliance.

**5. Sample Menu**

 a. Foods Recommended

 Recommended foods include:

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| Dairy | Milk, cream, ice cream, buttermilk, plain yogurt, cheese, cream cheese, processed cheese products, cottage cheese. |
| Breads, baked products, and other items | Made with amaranth, arrowroot, buckwheat, corn bran, corn flour, cornmeal, cornstarch, flax, legume flours, mesquite flour, millet, Montina flour, nut flours, potato flour, potato starch, uncontaminated oat products, quinoa, rice bran, rice flours, rice polish, sago, sorghum flour, soy flour, sweet potato flour, tapioca, taro, teff. |
| Cereals: Hot | Puffed amaranth, cornmeal, cream of buckwheat, cream of rice, hominy grits, uncontaminated oatmeal, quinoa, rice flakes, soy flakes, soy grits. |
| Cereals: Cold | Puffed (amaranth, buckwheat, corn, millet, rice), rice crisps, corn flakes, rice flakes, soy cereals. |
| Pasta | Macaroni, spaghetti and noodles made from beans, corn, lentils, peas, potato, quinoa, rice, soy, wild rice. |
| Rice | Plain |
| Miscellaneous | Corn tacos, corn tortillas, rice tortillas. Plain rice crackers, rice cakes, corn cakes.Gluten-free communion wafers. |
| Meat, fish, poultry | Plain |
| Eggs | Fresh, liquid, dried, or powdered. |
| Other | Dried beans, kidney beans, dried peas, lentils.Plain nuts and seeds.Plain tofu. |
| Fruits | Fresh, frozen, and canned fruits and juices. |
| Vegetables | Fresh, frozen and canned vegetables and juices. |
| Sweets | Honey, jam, jelly, marmalade, corn syrup, maple syrup, molasses, sugar, icing sugar.Gluten free licorice, marshmallows. |
| Snack foods | Plain popcorn, nuts, soy nuts, potato chips, taco chips. |
| Beverages | Tea, instant or ground coffee, cocoa, soft drinks. Distilled alcoholic beverages, wine.Gluten free beer, ale, and lager. |
| Condiments | Ketchup, relish, plain mustard, herbs, spices, salt, pepper, olives, plain pickles, tomato paste, vinegars, gluten free soy sauce, gluten free teriyaki sauce, other sauces and gravies with allowed ingredients. |
| Miscellaneous | Plain cocoa, pure baking chocolate, carob chips and powder, chocolate chips, baking soda, cream of tartar, coconut, monosodium glutamate, vanilla, pure vanilla extract, artificial vanilla extract, vanillin, yeast, xanthan gum, guar gum. |

 b. Foods to Avoid

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| Dairy | Malted milk, ice cream made with ingredients not allowed. |
| Breads, baked products, and other items | Items made with wheat bran, wheat farina, wheat flour, wheat germ, wheat-based semolina, wheat starch, durum flour, gluten flour, graham flour, atta, bulgur, einkorn, emmer, farro, kamut, spelt. |
| Cereals: Hot | Cereals made from wheat, rye, triticale, barley, and commercial oats. |
| Cereals: Cold | Cereals made with added barley malt extract or barley malt flavoring. |
| Pasta | Pastas made from wheat, wheat starch, and other ingredients not allowed. |
| Rice |  |
| Miscellaneous | Wheat flour tacos and tortillas.Matzoh, matzoh meal, matzoh balls, couscous, tabouli. |
| Meat, fish, poultry | Canned fish in vegetable broth containing hydrolyzed wheat protein.Frozen turkey basted or injected with hydrolyzed wheat protein; frozen or fresh turkey with bread stuffing.Frozen chicken breasts with chicken broth.Meat, poultry, or fish breaded in ingredients not allowed. |
| Eggs |  |
| Other | Fu, Seitan |
| Fruits |  |
| Vegetables | Scalloped potatoes, battered deep-fried vegetables. |
| Sweets | Licorice and other candies made with ingredients not allowed. |
| Snack foods | Potato chips with ingredients not allowed.Pizza made with ingredients not allowed. |
| Beverages | Cereal and malt-based beverages.Beer, ale, and lager derived from barley.Non-dairy beverages made with barley malt extract, barley malt flavoring, or oats. |
| Condiments | Malt vinegar, soy sauce, teriyaki sauce, other sauces or gravies made with wheat flour and/or hydrolyzed wheat protein. |
| Miscellaneous | Brewer’s yeast |

 c. Example of a meal plan

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| **Breakfast** | 2 Egg omelet with spinach, tomato, and cheese1 slice of gluten free toast1 Orange |
| **Snack** | String cheese with 6 gluten free crackers |
| **Lunch** | Caprese salad (tomato, basil, mozzarella, balsamic vinegar)10 gluten free pretzelsGrapes |
| **Snack** | 8 oz. smoothie with spinach and banana |
| **Dinner** | 3 oz. Salmon½ cup brown rice½ cup broccoli1 gluten free roll |
| **Snack** | 1 cup of light salted popcorn |

**6. Websites**

 a. Organizations with Websites

 Celiac Disease Foundation: <http://celiac.org/>

National Foundation for Celiac Awareness: <http://www.celiaccentral.org/Celiac-Disease/21/>

 b. Government Websites

 CDC: <http://www.cdc.gov/genomics/public/features/celiac.htm>

 Academy of Nutrition and Dietetics: <http://www.eatright.org/>

**7. References**

 a. Journal articles references

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