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Combining Diabetes and Gluten-Free Dietary Management Guidelines



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The association of celiac disease and type 1 diabetes is well documented in the literature. Type 1 diabetes, celiac and thyroid diseases are a triad of autoimmune conditions with a significant co-morbidity. However, very little is written about the management of celiac disease and type 1 diabetes and clear guidelines are not available. This article reviews nutrition recommendations for diabetes management by the American Diabetes Association (ADA) for healthy meal planning, carbohydrate counting, and potential use of glycemic index/glycemic load, as well as practical tips and suggestions for transitioning to a gluten-free, diabetes meal plan.

INTRODUCTION

The prevalence of celiac disease (CD) in children with type 1 diabetes mellitus (type 1) is estimated to be between 5%–10% (1–3) and as such, patients with type 1 should be screened routinely for CD. Diabetes (DM) and CD, in conjunction with a number of other conditions including autoimmune thyroid diseases, can be associated with a significant incidence of co-mor-

bidity. Patients diagnosed with DM1 and/or CD should also be screened for other associated autoimmune diseases such as thyroid and Addison's disease (4,5).

CD can be classified into classic, atypical, silent or latent disease. CD seen with diabetes is often silent, exhibiting no symptoms at all, and may only be found upon screening. Clinical manifestations, such as abdominal pain, gas, bloating, malabsorption, weight loss, and abnormal liver function tests may also be seen and easily confused with poor glucose control of DM or gastroparesis. Untreated celiac disease may also contribute to erratic blood glucose swings. Unexplained hypoglycemia can be a sign of malabsorption related to CD and should be investigated, particularly

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in small children. Such episodes may be due to a change in nutrient absorption as a result of blunted villi, or a change in the rate of absorption, and consequent imbalance with the insulin regimen.

Health care professionals involved in the care of patients with DM should be aware of the strong association of CD and type 1 DM. Routine screening for CD in some DM clinics has become the standard of practice. The American Diabetes Association (ADA) 2005 statement for Care of Children and Adolescents with Type 1 diabetes makes the following recommendation: "Patients with type 1 diabetes should be screened for celiac disease, using tTG antibodies, or EMA, with documented normal serum IgA levels. Testing should occur after the diagnosis of diabetes and subsequently if growth failure, failure to gain weight, weight loss, or gastroenterological symptoms occur." Screening is typically done on an annual or biannual basis, based on client and family history and associated symptoms and risk assessment. Current guidelines recommend screening at-risk individuals for serologic evidence of celiac disease using Tissue transglutaminase-IgA (tTG-IgA), or endomysial antibodies IgA tests (EMA IgA). A total IgA titer may also be drawn to increase the confidence of a negative result as some patients with CD do not produce IgA antibodies (2%–10%); hence, the less specific IgG test will be the only positive serological marker for CD (6). There is currently no age limit for screening. It is important to screen patients with DM1 for evidence of CD, as seroconversion may occur even in midlife (45–55 years). If the serological markers are positive, or patients demonstrate at-risk symptoms of CD, referral should be made to a gastroenterologist for further evaluation and consideration of small bowel biopsy to confirm the diagnosis. The NIH Consensus Panel on Celiac Disease does not recommend the use of Antigliadin IGA (AGA-IgA) and Antigliadin IgG (AGA-IgG) as the only serological screening tests for CD as both are less sensitive and specific than other tests (7).

The majority of patients today with both CD and diabetes have type 1 and research in both diseases has focused on this autoimmune connection. However, as the incidence of type 2 diabetes (type 2) and overweight and obesity increases in CD, along with an aging celiac population, this may not always be the case; CD should be considered, therefore, in patients

with type 2 when idiopathic symptoms cannot be explained by other conditions. It may be useful to monitor plasma glucose levels and/or glycosylated hemoglobin in patients with CD who become increasingly overweight (8).

Once the diagnosis of CD has been confirmed, especially in a patient with DM, it is important that a health care team be assembled that includes the treating physician, a diabetes nurse educator, social services/psychology support, and a dietitian with expertise in CD and, ideally, DM. The dietitian on this team is a vital link to patient knowledge and ability to self-manage both conditions. While it is beneficial that the dietitian be a diabetes educator, it is more important that her knowledge of CD and the GFD is current. It is unusual to find a dietitian with expertise in both CD and diabetes.

MANAGING TYPE 1 DIABETES

Type 1 diabetes management can be achieved with a combination of different types of insulin, varied dosing levels and number of injections, and a flexible nutritional management plan. Patients with type 1 should be taught basic carbohydrate (CHO) counting. After they have learned carbohydrate sources and serving sizes, they are often taught more advanced CHO counting. This involves learning how to adjust insulin based on the calculation of an insulin: CHO ratio for the meal bolus and calculation of an insulin sensitivity factor for making pre-meal blood glucose corrections. Exchange lists for meal planning are used with less frequency when managing type 1.

Overall Goals of Medical Nutritional Therapy (MNT) (9)

The most important goal is to achieve or maintain optimal glucose control. This is achieved more easily by frequent self-monitoring of blood glucose levels and self-adjustment of insulin given throughout the day. Nutritional intake may be variable due to symptoms associated with CD such as anorexia, early satiety and bloating and can often be inconsistent from meal to meal and day to day. Also, depending on the level of malabsorption (if present) in the patient with CD, an

increase in insulin requirements may occur when a GFD is started due to the improved absorption of food with gluten-free adherence. The following guidelines may be useful to assist the patient in improving glucose control and nutritional adequacy:

- Promote CHO consistency
 - The amount of total CHO intake is based on the caloric needs to meet a patient’s weight goal, though 210–240 grams (14–16 CHO choices) per day will be adequate for most individuals.
 - One CHO choice equals 15 grams.
 - CHO should be spread evenly across meals and snacks throughout the day to maintain more stable BG levels.
 - If six small meals were eaten throughout the day, each should consist of approximately 30–45 grams (two-three CHO choices).
- The total amount of CHO consumed is more important than the type of CHO; however, there are specific recommendations for the best types of CHO.
 - Promote GF whole grains, fruit, vegetables, legumes and low-fat dairy products.
- Self-Monitoring Blood Glucose
 - Patients should check BG levels before meals and snacks to determine their insulin dose as often as possible.
 - Occasionally check postprandial BG’s to determine how different GF grains or CHO affect the BG.
- A basal-bolus regimen may be helpful to promote optimal glucose control. Basal insulin, (Glargine® or Detemir®) is combined with short-acting (Regular insulin) or rapid-acting insulin (Aspart®, Lispro® or Glulisine®) before meals or snacks.
 - Insulin therapy should be individualized based on the patient’s ability to do the required calculations and willingness to take multiple daily injections.

Start insulin gradually with meals to improve BG control and then add insulin with snacks if tighter control is needed.

Carbohydrate Counting

The Diabetes Control and Complications Trial (DCCT) demonstrated that improved blood glucose

Table 1
American Diabetes Association Nutrition Recommendations (9,11,15)

Carbohydrates (CHO)

Carbohydrate and monounsaturated fat together should provide 60%–70% of the energy needs

- CHO are the body’s major energy source and is the easiest nutrient for our bodies to use
- Encouraging CHO from a variety of whole grains, legumes, fresh fruits and vegetables and low-fat dairy products
- Monitoring CHOs is the key to achieving glycemic goals
- Fiber—same recommendations as the general public 14g/1000 calories
- Low CHO diets, <130 g/day are not recommended for individuals with diabetes
- Sugar alcohols and nonnutritive sweeteners are safe when consumed within the guidelines of the Food and Drug Administration (FDA)
- Use of the glycemic index and load might provide some additional insight above what is observed when using total grams of CHO

Protein

Recommendation is 15%–20% of total daily calories. Most people need about 50–60 grams of protein per day

- Protein is used as the major building blocks for cells

Examples: meats, fish, poultry, milk, eggs, cheese

Fat

Primary fat goal for people with diabetes is to limited saturated fat and cholesterol

- Less than 7% of energy intake should be from saturated fats
- Dietary cholesterol should be less than 200 mg/day
- Intake of trans-unsaturated fats should be avoided
- Polyunsaturated fats intake should be approximately 10% of energy intake

2–3 serving of fish per week (with the exception of fried fish)

control could be achieved with CHO counting (10). CHO counting is the most common method of meal planning used today primarily because CHOs are the primary source of glucose in our eating plans, whereas only small amounts of protein and negligible amounts of fat or alcohol are converted to glucose. Most CHOs begin to affect the blood glucose about 15 to 20 minutes after consumption and are converted 100% to glucose in approximately two hours. The effect on blood

glucose, however, may vary depending on the total CHO consumed, the glycemic load of food consumed, and the protein, fat, and fiber composition of the meal. The American Diabetes Association recommends focusing on the total CHO consumed at one time versus the type of CHO (Table 1).

Basic Carbohydrate Counting with Carbohydrate Choices

A basic CHO counting plan is more often used with patients who have type 2 or as a starting place for patients with type 1 who are on simple insulin regimens. Patients are provided a meal plan or given recommendations to consume a set amount of CHO choices at meals and snacks based on their individualized needs. The medication is then adjusted based on this plan. In instances where the patient diagnosed with CD already has a diagnosis of DM and is following another type of nutrition plan for the management of their DM, the GFD is often applied to this meal plan, making the transition to the GFD much smoother and less stressful.

When using a basic CHO counting plan it is necessary to know the CHO content per serving size of any given food. With the food exchange system, one serving of CHO contains about 15 grams of CHO. This serving size may not correlate with the serving size listed on the food label or that listed in reference books with nutrient information. It is important for the patient to first learn food portions and the average amount of CHO in a food serving.

- Example: $\frac{1}{2}$ cup of cooked rice equals about 15 grams of CHO or one CHO choice. However, the serving size on food packages may be listed as anywhere from $\frac{1}{4}$ cup *uncooked* to 1 cup *cooked* and the CHO may range from 28 to 45 grams.

With any type of CHO counting plan with a GFD, teaching patients to read labels is crucial. GF foods may have higher CHO content and calories than gluten-containing foods. CHO content of GF starches/grains can be seen in Table 2. Many GF products contain highly-refined starches, adding to the CHO density of the product. Patients should be instructed to look at the serving size and the total CHO content on the food labels.

- Example: wheat-based hot dog buns are about two CHO choices (30–35 grams of CHO). Ener-G Foods GF hot dog buns equal two CHO choices (~25 grams CHO for a whole bun), but the Kinnickinnick GF hot dog bun equals four CHO choices (~58 grams CHO per whole bun).

A patient with diabetes and CD might have to adjust the total amount of a food item usually consumed at a meal or adjust the medication to better match the CHO load, depending on the types and amounts of GF products consumed at that meal. This can make it challenging for a patient to use basic CHO counting. Due to the challenge of finding GF products with consistent CHO per serving, patients may find it easier to count CHO grams rather than total number of CHO choices.

Advanced Carbohydrate Counting

Advanced CHO counting is most often used when the patient is highly motivated, on multiple daily injections, or insulin pump therapy. These patients take basal, long-acting insulin to cover baseline needs and multiple rapid-acting insulin injections to cover the CHO eaten at meals and to correct blood glucose levels at mealtime that are out of the target glucose range (usually 90–130 mg/dL). Insulin is prescribed based on an insulin to CHO ratio (I:CHO), which details how many grams of CHO one unit of insulin will cover. These guidelines are specific to each individual and are determined by the patient's sensitivity to the insulin, the type of insulin used, and their food choices. Some general guidelines can be applied initially and adjusted with frequent monitoring.

- Example: If the I:CHO is 1:15, then one unit of insulin will cover 15 grams of CHO.

The patient is also given an insulin sensitivity factor, which approximates how much one unit of insulin will decrease BG levels.

- Example: If the insulin sensitivity factor is 50, then one unit of insulin will lower the blood glucose approximately 50 mg/dL.

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Table 2
Sample Carbohydrates in Gluten-Free Foods

<i>Gluten Free Food</i>	<i>Company</i>	<i>Product Type</i>	<i>CHO (g) / Mfg Suggested Serving</i>	<i>Serving (Mfg Suggested Serving Size)</i>	<i>Fiber Content (g)</i>
Breads					
White Rice Bread	Ener-G Foods, Inc.	Ready to Eat	19	1 slice	
Four Flour Bread	Ener-G Foods, Inc.	Ready to Eat	48	1 slice	
Light Brown Rice Loaf	Ener-G Foods, Inc.	Ready to Eat	7	1 slice	<1
White Rice Flax Loaf	Ener-G Foods, Inc.	Ready to Eat	14	1 slice	2
Light Tapioca Loaf	Ener-G Foods, Inc.	Ready to Eat	7	1 slice	1
Corn Loaf	Ener-G Foods, Inc.	Ready to Eat	8	1 slice	3
Hi-Fiber Loaf	Ener-G Foods, Inc.	Ready to Eat	18	1 slice	2
Bread Mix Homestyle	Authentic Foods	mix	23	1/4 c.	2
Tapioca Hamburger Buns	Ener-G Foods, Inc.	Ready to Eat	21	1 bun	4
Seattle Brown Hamburger Buns	Ener-G Foods, Inc.	Ready to Eat	43	1 bun	14
Tapioca Hot Dog Buns	Ener-G Foods, Inc.	Ready to Eat	21	1 bun	4
Seattle Brown Hot Dog Buns	Ener-G Foods, Inc.	Ready to Eat	43	1 bun	14
6" Rice Pizza Shells	Ener-G Foods, Inc.	Ready to Eat	7	1/4 crust	2
Pizza Crust Mix	Authentic Foods	mix	27	1 serv (36 g)	2
Brown Rice English Muffins (with Sweet Potato)	Ener-G Foods, Inc.	Ready to Eat	43	1 muffin	8
English Muffins with Tofu	Ener-G Foods, Inc.	Ready to Eat	43	1 muffin	3
Pancake & Baking Mix	Authentic Foods	mix	24	1/4 cup	2
Blueberry Muffin Mix	Authentic Foods	mix	23	1 slice	2
Crackers and Snacks					
Seattle Crackers	Ener-G Foods, Inc.	Ready to Eat	43	1 roll (84 g)	8
Ener-G Gourmet Crackers	Ener-G Foods, Inc.	Ready to Eat	23	3 crackers	<1
Ener-G Crisp Pretzels	Ener-G Foods, Inc.	Ready to Eat	21	25 pieces	<1
Wylde Sesame Pretzels	Ener-G Foods, Inc.	Ready to Eat	24	40 pieces	2
Crackers	Glutino		15	4 each	
Pasta					
White Rice Spaghetti	Ener-G Foods, Inc.	Ready to Cook	43	56 g	<1
White Rice Macaroni	Ener-G Foods, Inc.	Ready to Cook	43	2 oz	<1
Pasta, rice, potato & soy	BioNaturae	Ready to Cook	57	2 oz	
Rice and corn pasta, gluten-free	Orgran Foods	Ready to Cook	180	6.35 oz	
Corn pasta, gluten-free	Orgran Foods	Ready to Cook	180	6.35 oz	
White Rice, boiled		Ready to Cook	150	5.29 oz	
Millet, boiled		Ready to Cook	150	5.29 oz	
Buckwheat groats, roasted	Wolff's Kasha	Ready to Cook	45	1/4 c. dry	
Desserts					
Ginger Cookies	Ener-G Foods, Inc.	Ready to Eat	9	1 cookie	0
Biscotti	Ener-G Foods, Inc.	Ready to Eat	24	1 cookie	0
Chocolate Chip Potato Cookies	Ener-G Foods, Inc.	Ready to Eat	11	1 cookie	0
Brownies	Ener-G Foods, Inc.	Ready to Eat	22	1 piece (40 g)	2
Plain Doughnuts	Ener-G Foods, Inc.	Ready to Eat	14	1 doughnut	2
Chocolate Cake Mix	Authentic Foods	mix	23	1 slice (28 g)	1
Vanilla Cake Mix	Authentic Foods	mix	24	1 slice (28 g)	1
Gingersnap Cookies	Kinnikinnick Foods	Ready to Eat	1 oz	2 cookies	
Carmel Apple Snack Bar	Enjoy Life Natural Brands	Ready to Eat	28	1 bar	

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Table 2 (continued)
Sample Carbohydrates in Gluten-Free Foods

<i>Gluten Free Food</i>	<i>Company</i>	<i>Product Type</i>	<i>CHO (g) / Mfg Suggested Serving</i>	<i>Serving (Mfg Suggested Serving Size)</i>	<i>Fiber Content (g)</i>
Gluten-Free Flours/Grains					
Sweet Rice Flour	Ener-G Foods, Inc.	Baking supplies	28	1/4 cup	0
Brown Rice Flour	Ener-G Foods, Inc.	Baking supplies	31	1/4 cup	2
Potato Starch Flour	Ener-G Foods, Inc.	Baking supplies	41	1/4 cup	0
Potato Starch	Authentic Foods	Baking supplies	32	1/4 cup	1
Tapioca Flour	Ener-G Foods, Inc.	Baking supplies	42	1/2 cup	0
White Rice Flour	Ener-G Foods, Inc.	Baking supplies	32	1/4 cup	<1
Gluten-free Gourmet Blend	Ener-G Foods, Inc.	Baking supplies	39	1/4 cup	<1
Garfava Flour	Authentic Foods	Baking supplies	23	1/4 cup	3
Arrowroot Flour	Authentic Foods	Baking supplies	35	1/4 cup	2
Bette's Gourmet Four Flour	Authentic Foods	Baking supplies	32	1/4 cup	2
Multi Blend Gluten Free Flour	Authentic Foods	Baking supplies	31	1/4 cup	1
White Corn Flour	Authentic Foods	Baking supplies	28	1/4 cup	3
Cereals					
Crispy Brown Rice Cereal	Erewhon	Ready to Eat	25	1 cup	0
Mighty Tasty GF Hot Cereal	Bob's Red Mill, USA	Ready to Cook	42	1/4 cup dry	
Cold cereal—Perky O's original	Enjoy Life Natural Brands	Ready to Eat	33	3/4 cup	
Oats, rolled (certified GF)	Gifts of Nature	Ready to Cook	40 g	1/2 cup dry	

Since CD often causes varying degrees of malabsorption, the patient transitioning to the GF diet may find that these ratios will need adjustments until the GFD is well established and the small bowel is revitalized. The same is true of any medications absorbed in the small intestine. Oral diabetes agents should be monitored closely in patients newly diagnosed with type 2 in conjunction with CD. Close monitoring of blood glucose levels, along with adjustments in DM medications, is helpful in avoiding erratic blood glucose levels during the first several months of adjustment to a GF/DM meal plan or nutrition guidelines.

GLYCEMIC INDEX AND GLYCEMIC LOAD

Sometimes BG is more difficult to manage than one would expect. In highly motivated clients, providing additional information on the glycemic index (GI) and glycemic load (GL) of foods may be helpful. According to the American Diabetes Association Nutrition Recommendations and Interventions for Diabetes—2006 “the use of the glycemic index and load may provide a modest additional benefit over that observed

when total CHO is considered alone (11).” The GI is a method of numbering a particular food from 0–100 by how it affects the blood glucose. The higher the glycemic index of a food, the higher the blood glucose response. Researchers determine the GI by measuring the effect of 50 grams of CHO of a specific food against a reference food, usually 50 grams of glucose or white bread. The more refined the food, the higher the GI, is one possible explanation for some of the blood glucose changes seen when the patient transitions to the GF diet. Many GF foods are made with rice flour and other concentrated, low fiber, highly refined starches (potato, corn and tapioca starches). Some practitioners find that encouraging patients to use lower GI GF grains in food preparation might help glycemic control.

Some of the GF starches (flours and grains) are higher in protein and fiber than most wheat-based grains and foods, and therefore will have a lower GI (Table 3). For example: Heartland's Finest® Bean Flour Pasta has a GI 36 as compared to traditional wheat-based pasta (GI of 45) and rice pasta (GI of 58). In addition, mesquite flour, a GF flour, has a natural

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Table 3
High Fiber, Higher Protein Gluten-free Grains and Flours (18)

<i>Grains and Flours</i>	<i>1 cup (grams)</i>
Amaranth Seed	29.6
Amaranth Flour	18.2
Bean flours (Garfava)*	12
Buckwheat Groats	16.9
Buckwheat Flour	12
Cornmeal	10.2
Millet Seed	17
Montina® (Indian rice grass)	36
Nut flours (Almond)	15
Quinoa Seed	10
Quinoa Flour	6
Sorghum Flour	8.2
Soy Flour (defatted)	17.5
Soy Flour (full fat)	8.1
Teff Seed	5.4
Teff Flour	3.6

*Authentic Foods Inc

sweetness and products made from it require less sugar to be added, potentially giving foods made from it a lower GI.

Glycemic load combines the GI value and the CHO content ($GI \times CHO \text{ grams}/100 = GL$), thereby combining the quality and quantity of CHO consumed. For example, carrots have a very high GI (131), but the glycemic load using the serving size of one-half cup is low (10) because of the quantity that is usually consumed, so the effect on the blood glucose is minimal. By observing patterns of how certain foods affect

Chart 1
Glycemic Index and Glycemic Load Values of Foods

<i>Food</i>	<i>Svg Size/CHO (g)</i>	<i>GI</i>	<i>GL</i>
Pizza	1 slice/78	86	68
White rice	1 cup/45	102	46
Potatoes	1 medium/37	102	38
Orange juice	6 oz/20	75	15
White bread	1 slice/13	100	13
Carrots	1/2 cup/8	131	10
Milk	8 oz/11	46	5

blood glucose the patient can learn how to adjust insulin doses. See Chart 1 for examples of glycemic index and load of foods.

At this time there is limited information on GI and load of GF foods but it may be useful for some patients as an additional resource to fine-tune their blood glucose levels. Encouraging the patient to use less refined, higher fiber GF flours may be enough to make subtle improvements in BG control.

Nutritional Guidelines for Patients with Diabetes

Guidelines for healthy eating for patients with diabetes, as recommended by the American Diabetes Association can be found in Table 1.

PRACTICAL TIPS FOR A SMOOTH TRANSITION TO A GLUTEN-FREE DIABETES MEAL PLAN

Management Plan

Learning to follow GF guidelines for someone newly diagnosed with CD is an overwhelming experience and combining it with diabetes management can be daunting. The patient will benefit from a series of appointments with the dietitian and other Health Care Team members during the transition to combining both diets. Transitioning to the GF diet may occur over a few weeks to months depending on the patient’s age, symptoms, other medical issues, support and resources. Below are tips for educating and helping patients transition to a GF/DM diet.

The Basics

First, eliminate the obvious foods that must be avoided for the greatest impact on BG control. When the patient is able to recognize these foods and avoid them with good success, refine the diet by eliminating hidden sources of gluten, such as gravies and marinades that may have wheat as an ingredient. Discuss cross-contamination in food preparation. Offer substitutions and resources for purchasing GF foods. These changes will generally have little effect on overall BG control. Once this becomes easy, refine further by searching for

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the minute gluten sources, such as fillers in medications and nutritional supplements. Discuss dining out and how to make sound choices to reduce the risk of accidental gluten ingestion.

Going “Natural”

Commercial GF products can be expensive and may become prohibitive for some patients. An alternative to using specialty products is a “natural GFD.” This is also a good way to transition to a GFD. Patients should be taught how to make GF substitutions using naturally GF foods, such as Asian rice pasta in place of regular pasta, using corn tortillas instead of flour tortillas, or finding common brand substitutions for soups, seasoning blends, etc. Use the patient’s detailed diet history in order to individualize the meal plan. This approach appears to relieve the stress some patients feel when they begin to understand the significant social and psychological impact of following a GFD. In this approach the patient’s diet doesn’t change significantly, except for minor ingredient substitutions and elimination of some starches. The eliminated starch sources may alter the patient’s total CHO intake enough to impact BG control.

Gluten Free Flours

Part of nutrition management education should include discussion of those GF flours with superior nutritional value and those with poor nutritional value. Flours, such as Montana®, quinoa, amaranth, buckwheat, bean, teff, millet, corn, and nut flours are higher in fiber than other gluten-free flours. Other GF fiber sources include flax, salba (a seed from the mint family, high in omega-3 fatty acids), sesame, guar (from a bean source), as well as natural sources found in raw fruits, vegetables, legumes, nuts and seeds. An overview of gluten-free grains can be found in the October 2006 *Practical Gastroenterology* (17).

In advanced CHO counting systems, CHO from fiber (if >5 grams per serving) is usually subtracted from the total CHO. If the meals consist of several good fiber sources and together they equal greater than 5 grams, the amount of insulin may need to be lowered. This allows for larger portions or more dense

bread and starches to be used without significant impact on BG, especially useful when working with growing children with healthy appetites.

OATS AND THE GLUTEN-FREE MEAL PLAN

Oats should only be used under the advisement of the medical team. If used, the patient needs to ensure they are contaminate-free. Currently, there are two sources of oats in the USA that have been certified gluten-free by the Gluten-Free Certification Organization (www.GFCO.org), Gifts of Nature oats (www.giftsofnature.com) and Gluten-Free Oats, Inc. (www.GFCO.org) (12). Studies using oats in the GFD have shown that most people with CD can consume uncontaminated oats in moderation (50 gram dry oats) without ill effect. It is common practice with dietitian experts in CD to recommend avoiding oats for the first several months after diagnosis to allow the intestine to heal.

Sources of Gluten-Free Oats in the United States and Canada

- Gifts of Nature Oats
www.giftsofnature.com
(888) 275-0003
- Gluten-Free Oats, Inc.
<http://www.glutenfreeoats.com>
(307) 754-2058

The only two companies in Canada producing pure oats products

- Cream Hill Estates of Montreal
www.creamhillestates.com
(866) 727-3628
- FarmPure Foods
<http://www.farmpurefoods.com/>

Watch Out for Weight Gain

Patients, especially those who present with signs of malabsorption, wasting and weight loss, should be advised of the possibility of weight gain and monitored for undesirable weight changes. Patients who have experienced weight loss prior to diagnosis of diabetes and/or CD must understand that weight gain is possi-

Table 4
Sample Menus with Gluten-Free Alternatives (16)

<i>Breakfast</i>	<i>Serving size</i>	<i>CHO</i>	<i>GF CHO</i>	<i>Notes</i>
Waffles* - toaster	2 Each	30 g	39 g	GF Waffle
w/ syrup(sugar-free syrup)	2 Tbsp	0 g	0 g	
Lowfat Milk	1 Cup	12 g	12 g	
Strawberries, sliced (6 oz)	1 Cup	10 g	10 g	
Total CHO		52 g	61 g	
Low fat Plain Yogurt w/	8 oz	17 g	17 g	Enjoy Life Natural Brands Cranberry Crunch Granola Foods GF Granola
Granola*	1/2 Cup	34 g	31 g	
Fresh Blueberries	1 cup	17 g	17 g	
Total CHO		68 g	65 g	
Scrambled Eggs	2 Each	1 g	1 g	
Hash browns w/	1/2 Cup	15 g	15 g	
Green peppers	2 Tbsp	0 g	0 g	
Fresh Fruit Cup	1/2 cup	15 g	15 g	
Total CHO		31 g	31 g	
Cold Cereal* w/	1 Cup	32g	32g	Nature's Path Organic Crispy Rice
Skim Milk	1 Cup	12g	12g	
Grapefruit, med, 4" diameter	Half	10g	10g	
Total CHO		52 g	54 g	
Oatmeal*	1/3 Cup	15 g	17 g	Gifts of Nature Certified Oats (1/3 c.)
Banana, small (~3.5 oz)	1 Each	20 g	20 g	
Lowfat Milk	1 Cup	12 g	12 g	
Total CHO		47 g	49 g	
<i>Lunch</i>	<i>Serving size</i>	<i>CHO</i>	<i>GF CHO</i>	<i>Notes</i>
Grilled Chicken	3 oz	0 g	0 g	
Brown Rice	1 Cup	40 g	40 g	
Steamed Vegetables	1/2 Cup	0 g	0 g	
Lowfat Milk	1 Cup	12 g	12 g	
Total CHO		52 g	52 g	
Tuna Casserole w/Noodles*	1 Cup	30g	40g	GF rice pasta
Carrots w/	1/2 Cup	5g	5g	
Dressing	1 Tbsp	2g	2g	
Lowfat Milk	1 Cup	12g	12g	
Total CHO		49 g	59 g	
Mac and Cheese*	1 Cup	50 g	60 g	Annie's GF
Green Salad	1 Cup	0 g	0 g	
w/ dressing	2 Tbsp	2 g	2 g	
Lowfat milk	8 oz	12 g	12 g	
Total CHO		64 g	74 g	

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**Table 4 (continued)
Sample Menus with Gluten-Free Alternatives (16)**

<i>Lunch</i>	<i>Serving size</i>	<i>CHO</i>	<i>GF CHO</i>	<i>Notes</i>
Brown Rice and Beans w/Vegetables	1 Cup	41 g	41 g	Brown rice 1 cup = 44.8 g, carb – 3.5 g, fiber = 41.2 g
Green Salad w/	1 Cup	0 g	0 g	
Dressing	2 Tbsp	0 g	0 g	
Lowfat Milk	1 Cup	12 g	12 g	
Total CHO		53 g	53 g	
Sliced Turkey and	3 oz	0 g	0 g	Glutino crackers (2 each)
Cheese w/	1 oz	0 g	0 g	
Crackers*	2 Serving	30 g	24 g	
Carrot Sticks	1/3 Cup	0 g	0 g	
Prepared Fruit Cup	1 serving	15 g	15 g	
Lowfat Milk	1 Cup	12 g	12 g	
Total CHO		57 g	51 g	
Dinner				
<i>Dinner</i>	<i>Serving size</i>	<i>CHO</i>	<i>GF CHO</i>	<i>Notes</i>
Beef Soft Tacos	1/2 Cup	0 g	0 g	
w/ corn tortillas (24g)	2 Each	20 g	20 g	
Lettuce, tomatoes	1/2 Cup	0 g	0 g	
Sour cream	1 Tbsp	0 g	0 g	
Refried beans	4 Tbsp	6 g	6 g	
Rice	1/3 Cup	15 g	15 g	
Diet Soda	1 Each	0 g	0 g	
Total CHO		41 g	41 g	
Baked Chicken	3 oz	0 g	0 g	
Baked Potato	5.5 oz	30 g	30 g	
w/ butter	2 Teaspoons	0 g	0 g	
Green Salad	1 Cup	0 g	0 g	
w/ dressing	2 Tbsp	2 g	2 g	
Lowfat Milk	1 Cup	12 g	12 g	
Total CHO		44 g	44 g	
Spaghetti* (2 oz dry)	1Cup	40 g	36 g	Heartland Finest Ingredients (bean pasta 41-5 g fiber)
Marinara Sauce	1/2 Cup	15 g	15 g	
Green Salad w/	1 Cup	0 g	0 g	
Dressing	2 Tbsp	2 g	2 g	
Total CHO		57 g	53 g	
Beef Stroganoff *	1 Cup	30 g	49 g	Orgran Foods Rice and corn pasta
Grilled Vegetables	1/2 Cup	0 g	0 g	
Diet Iced Tea	8 oz	0 g	0 g	
Total CHO		30 g	49 g	
Salmon	3 oz	0 g	0 g	
Brown Rice	1/2 Cup	20 g	20 g	
Steamed Vegetables	1/2 Cup	0 g	0 g	
Lowfat Milk	1 Cup	12 g	12 g	
Total CHO		32 g	32 g	

(continued on page 82)

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(continued from page 80)

**Table 4 (continued)
Sample Menus with Gluten-Free Alternatives (16)**

<i>Snacks</i>	<i>Serving size</i>	<i>CHO</i>	<i>GF CHO</i>	<i>Notes</i>
Orange (2" diameter)	1 each	15g	15g	GF Ener-G Foods Pretzels (1 oz)
Pretzels*	1 oz	22g	21g*	
Cheese, cheddar	2 oz	<1g	<1g	
Total CHO		37 g	36 g	
Natural Peanut Butter	2 Tbsp	7 g	7 g	Kinnikinnick Bagel (3.3 oz)
Bagel*	1 Each (2 oz)	30 g	43 g	
Total CHO		37 g	50 g	
Cookies* – ginger snap	2 cookies	20 g	14 g	Kinnikinnick Foods (1 oz = 2 cookies)
Lowfat milk	4 oz	6 g	6 g	
Total CHO		26 g	20 g	
Popcorn	3 Cups	15 g	15 g	
Diet Soda	1 Each	0 g	0 g	
Total CHO		15 g	15 g	
Apple, small , sliced w/	1 Each (2-1/2")	15 g	15 g	
Natural Peanut Butter	2 Tbsp	7 g	7 g	
Diet Soda	1 Each	0 g	0 g	
Total CHO		22 g	22 g	
Ginger Snaps*	1 Serving	15 g	21 g	GF Cookies
Milk	1 Cup	12 g	12 g	
Total CHO		27 g	33 g	
Apple slices w/	1 Each	15 g	15 g	
Cheese slices	1 oz	1 g	1 g	
Diet Soda	1 Each	0 g	0 g	
Total CHO		16 g	16 g	
Popcorn	3 Cups	15 g	15 g	
Total CHO		15 g	15 g	
Celery and	5 Sticks	0 g	0 g	
Natural Peanut Butter	1 Tbsp	3.5 g	3.5 g	
Diet Iced Tea	8 oz	0 g	0 g	
Total CHO		3.5 g	3.5 g	
Pudding*	4oz	22 g	22 g	GF pudding
Total CHO		22 g	22 g	

ble as absorption of food increases with intestinal healing. Patients should be educated about weight management and an ideal or goal weight should be established. Some patients with undiagnosed CD may find that they are over-eating without realizing it. Weight management is a key element in diabetes management and overall health. On rare occasion, reports of gluten-abuse primarily by young women purposefully eating

gluten to lose weight have been uncovered. The mentality is similar to that used by some individuals who omit insulin to allow higher than acceptable BGs in order to lose weight. In other instances, patients beginning a GFD will lose weight, this is generally due to a reduction in total caloric intake due to dietary changes and a lack of understanding about how to make GF substitutions for foods normally eaten.

Nutritional Supplements

Consider GF nutritional supplements if the patient's meal plan is poorly balanced. Be especially aware of potential deficiencies in B-vitamins, iron, calcium (if the patient is lactose intolerant), vitamin D and possibly fiber (13,14).

CONCLUSION

A healthy eating plan for diabetes should always be individualized based on the patient's needs and metabolic outcome goals (A1C, weight/BMI, lipids, blood pressure, etc.). Adding gluten-free restrictions can be overwhelming. When combining the two eating plans, it should be viewed as one plan to control both conditions. It is often best to start with the initial eating plan and modify it to include the added restrictions. When transitioning to the GF diet a patient's glycemic control should be monitored closely. Regular follow-up with a dietitian specializing in CD and diabetes is optimal for the management of patients with CD and diabetes. ■

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