

Series Editor: Carol Rees Parrish, R.D., MS

Going Gluten-Free: A Primer for Clinicians



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Acceptance, a positive “can-do” attitude and a clear understanding of the gluten-free (GF) diet are key components to living a healthy GF life for a patient with celiac disease (CD). The gastroenterologist, primary care physician and the dietitian all share in the responsibilities of clinical and nutritional assessment, treatment of nutrient deficiencies and a thorough teaching of the GF diet and lifestyle. This article introduces the complexities of the GF diet and addresses specific nutritional considerations that may affect a person with CD, including food intolerances, vitamin and mineral supplementation, fiber intake, and gastrointestinal complaints. A wide range of resources is also provided.

BREAKING THE NEWS: THE IDEAL

“You have celiac disease, a condition which can be treated with healthy diet therapy. Here is some preliminary information on the gluten-free diet and a referral to see a dietitian familiar with celiac disease.”

- Is there a way to tell if I am getting gluten accidentally?
- If I can't feel it hurting me, it probably isn't, right?
- How much gluten can I eat without damaging my intestine?

COMMONLY ASKED QUESTIONS BY PATIENTS WITH CD

- How soon will the diet work and when can I expect to feel better?
- When will I not feel so tired?

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INTRODUCTION

A diagnosis of celiac disease (CD), also known as gluten-sensitive enteropathy, nontropical sprue, or celiac sprue, is followed by a recommendation to follow a gluten-free (GF) diet for the rest of one's life. This news is often met with disbelief, particularly in those patients who are asymptomatic. Although once considered a rare disorder, the number of newly diagnosed patients is ever increasing. It is imperative that patients understand the physiology of

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the disorder and the complexities of the diet in order to maintain compliance. Presenting the diagnosis in a positive, upbeat manner will significantly help with patient acceptance.

In order to achieve patient compliance, health professionals need to be better educated about CD and the GF diet. Several published surveys have evaluated the knowledge and perceived quality of information patients received from physicians, dietitians and others (1–3). Unfortunately, health professionals have been given significantly lower rankings than celiac support groups. In a U.S. survey of over 1,600 patients, 66% of patients were referred to a nutritionist; however, 88% stated they obtained most of their information about celiac disease from celiac groups. Only 10% received information from their primary care physician and 39% from their gastroenterologist (1). A recent Canadian survey revealed that 83% of patients felt the information received from the Canadian Celiac Association was excellent in contrast to 35%, 12% and 29% from their gastroenterologist, family physician and dietitian respectively (2). In another Canadian survey, 44% of the patients rated dietitians as an abundant source of information, however, only 55% had a high level of confidence in the quality of information they received (3).

CD is a genetically determined, immune-mediated disorder in which gluten damages the lining of the small intestine. Gluten is the general name for specific storage proteins called prolamins in wheat, barley and rye. Removing gluten from the diet results in clinical and histological improvement, while reintroducing gluten causes a relapse in villi damage. Recent research indicates that CD is the most common chronic intestinal inflammatory disease (4), and far more common in this country than previously thought, affecting 1:266 people worldwide (5). CD has been commonly misdiagnosed as irritable bowel syndrome, lactose intolerance, inflammatory bowel disease, recurrent abdominal pain of childhood (6), and stress (2). Diagnosis of celiac disease has often been delayed for a mean of eleven years (1).

Patients may present with a variety of nutrition-related problems such as:

- Involuntary weight loss
- Lactose Intolerance
- Osteopenia or Osteoporosis
- Iron Deficiency Anemia

- Folate Deficiency
- Vitamin B₁₂ Deficiency
- Diarrhea
- Constipation

DERMATITIS HERPETIFORMIS AND ASSOCIATED DISEASES

CD is related to a large number of associated conditions, one of which is Dermatitis Herpetiformis (DH). DH, a blistering, itchy skin rash, may be the only presenting symptom, occurring in about 5% of patients with CD between 15–40 years old (6). Typically, the rash appears bilaterally on elbows, knees, buttocks and other pressure points on the body. Patients with DH may not present with gastrointestinal symptoms; biopsies, however, show damage to the mucosa in almost all cases. While dapsone may be used to control the skin lesions (7), a strict GF diet is indicated in order to reduce the risk of associated complications and to possibly decrease dosage or even the need for dapsone over time. Compared to the more rapid improvement seen in gastrointestinal manifestations from the GF diet, improvement of the DH rash may require from six months to over two years before medication can be discontinued (8).

DIET EDUCATION

Once the diagnosis is made, it is important to refer the patient as soon as possible to a dietitian *with experience* in CD for diet education, assistance in meal planning, and social and emotional adaptation to a radically new lifestyle. Delay in referral increases the likelihood of the patient obtaining misinformation from a variety of sources including the Internet, friends, well-meaning family members, and health food stores, making for a frustrated patient not sure whom to believe when the actual nutrition clinic appointment arrives. The dietitian will complete a nutritional assessment and, over the course of several visits, address the complexities of the GF diet, sources of hidden gluten, balanced meal planning with emphasis on fiber and enrichment, shopping for GF foods and label reading, additional food allergies or intolerances, prevention of cross-contamination in the kitchen and when dining out or traveling, benefits of exercise and relaxation, and credible resources

available. The dietitian may also recommend appropriate vitamin and mineral supplementation in consultation with the physician. At follow-up appointments, the patient's food recall is reviewed for potential gluten ingestion and the patient is questioned as to his/her current understanding and/or compliance to the diet.

SUPPORT

The GF diet is undoubtedly one of the most difficult diets to embrace in the U.S. given the heavy reliance on wheat and wheat-based products in our food supply. Acceptance of, and compliance to the diet can vary widely among the patient population. Family members and those involved in care and meal preparation are encouraged to attend the educational sessions as a means of supporting the patient in making tremendous diet and lifestyle changes. The physician can ask the patient to what extent he/she is following the diet and, if necessary, offer resources and encouragement by discussing its positive health benefits. One of the most important components of a celiac patient's success in managing the GF diet and lifestyle is access to a well-founded celiac support group. Support groups offer resource materials, updated product research, and invaluable emotional and social support. Tables 1 and 2 list nationwide organizations and websites that can provide resources to both patients and providers.

TOXIC AND ALLOWED GRAINS AND STARCHES

The alcohol-soluble protein fractions (prolamins) of gliadin in wheat, secalin in rye and hordein in barley are toxic in CD and, thus, all forms of wheat, rye, barley (and oats in the U.S. and Canada) and their derivatives must be strictly avoided. See Table 3 for a listing of toxic grains, as well as GF grains and starches.

It is critical to note that products listed as "wheat free," however, are not necessarily "gluten-free." Wheat-free products may contain spelt, kamut or barley, which are toxic. Barley is commonly used as a flavoring agent in malt form and can be easily hidden in foods. Although it may be listed as "barley malt, barley malt extract or barley malt flavoring," it may only be listed as flavoring or natural flavoring, making it difficult to decipher the origin (9).

Table 1 Organizations, Celiac Centers and Resource Materials for Celiac Disease

Associations/Organizations/Contact Information

Gluten Intolerance Group

Seattle, WA
Phone: 206-246-6652
www.gluten.net
email: info@gluten.net

Celiac Disease Foundation

Studio City, CA
Phone: 818-990-2354
www.celiac.org
email: cdf@celiac.org

Celiac Sprue Association of the United States of America (CSA/USA, Inc)

Omaha, NE
Phone: 402-558-0600
www.csaceliacs.org
email: celiacs@csaceliacs.org

Canadian Celiac Association/L'association Canadienne de la Maladie Coeliaque

Toronto, Canada
Phone: 905-507-6208 or 800-363-7296
www.celiac.ca
email: celiac@look.ca

American Dietetic Association

Chicago, IL
Phone: 312-899-0040
www.eatright.org

Medical Centers

University of Maryland School of Medicine

Center for Celiac Research
Phone: 410-706-8021
www.celiaccenter.org

Celiac Disease Center at Columbia University

New York, NY
Phone: 212-342-0251 (Hal Winfield, RN)
Phone: 212-342-0252 (Anne Lee, RD)
www.cdcc.hs.columbia.edu
email: celiac@columbia.edu

University of Chicago Celiac Disease Program

Phone: 773-702-7593
www.uchospitals.edu

Table 2
Websites/Listserve for Celiac Disease

- www.celiac.com (Celiac Disease and Gluten-Free Diet Support Page)
- Cel-Pro (Celiac listserve for healthcare professionals) Send email to mjones@digital.net with name and professional interest in CD
- Dietitians in Gluten Intolerance Disease (DIGID) Practice Group Subunit of Dietitians in General Clinical Practice (DPG #27), American Dietetic Association (ADA) (Must be a member of ADA and DPG #27: Call 800-877-1600, ext. 5000 for more info)

OATS CONTROVERSY

The GF diet requires the strict avoidance of the prolamins of wheat, barley and rye; however, it is controversial whether the oat prolamins (avenin) should also be avoided (10). A study published by Janatuinen and colleagues concluded that long-term consumption of a moderate amount of oats was safe on a GF diet (11). Subsequent studies have also confirmed the safety of varying amounts of oats in the GF diet in both children and adults (12–15). As a result, several European organizations have changed their recommendations to include oats in the GF diet. To date, however, North American organizations
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Table 3
Allowed and Toxic Grains, Starches & Flours

Allowed Grains, Starches & Flours

- Arrowroot
- Amaranth
- Bean flours (garfava, romano)
- Buckwheat
- Flax
- Corn (maize)
- Legume flours (garbanzo/chickpea, lentil, pea)
- Millet
- Montina™ (Indian Rice Grass)
- Nut flours (almond, hazelnut, pecan)
- Quinoa
- Rice—brown, white, wild, Basmati, etc.
- Rice bran
- Potato starch, potato flour, sweet potato flour
- Sago
- Seed flours (sesame)
- Sorghum
- Soy (soya)
- Tapioca (also called cassava or manioc)
- Teff (tef)

Toxic Grains, Starches & Flours Not Allowed

- Barley
- Bran
- Bulgur
- Couscous
- Durum flour
- Einkorn*
- Emmer*
- Farina
- Farro*
- Gluten, gluten flour
- Graham flour
- Kamut*
- Malt, malt extract, malt flavoring
- Oats**, oat bran**, oat syrup**
- Orzo
- Rye
- Semolina (durum wheat)
- Spelt
- Triticale
- Wheat germ, wheat starch, wheat bran, any word with wheat in its name

*Types of wheat

**Although many studies have indicated that a moderate amount of oats can safely be eaten by people with CD, there is concern over the contamination of oats by wheat and/or barley. Currently, oats are not recommended on the GF diet in North America.

References:

Case S. Gluten-Free Diet: A Comprehensive Resource Guide. Regina, Saskatchewan, Canada, Case Nutrition Consulting. 2003. Celiac Disease. In Manual of Clinical Dietetics. 6th ed. Chicago, IL: American Dietetic Association; 2000: 181–190.

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Table 4
Getting Started: Basic Gluten-Free Diet*

MILK PRODUCTS

Milk, cream, most ice cream, buttermilk, plain yogurt, cheese, cream cheese, processed cheese, processed cheese foods, cottage cheese

GRAIN PRODUCTS

Breads: Bread and baked products containing amaranth, arrowroot, buckwheat, corn bran, corn flour, cornmeal, cornstarch, flax, legume flours (bean, garbanzo or chickpea, garfava, lentil, pea), millet, Montina' Flour (Indian rice grass), potato flour, potato starch, quinoa, rice bran, rice flours (white, brown, sweet), sago, sorghum flour, soy flour, sweet potato flour, tapioca, and teff

Cereals: Hot: Puffed amaranth, cornmeal, cream of buckwheat, cream of rice (brown, white), hominy grits, rice flakes, quinoa flakes, soy flakes, and soy grits

Cold: Puffed amaranth, puffed buckwheat, puffed corn, puffed millet, puffed rice, rice flakes, and soy cereals

Pastas: Macaroni, spaghetti, and noodles from beans, corn, pea, potato, quinoa, rice, soy and wild rice

Miscellaneous: Corn tacos, corn tortillas

MEATS & ALTERNATIVES

Meat, Fish, Poultry: Fresh

Eggs: Eggs

Others: Lentils, chickpeas (garbanzo beans) peas, beans, nuts, seeds, tofu

FRUITS & VEGETABLES

Fruits: Fresh, frozen, and canned fruits and juices

Vegetables: Fresh, frozen, and canned vegetables and juices

SOUPS

Homemade broth, gluten-free bouillon cubes, cream soups and stocks made from ingredients allowed

FATS

Butter, margarine, lard, vegetable oil, cream, shortening, homemade salad dressing with allowed ingredients

DESSERTS

Ice cream, sherbet, whipped toppings, egg custards, gelatin desserts; cakes, cookies, pastries made with allowed ingredients, Gluten-free ice cream cones, wafers and waffles

MISCELLANEOUS

Beverages: Tea, instant or ground coffee (regular or decaffeinated), cocoa, soft drinks, cider; distilled alcoholic beverages such as rum, gin, whiskey, vodka, wines, and pure liqueurs; some soy, rice and nut beverages

Sweets: Honey, jam, jelly, marmalade, corn syrup, maple syrup, molasses, sugar (brown and white), icing sugar (confectioner's)

Snack Foods: Plain popcorn, nuts and soy nuts

Condiments: Plain pickles, relish, olives, ketchup, mustard, tomato paste, pure herbs and spices, pure black pepper, vinegars (apple or cider, distilled white, grape or wine, spirit), gluten-free soy sauce

Other: Sauces and gravies made with ingredients allowed, pure cocoa, pure baking chocolate, carob chips and powder, chocolate chips, monosodium glutamate (MSG), cream of tartar, baking soda, yeast, brewer's yeast, aspartame, coconut, vanilla, and gluten-free Communion wafers*

Excerpted from Case S. *Gluten-Free Diet: A Comprehensive Resource Guide*. Regina, Saskatchewan, Canada, Case Nutrition Consulting. 2003:22-24.

continue to recommend the avoidance of oats. The rationale given for this recommendation is that commercial oats in North America may be contaminated with wheat and/or barley during harvesting and processing.

SAFE FOODS

Numerous foods found in the supermarket, such as *plain* meats, fish, poultry, nuts, seeds, eggs, legumes, milk, cheese, fruits and vegetables are naturally gluten-

free. Newly diagnosed patients are encouraged to shop the perimeter of the grocery store for produce, plain meat/fish/chicken and plain dairy products, rather than the center aisles, which contain the main bulk of the gluten-containing starches and prepared food. See Table 4 for a quick introduction to the GF diet.

As the celiac population grows, GF specialty food markets are striving to keep pace with new GF baked goods, cereals, entrees, snack foods and ready-to-make mixes of all assortments. Patients can find GF products

in supermarkets, health food stores, on-line, via mail order, and occasionally through their support groups. While some products are conveniently manufactured in dedicated facilities that only produce GF products, others may be produced in factories that also produce gluten-containing foods, raising the risk of cross-contamination. Numerous factors contribute to the higher cost of GF commercial products compared to general commercial based products. A single loaf of gluten-free bread can cost ~\$4.00. Individuals with CD may claim the GF diet as a medical expense deduction on their income taxes. Rules regarding legitimate claims are specific and the net of insurance reimbursements must exceed 7.5% of Adjusted Gross Income (See www.celiac.com for more details.)

FIBER

Dietary fiber, readily present in gluten-containing foods, such as wheat bread and wheat germ, is more difficult to find in GF commercial foods. The recommended amount of fiber per day is 25 and 38 g for women and men under 50 years, and 21 and 30 g for women and men over 50 years, respectively (16). Excellent sources of GF fiber can be found in Table 5. Easy ways to increase fiber intake include adding ground flax seed to cold or hot cereal, yogurt and baked goods, switching from white rice to brown rice, or making soups or main dishes from beans and legumes. To avoid gas, bloating and cramping, fiber is best increased gradually with an accompanying increase in water/fluid intake. Table 6 lists commercial GF fiber supplements available to help boost a patient's fiber intake, if necessary.

ENRICHMENT

Typically, GF cereals, pasta and bread are not enriched, and are low in dietary fiber, thiamin, riboflavin, niacin, iron and folate (17). Fortunately, some companies specializing in GF foods are reformulating their products to include healthier ingredients and enriching them with a variety of vitamins and minerals. Patients should be encouraged to choose products that are enriched and/or made with healthier ingredients, such as brown rice flour, amaranth, quinoa, flax, buckwheat and teff.

Table 5
High Fiber Gluten-Free Foods

<i>Food Items, raw (serving size = 1 cup)</i>	<i>Fiber (g)</i>
Grains/Seeds/Flour	
Brown rice	6.5
Buckwheat groats (roasted, dry)	16.9
Flax seed	43.2
Garbanzo (chickpea) flour	20.9
Wild rice	9.9
Beans	
Lentils	15.6
Soybeans	10.3
Split peas	16.3
Nuts	
Almonds	15.1
Sesame seeds	17.4
Fruits	
Blackberries	7.6
Raisins	6.6
Vegetables	
Beans, green (cooked)	8
Parsnips (cooked)	6.2
Peas, green (cooked)	8.8
Squash, acorn (cooked)	9

Excerpted from: Case S. Dietary Fiber Chapter in Gluten-Free Diet: A Comprehensive Resource Guide. Regina, Saskatchewan, Canada, Case Nutrition Consulting. 2003:29–32, 166.

CROSS-CONTAMINATION

Cross-contamination is a challenge that faces the celiac patient everywhere—at home, while food shopping, and when dining out. The patient is counseled to eliminate potential cross-contamination as much as possible given the inevitable accidental exposure to gluten. When sharing a kitchen with individuals who eat gluten-based foods, the celiac patient should be careful to isolate all GF foods. Separating butter sticks, margarine tubs, peanut butter and jelly containers will help to avoid accidental exposure to gluten through “double dipping.” Squeeze bottles for condiments such as ketchup, mustard and mayonnaise are recommended, as is frequent cleaning of counter tops, cutting boards and microwave walls. Colanders, strainers,

Table 6
Comparison of Gluten-Free Commercial Fiber Supplements

<i>Product</i>	<i>Fiber/Serving</i>	<i>Considerations</i>
Benefiber® Novartis Consumer Health 800-452-0051 www.benefiber.com	3 g/1 TBSP	<ul style="list-style-type: none"> • Made from cluster bean • Grit-free, non-thickening • 100% natural, sugar-free, taste-free • Not recommended for carbonated beverages
Citrucel® GSK Corp. 800-897-6081	2 g/ ~1 TBSP (regular)	<ul style="list-style-type: none"> • Regular, sugar-free, clear mix, caplets • No excess gas • Made from methylcellulose
FiberCon® Wyeth 800-282-8805	0.5 mg insoluble fiber/caplet	<ul style="list-style-type: none"> • Easy-to-use caplets, no mixing • 224 mg calcium per 2 caplet dose • Made from calcium polycarbophil
Metamucil® Proctor & Gamble 800-832-3012	3.4 g/1 TBSP (Original Texture Orange; doses vary with flavor)	Powder is gluten-free; WAFER IS NOT GLUTEN-FREE Made from psyllium fiber Capsules, powder, wafers

wooden utensils and other cooking utensils where gluten can easily congeal should be kept separate. The celiac patient should have his/her own toaster oven. When shopping, avoiding bulk bins or purchasing from bins that only hold GF products is important.

DINING OUT

CD dramatically affects one’s experience with eating and the social and emotional connection that dining with friends and family provides (2). Not surprisingly, a recent study showed that 26% of the respondents admitted to noncompliance when dining out, and 21% while at parties or functions (1). Dining out can be a difficult affair for the unprepared celiac. Although restaurants have been aware of, and have made concessions for allergies for many years, the term “gluten-free meal” is relatively new in this country. Cross-contamination can occur by dusting fish, meat or poultry with flour for a shiny coating, through frying GF foods in the same fryer that has also contained other foods basted with flour, or by thickening soup with flour, to name a few. It is imperative that celiac patients learn to ask the right questions to determine if a product is GF.

Several celiac support groups, such as the Gluten Intolerance Group, CSA/USA Inc., and the Canadian Celiac Association have dining out restaurant cards available listing allowed ingredients (see Table 1).

SHOPPING AND LABEL READING

Label reading can be a daunting challenge as gluten is found in many frequently used products and condiments, such as salad dressings, seasonings, packaged mixes, luncheon meats, bouillon cubes, canned soups, and soy sauce to name only a very few. Ingredients and labels may change without notice at any time. To complicate the matter, gluten is also hidden in many products as a thickener, emulsifier or stabilizer. In the U.S. and Canada, the single word “starch” on a food label always means that it is derived from corn; “modified food starch,” however, can be derived from any number of sources, including wheat. Hydrolyzed vegetable protein (HVP) or hydrolyzed plant protein (HPP) that does not list the source of the protein (i.e., corn, soy or wheat) may contain gluten. Hidden gluten may also be in malt, barley malt, flour or cereal products, dextrin,

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Table 7
Questionable Ingredients

- Dextrin—usually made from corn but may be made from wheat
- Flavorings (see a dietitian for detailed explanation)
- Modified food starch/food starch
- Seasonings
- “Starch” in pharmaceuticals, vitamin/mineral and herbal supplements
- Unidentified sources of:
 - Hydrolyzed plant protein
 - Hydrolyzed vegetable protein
 - Textured vegetable protein

etc. See Table 7 for a list of questionable ingredients that need further scrutiny. Label reading and meal preparation are very important components of the nutrition counseling session. Table 8 provides a list of excellent celiac reference guides and books.

The term “gluten-free” is unregulated in the United States; Canada, however, has determined a specific regulation for the term “gluten-free,” and products are randomly tested for gluten content. Several European countries have a different definition for “gluten-free,” allowing wheat starch, which contains varying amounts of gluten, in their products. Celiac organizations in North America do not recommend GF foods made with wheat starch (18). The American Celiac Task Force, comprised of health care professionals, celiac organizations, and GF companies, among others, is working to improve food-labeling laws. Legislation entitled the “Food Allergen Labeling and Consumer Protection Act HR 3684 and S741” was recently introduced in Congress. This legislation would require companies to list the top eight major allergens (wheat, milk, eggs, fish, shellfish, tree nuts, peanuts, soybeans) on food labels as well as develop rules for the use of the term “gluten-free.” If enacted, it would go into effect on January 1, 2006, thereby simplifying label reading for patients with CD (19).

FOOD INTOLERANCES/ALLERGIES

Some celiac patients may have one or more food sensitivities in addition to gluten intolerance, the most com-

mon being secondary lactose intolerance. These patients may benefit from a lactose-restricted diet for one or more months until the villi are allowed to recover and lactase enzymes return (20). Refer to the section below on Lactose Intolerance/Calcium and Vitamin D Needs for lactose-reduced or lactose-free alternatives.

LACTOSE INTOLERANCE/CALCIUM AND VITAMIN D NEEDS

Lactose intolerance is commonly seen in untreated CD (21). Patients who present with severe symptoms, such as nausea, bloating and diarrhea, may benefit from a lactose-free diet in addition to a GF diet. Patients may 1) select lactose-reduced or lactose-free products, such as Lactaid milk, 2) use GF lactase enzyme supplements (e.g., Lactaid® caplets or chewables or Lacteeze® drops or tablets) when consuming dairy products, or 3) choose dairy-free/GF beverages, such as soy, almond, or rice milk. These beverages must be researched carefully as some of them contain barley malt as a flavoring agent. They should also be enriched with calcium, vitamin D and other nutrients. Aged cheese and yogurt with live, active cultures are usually well tolerated. Whether through diet, supplementation or a combination of the two, recommendations for adequate calcium and vitamin D ingestion are very important, particularly given the risk for bone disease in this population (22). Additional oral calcium and vitamin D supplementation may be necessary for patients with osteopenic bone disease (21). If osteoporosis is significant, more aggressive treatment of this disorder may be required. A baseline DEXA scan in all newly diagnosed patients has been suggested (23). See Table 9 for a listing of gluten free supplements including calcium.

VITAMIN AND MINERAL ISSUES IN CELIAC DISEASE

It is important to assess a patient’s overall nutritional status for macro- and micronutrient deficiencies. Although CD is known as a disorder of the proximal intestine, the entire small bowel can be affected (24). In patients who present with diarrhea, steatorrhea and weight loss, baseline fat-soluble vitamin status should be evaluated (20).

Table 8
Celiac Disease Resource Materials*

Resources—Contact Information

Books

Shelley Case, B.Sc., RD

- Gluten-Free Diet: A Comprehensive Resource Guide, 2003 edition
www.glutenfreediet.ca
email: info@glutenfreediet.ca

Danna Korn

- Kids with Celiac Disease: A Family Guide to Raising Happy, Healthy Gluten Free Children
www.woodbinehouse.com
- Wheat Free, Worry Free—The Art of Happy, Healthy, Gluten-Free Living
www.hayhouse.com

LynnRae Ries

- What? No Wheat? A lighthearted Primer to Living the Gluten-Free, Wheat-Free Life
www.whatnowheat@whatnowheat.com

Nancy Patin Falini, MA, RD, LDN

- Gluten-Free Friends: An Activity Book for Kids
www.savorypalate.com

Publications

- Gluten-Free Living: National Newsletter for People with Gluten Sensitivity
www.glutenfreeliving.com
email: glutenfreeliving@aol.com
- Living Without Magazine
www.livingwithout.com

Cookbooks and Cooking Resources

Cookbook Series by Carol Fenster, PhD

- Wheat-Free Recipes and Menus: Delicious Dining Without Wheat or Gluten, etc.
www.savorypalate.com

Cookbook Series by Bette Hagman

- The Gluten-Free Gourmet—Living Well Without Wheat, etc.
www.henryholt.com

Cookbook Series by Connie Sarros

- Wheat-Free, Gluten-Free Recipes for Special Diets, etc.
www.gfbooks@homestead.com

Rebecca Reilly

- Gluten-Free Baking
www.mysimon.com

Karen Robertson

- Cooking Gluten-Free! A Food Lover's Collection of Chef and Family Recipes without Gluten or Wheat
www.cookingglutenfree.com

Donna Wahsburn, P.H.Ec, Heather Butt, P.H.Ec.

- 125 Best Gluten-Free Recipes
www.bestbreadrecipes.com

Glutenfreeda Cooking School

- On-line cooking magazine
- Gluten-free vacations
www.glutenfreeda.com

Gluten-Free Cooking Club and School

- Gluten-free cooking classes for adults and kids
www.glutenfreecookingclub.com

*This list represents only a sampling of the many available celiac-related publications.

Low serum concentrations of iron, folate, calcium, vitamin D (21), phosphorus, protein, magnesium and elevated alkaline phosphatase (20) can be found in untreated celiac disease, with iron-deficiency anemia being the most common clinical presentation in adults (21). Other abnormalities may include coagulopathy resulting from vitamin K deficiency or macrocytic anemia due to folate deficiency. Vitamin B₁₂ deficiency is less common, as distal small bowel disease is unusual (21).

GF vitamins and minerals in therapeutic doses may be required to correct iron, folate (21) or other vitamin or mineral deficiencies while the intestinal villi regenerate. Although a well-balanced GF diet can usually provide adequate amounts of most nutrients, B vitamins and fiber tend to appear in reduced quantities in GF cereals and commercial grain products (17,20,25). Rich sources of folate include liver, legumes, bean flours, amaranth, flax, enriched corn flour and corn meal, enriched rice,

Table 9
Gluten-Free Vitamin and Mineral Suppliers*

General—Contact Information

Wyeth Consumer Healthcare

- Centrum Advanced Formula, Centrum Performance, Centrum Silver, Centrum Liquid, Centrum Chewables
877-CENTRUM
www.centrum.com

Freeda Vitamins

- Entire line is GF and corn free
800-777-3737
www.freedavitamins.com

Nature Made

- Entire line is GF
800-276-2878
www.naturemade.com

Solgar

- 877-SOLGAR-4
www.solgar.com

Bristol-Myers Squibb

- Theragran M Advance
800-468-7746
www.bms.com

Twin Lab

- Most are GF
- Twin Lab Daily One, Twin Lab Allergy Multi Caps
800-645-5626
www.twinlab.com

Iron—Contact Information

KV Pharmaceutical Co.

- Niferex Elixir
877-567-7676

Novartis

- Slow Fe, Slow Fe + Folic Acid
800-452-0051
www.novartis.com

Calcium—Contact Information

Wyeth Consumer Healthcare

- Caltrate 600, Caltrate 600 + Vitamin D, Caltrate 600 + Soy, Caltrate 600 Plus Chewables, Caltrate 600 Plus, Caltrate Colon Health
888-797-5638
www.caltrate.com

Mission Pharmacal

- Citracal, Citracal Caplet + D, Citracal 250 + D, Citracal Plus with Magnesium
800-531-3333
www.missionpharmacal.com

McNeil Nutritionals

- Viactiv Soft Calcium Chews (w/ vitamin D and K)
877-VIACTIV
www.viactiv.com

Pediatric—Contact Information

Freeda Vitamins

- Vitalets
800-777-3737
www.freedavitamins.com

Twin Labs

- Infant Care Multi Drops
800-645-5626
www.twinlab.com

Mead Johnson Nutritionals

- Poly-Vi-Flor, Poly-Vi-Sol, Tri-Vi-Sol, Tri-Vi-Flor, Fer-in-Sol
800-BABY-123
www.meadjohnson.com

Prenatals—Contact Information

Freeda Vitamins

- Prenatal 1-a-Day, Prenatal with Extra Calcium
800-777-3737
www.freedavitamins.com

Solgar

- Prenatal Nutrients Tablets
877-SOLGAR-4
www.solgar.com

Twin Lab

- Twin Lab Prenatal Formula
800-645-5626
www.twinlab.com

Adapted from Gluten-Free Vitamin and Mineral Supplements Handout, Digestive Center of Excellence, University of Virginia Health System, Charlottesville, VA

Unless specifically noted as “entire line is GF,” the companies listed above may produce gluten-containing supplements. As of February 2004, the products listed were confirmed as gluten-free by the manufacturers.

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Table 10
Resources for Patients with Both Celiac Disease and Diabetes Mellitus

- Gluten Intolerance Group:
www.gluten.net/programs.asp
“Diabetes, Celiac Disease and Me! An Introduction to Living with Both Diseases”
- Canadian Celiac Association:
www.celiac.ca
“Managing Diabetes and Celiac Disease . . . Together”

enriched GF pastas, broccoli, asparagus, orange juice, peanuts, walnuts, sesame and sunflower seeds. Rich sources of vitamin B₁₂ include liver, eggs, milk, meat, poultry, fish and seafood. A standard GF multi-vitamin and mineral supplement may be indicated, depending on the patient's individual food choices and compliance to the GF diet. Care should be taken to recommend the appropriate amount of iron depending on the sex, age and iron stores of the individual. See Table 9 for a listing of GF vitamin and mineral preparations.

IRON

Chronic iron deficiency anemia is a common presentation in undiagnosed CD (2). Patients should be encouraged to include GF iron-rich foods in their daily diet, including heme sources, such as lean red meat, poultry and fish. Rich sources of non-heme iron [3%–8% absorbed by the body compared to 23% in heme-rich sources (9)] include nuts, seeds, flax seed, legumes, dried fruits (apricots, prunes, raisins), several GF grains (amaranth, bean flours, quinoa, rice bran, soy flour) and blackstrap molasses (18). To enhance absorption, non-heme foods should be consumed along with a vitamin C-containing food or beverage, such as oranges, tangerines, tomatoes, bell peppers, fruit juice or drink.

DIARRHEA AND CONSTIPATION

Patients who present with diarrhea typically see resolution of their symptoms within two weeks after starting a GF diet (23). A temporary lactose-reduced or lactose-free diet may be indicated and adequate fluid intake encouraged.

Other patients with CD may actually present with constipation or complain of constipation when starting a GF diet. It is important to increase dietary fiber intake and include more fruits and vegetables, legumes, bean flours, and whole GF grains and seeds, such as amaranth and flax seed, as well as ensure adequate amounts of fluid.

DIABETES AND CELIAC DISEASE

The coexistence of CD and Type 1 diabetes mellitus (DM) has been reported in numerous studies around the world with prevalence rates of 2%–10% (26,27,28,29). The relationship between CD and DM is thought to be due to an underlying common genetic predisposition. Some patients with DM may present with typical gastrointestinal symptoms, growth retardation or anemia; however, the majority are asymptomatic for CD or have atypical or subtle symptoms (27). Undiagnosed CD in a patient with DM may result in poor or erratic glycemic control in addition to all the other complications of untreated CD. Although there are no standard protocols, many researchers and clinicians recommend routine screening for CD during the first years after the diagnosis of Type I DM (27,30,31). In most people with combined disease, DM usually precedes CD or both are diagnosed at the same time. Although it has been presumed that glycemic control will improve following repair of the GI mucosa, there is no data to suggest that a GF diet benefits glycemic control at the time of this writing.

It is essential that patients be referred to a dietitian with expertise in managing both disease states, as a diabetic, GF diet is quite complex. Patients not only have to avoid gluten but also balance what and when they eat with insulin and activity. This can be a real challenge as many GF foods are higher in carbohydrates and lower in dietary fiber than their gluten-containing counterparts. Table 10 provides a few dietary resources that incorporate both CD and DM. The following are key nutritional strategies for managing both diseases (32):

- Monitor blood glucose frequently.
- Keep a food diary to assess the effect of various GF foods on glycemic control.
- Use carbohydrate counting for meal planning.

Table 11
Common Oral Gluten-Free Liquid Nutritional Supplements*

<i>Product</i>	<i>Product Details</i>	<i>Manufacturer</i>
Ensure Ensure Fiber w/ FOS Ensure High Calcium Ensure High Protein Ensure Plus Ensure Light Ensure Pudding Enlive	Lactose-free NUTRITION AND ENERGY BARS ARE NOT GLUTEN-FREE	Ross Products Division Abbott Laboratories 800/227-5767 www.ross.com
Boost Boost Plus Boost w/ Fiber Boost Pudding Boost High Protein Boost Breeze	Lactose-free CHOCOLATE MALT FLAVOR IS NOT GLUTEN-FREE BOOST BAR IS NOT GLUTEN-FREE	Mead Johnson Nutritionals 800/457-3550 www.meadjohnson
NuBasics NuBasics Plus NuBasics Juice Drink	Lactose-free	Nestle Clinical Nutrition 800/422-2752 www.nestleclinicalnutrition.com
Nutra/SHAKE Supreme Nutra/SHAKE Free High Fibre Nutra/SHAKE Nutra/SHAKE Citru Nutra/SHAKE Citrus Free Lacta/Care Juice+Fibre	Nutra/SHAKES are milk-based Lacta/Care is low lactose Nutra/SHAKE Citrus and Nutra/SHAKE Citrus Free are dairy-free Juice+Fibre is lactose-free	Nutra-Balance Products 800/654-3691 www.nutra-balance-products.com
SCANDISHAKE	Milk-based; also comes in lactose-free and sweetened with aspartame	AXCAN PHARMA 800/472-2634 www.axcanscandipharm.com
Equate Plus	National brand comparable to Ensure and Boost Plus Lactose-free	Wal-Mart 800/986-8737
Resource Resource Plus Resource Fruit Beverage	Novartis Nutrition Corp. 800/828-9194 www.walgreens.com/store/novartis	Novartis Nutrition Corp. 800/828-9194 www.walgreens.com/store/novartis

*Most commercial enteral products are gluten-free.

- Include a solid protein choice at each meal and HS snack.
- Incorporate more fiber-rich GF foods.
- Ensure adequate amounts of calcium and vitamin D in the diet and/or use supplements.
- Include more iron-rich GF foods.

LIQUID NUTRITIONAL SUPPLEMENTS FOR PATIENTS WITH CELIAC DISEASE

In some cases of severe malabsorption and/or weight loss, patients may need additional oral supplementation to promote weight gain. There are a variety of over-the-counter GF commercial liquid nutritional products on

Table 12
Researching Gluten-Free Medications & Supplements

Steve Plogsted's medication list

- www.glutenfreedrugs.com

Stokes Pharmacy

- www.Stokesrx.com (includes fee to research ingredients)
- "Celiac Sprue: A Guide through the Medicine Cabinet" by Marcia Milazz
- www.celiacmeds.com

Clan Thompson Celiac Pages Website

- www.clanthompson.com
- Listing of prescription and over-the-counter medications, drug database, pocket drug guides

On-line Medication/Supplement Listing

- www.delphiforums.com
- Scroll to Health and Wellness, click on Celiac On-Line Support Groups; click on Gluten-Free Product List

the market, such as Ensure[®] and Boost[®], etc. See Table 11 for commercial GF liquid supplements.

GLUTEN IN MEDICATIONS AND SUPPLEMENTS

Gluten may be present in some medications and vitamin/mineral supplements as a filler or inactive (inert) ingredient, such as food starch. Although the single word "starch" on a U.S. or Canadian food label indicates cornstarch, "starch" on a medication or vitamin/mineral supplement label can be made from a variety of starches. When prescribing medication (over-the-counter or prescription) for a celiac patient, the physician and/or patient can contact the pharmacy or drug company to ensure the ingredients are GF. Several websites and resources offer information on GF medications and supplements (Table 12).

POOR RESPONSE TO THE GLUTEN-FREE DIET

The most likely explanation for a patient's poor clinical or histological response to the diet is gluten ingestion, either accidental or intentional (21). In this case, a dietitian skilled in the GF diet should review the patient's

understanding of the diet, label reading for hidden gluten, and consider sources of potential cross-contamination in the patient's eating habits. Other reasons for a poor response may include lactose or fructose intolerance, pancreatic insufficiency, inflammatory bowel disease, lymphoma, ulcerative jejunitis, collagenous sprue, and refractory sprue, among others (7).

CONCLUSION

CD is unique in that it is controlled through diet therapy. Given the high morbidity and mortality of untreated CD, it is critical that patients receive extensive education by a trained individual on the GF diet and the resources needed to successfully adapt to the dietary, social and emotional lifestyle changes it requires. Periodic assessment, update and review of the GF diet may be necessary in those patients without good response. Support groups are essential for the success of this patient population. ■

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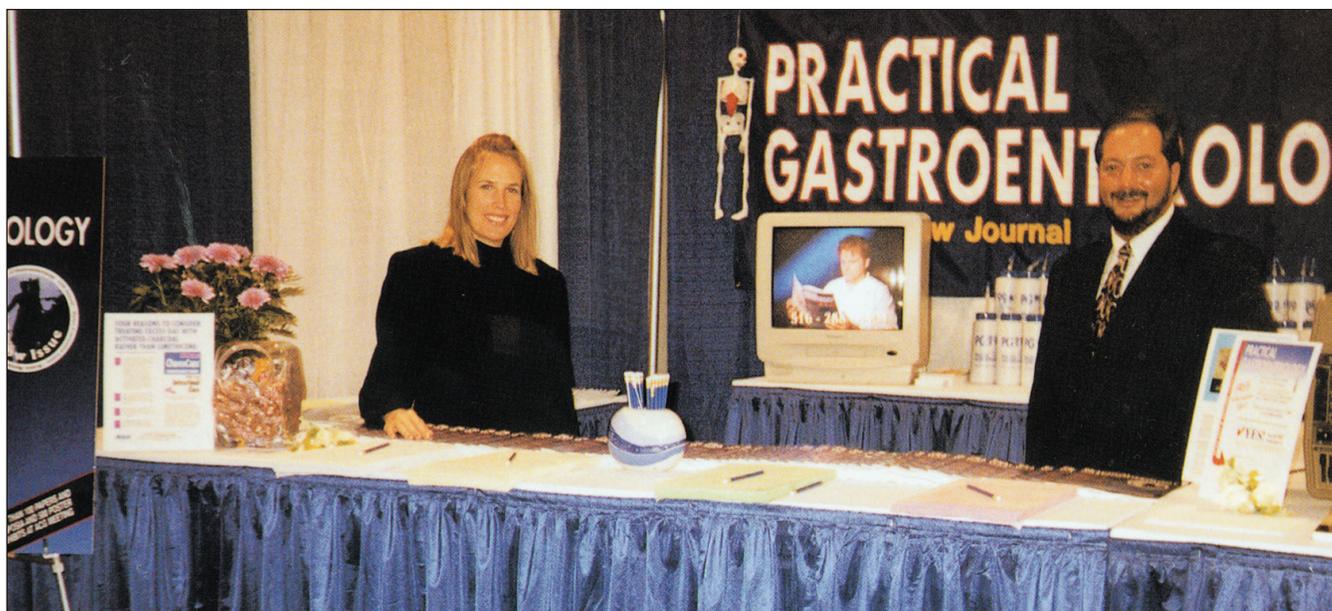
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