Celiac disease: When the body goes against the grain

"Celiac" comes from the Latin word for abdomen, but this digestive disease can cause symptoms throughout the body.

Wheat-based foods—from a bagel for breakfast to pasta for dinner—are a dietary staple for many people. But for a person with celiac disease, nibbling even a crumb of toast can spell trouble. Celiac disease (also known as celiac sprue) is an inherited intolerance to gluten, the sticky protein found in grains such as wheat, barley, and rye. For people with this condition, eating gluten can trigger immune system attacks that may ravage the lining of the small intestine, causing symptoms that include abdominal pain and bloating, diarrhea, and fatigue. Because the injured intestine can't adequately absorb vital nutrients (such as iron, calcium, and vitamin D), untreated celiac disease can lead to iron deficiency anemia, osteoporosis, lactose intolerance (the inability to digest or absorb lactose, a sugar found in milk and other dairy products), and other problems.

Celiac disease was once thought to be rare, but experts now estimate that in the United States, about 1 in 133 people—two million in all—have the disorder. It's more common among people of European ancestry (especially those from Italy, Ireland, and the Scandinavian countries), and it's slightly more prevalent in women.

Not always obvious

Celiac disease often goes undiagnosed because its classic symptoms resemble those of other common ailments, such as irritable bowel syndrome and lactose intolerance. Two other bowel disorders, Crohn's disease and ulcerative colitis, are perhaps more familiar than celiac disease, but celiac disease is more common than both of them combined.

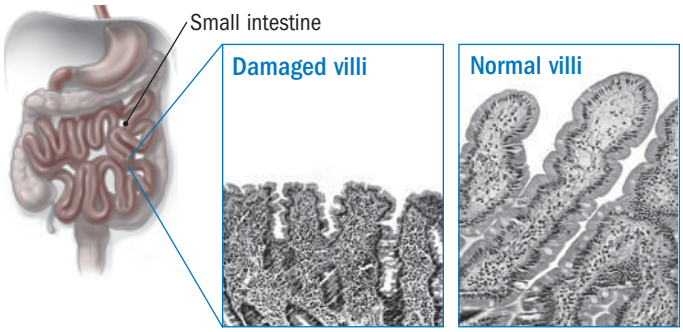
Another reason for misdiagnosis is that one-half to two-thirds of celiac patients don't have gastrointestinal complaints; instead, they show signs of anemia or fatigue. Celiac disease is usually identified only after no other causes, such as internal bleeding, are found for these symptoms.

These difficulties help explain why it takes an average of 11 years to be diagnosed with celiac disease after the symptoms first appear. Many people assume that the disease is diagnosed as soon as a child starts eating foods that contain gluten, but that's not the case. Celiac disease can develop at any time in life, including old age. Also, people with a genetic predisposition for gluten intolerance don't necessarily manifest symptoms of the disease. Researchers describe this phenomenon as "the celiac iceberg" (see illustration).

In very young children, symptoms usually include diarrhea, vomiting, and stunted growth. Older children and adolescents may have stomach pain, canker sores, and tooth enamel defects, and may become depressed or irritable. Some people diagnosed as adults recall having symptoms during childhood, but many don't. Presumably, they've had latent disease most of their lives, and then something—a viral infection, pregnancy, surgery, or even severe emotional stress—has provoked the symptoms. "Some of my patients tell me that they and their family members all got a viral illness, like the stomach flu. But after the family gets better, their own symptoms never seem to go away," says Dr. Ciaran Kelly, director of the Celiac Disease Center at Beth Israel Deaconess Medical Center in Boston (BIDMC).

The average age at diagnosis is 46; about 20% of cases are diagnosed after age 60. In addition to anemia and osteoporosis, celiac disease is associated with type 1 diabetes, thyroid problems, and dermatitis herpetiformis, a painful skin condition that involves itchy blisters on the elbows and knees. These associations are strong. For example, the rate of celiac disease in people with type 1 diabetes is four to 10 times the average. Infertility, recurrent miscarriages, and neurological problems such as ataxia (loss of coordination) have also been linked to this disease.

Anatomy of celiac disease



Images of villi courtesy of John Woosley, M.D., UNC School of Medicine

The small intestine is lined with fingerlike projections, called villi, that absorb nutrients. In a healthy intestine, they resemble the rough surface of a shag carpet. In celiac disease, the immune system attacks the villi, causing them to flatten and become inflamed. Sometimes only a small portion of the intestine is affected. That's why some people with celiac disease have few or no symptoms and no signs of nutrient deficiencies.

Diagnosis: Blood tests and biopsies

In a person with celiac disease, gluten produces higher-than-normal levels of two antibodies: anti-tissue transglutaminase (tTG-IgA) and antiendomysium (EmA-IgA). The tTG-IgA screening test is the most sensitive; it identifies people who are at risk for celiac disease even if they have no symptoms. If you test positive for these antibodies, Dr. Kelly and other experts strongly recommend that you undergo a small-bowel biopsy to confirm the diagnosis. (The biopsy is a relatively simple procedure performed under local anesthesia.) Damage to the lining verifies the presence of celiac

disease. Knowing for certain is critical because the treatment—following a gluten-free diet for a lifetime—can be challenging and costly.

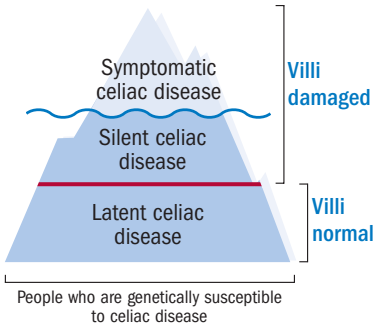
Doctors strongly discourage people from trying a gluten-free diet on their own before receiving a firm diagnosis. That's because the antibody tests are accurate only if you are eating gluten-containing foods.

Who should be tested?

People with recurring, unexplained gastrointestinal symptoms such as pain, bloating, or diarrhea should consider testing for celiac disease. Iron-deficiency anemia or high levels of certain liver enzymes (transaminases) should raise a red flag, as should unexplained, recurrent miscarriages and infertility.

Women who develop osteoporosis early (before menopause) or whose osteoporosis suddenly worsens should also consider the possibility of celiac disease. One small study reported a 17-fold higher incidence of the disease among women with osteoporosis compared to women in the general population. Some doctors recommend that parents, siblings, and children of people with celiac disease undergo testing because 5%–15% of first-degree relatives of an affected person are likely to have the disease, too.

The celiac iceberg



The iceberg represents all people at risk for celiac disease by virtue of their genes. Those with latent celiac disease have no symptoms. Those in the middle have silent or atypical celiac disease—characterized, for example, by anemia without gastrointestinal symptoms. The proverbial "tip of the iceberg" represents those with the classic symptoms: abdominal bloating, diarrhea, and fatigue.

Treatment: Avoid gluten

The good news is that the only treatment for celiac disease—a gluten-free diet—starts to work within days, and the small intestine usually heals completely within three to six months. Although giving up favorite foods such as wheat breads and pizza can be tough at first, many people who have adapted to a gluten-free diet comment that while it can be inconvenient, it does not prevent them from socializing or traveling. Many gluten-free foods are available by mail order and on the Internet, and gluten-free items are becoming more common in supermarkets and restaurants.

Recent developments are making shopping a bit easier, too. As of January 2006, new FDA rules require that all foods containing any of the eight major food allergens (milk, eggs, fish, shellfish, tree nuts, peanuts, wheat, and soybeans) must list that information on their labels. This doesn't mean that people with celiac disease are home free, because even wheat-free products can still cause trouble. For example, while oats don't contain the gluten that harms people with celiac disease, there is the possibil-

General guidelines for gluten-free eating*

Food type	Do not eat	Okay to eat
Grains, potatoes, flours, and cereals	• wheat, rye, or barley (breads, bread crumbs, pasta, noodles) • spelt, semolina, kamut, triticale, couscous, bulgur, farina • rice mixes, some converted rice • unidentified starches or fillers • most commercial cereals	• gluten-free pastas and breads (made from soy, rice, corn, potato, and bean flours) • plain rice, corn, popcorn, potatoes, sweet potatoes, soybeans, other beans, nuts, millet, amaranth, quinoa • oats (consult doctor first), buckwheat • cornstarch, tapioca, and arrowroot starch • gluten-free cereals (e.g., corn and rice)
Fruits and vegetables	• canned soups, soup mixes, bouillon cubes • creamed vegetables • most salad dressings	• fresh, frozen, or canned fruits or vegetables, unprocessed and without sauces • homemade soups with allowed ingredients
Meat, fish, poultry, main dishes	• commercially prepared fresh or frozen meat and main dishes, lunch meats, and sausages	• fresh meat, fish, poultry
Dairy products	• processed cheese, cheese mixes, blue (veined) cheese • yogurt or ice cream that's unlabeled or that contains fillers or additives • low-fat or fat-free cottage cheese, sour cream, or cheese spreads	• plain natural cheese • gluten-free plain yogurt and ice cream • whole, low-fat, and fat-free milk • full-fat cottage cheese and sour cream
Alcohol	• beer, whiskey, bourbon, grain alcohol	• wine, light rum, potato vodka • distilled alcohol
Miscellaneous	• grain vinegar • malt vinegar • beer • commercial pudding mixes • malt from barley • soy sauce made from wheat	• distilled rice, wine, or apple cider vinegar • homemade puddings from tapioca, cornstarch, rice • sugar, honey, jam, jelly, plain syrup, plain hard candy, marshmallows • gluten-free soy sauce

* Not an exhaustive list. More complete information is available through the various celiac disease organizations listed under "Selected resources."

ity of cross-contamination with wheat in the growing and milling process. Also, some products labeled "wheat-free" contain barley, usually in the form of malt or malt syrup. The FDA is working on a rule for gluten-free labeling with action expected sometime after 2007.

There are general guidelines you can follow (see table, page 5), but you'll need to check labels carefully for hidden gluten in commercially prepared foods, such as cured pork products, self-basting turkeys, imitation meats and seafood, and the thickeners found in gravy and some spaghetti sauces. Another source of hidden gluten is dates and candies that are dusted with flour to prevent sticking.

Foods and beverages aren't the whole story. If you have celiac disease, anything that goes in, on, or near your mouth must be gluten-free, says Melinda Dennis, nutrition coordinator of the Celiac Center at BIDMC. Medications (both prescription and over-the-counter) as well as vitamins, minerals, and other supplements are often packed in a starch base that may contain gluten. Make sure yours is derived from corn or tapioca. Gluten is also found in some personal care products, such as lipstick, toothpaste, and mouthwash, and in the glues on envelopes and stamps.

Selected resources

Celiac Disease Foundation
818-990-2354
www.celiac.org

Celiac Sprue Association
877-272-4272 (toll free)
www.csaceliacs.org

Gluten Intolerance Group
206-246-6652
www.gluten.net

National Foundation for Celiac Awareness
215-325-1306
www.celiacawareness.org

FOOD SAFETY

Microwaving food in plastic: Dangerous or not?

If you use e-mail, chances are you've received an urgent "PLEASE READ THIS!" message about the dangers of microwaving food in plastic containers or plastic wrap. The message warns that chemicals can leach out of the plastic and into the food, causing cancer, reproductive problems, and other ills. Is there any truth to this, or is it just another Internet-fueled "urban legend"? As is often the case with alarmist e-mails, this one contains a small kernel of truth—and a lot of misinformation.

Migrating chemicals

When food is wrapped in plastic or placed in a plastic container and microwaved, substances used in manufacturing the plastic (plasticizers) may leak into the food. In particular, fatty foods such as meats and cheeses cause a softening agent called diethylhexyl adipate to leach out. This certainly sounds scary, so it's little wonder that a warning is making its way across the Web.

But here's what the e-mails don't mention. The FDA, recognizing the potential for small amounts of plasticizers to migrate, closely regulates plastic containers and materials that come into contact with food. Before approving a container, the FDA conducts tests to make sure that it doesn't leak unsafe amounts of any substance into food.

According to Dr. George Pauli, a retired associate director in the Office of Food Additive Safety at the FDA, these tests measure the migration of chemicals at temperatures that the container or wrap is likely to encounter during ordinary use. For microwave approval, the agency estimates the ratio of plastic surface area to food, how long the container is likely to be in the microwave, how often a person is likely to eat from the container, and how hot the food can be expected to get during microwaving. Because microwaves heat the water in food, the peak temperature is the boiling point of water—212˚ F, or 100˚ C. The only exception is microwave popcorn and other packages that come with the instruction, "this side down." Such packages, says Pauli, are made with small amounts of metal to create a "frying pan effect." They get hotter than the boiling point of water and are tested accordingly.

The scientists then measure the chemicals that leach out and the extent to which they migrate to different kinds of foods. The maximum allowable amount is 100–1,000 times *less* per pound of body weight than the amount shown to harm laboratory animals over a lifetime of use. According to the FDA, this limit takes into account differences between laboratory animals and humans as well as individual variations in the use of plastic for microwaving. Only containers that pass this test can display a microwave-safe icon, the words "microwave safe," or words to the effect that they're approved for use in microwave ovens.

What about containers without a microwave-safe label? The FDA tests all containers that come in contact with food, but only those labeled microwave safe have been tested and found safe for that purpose. A container that's not labeled

Is Styrofoam microwave safe?

Styrofoam is the brand name of a plastic product (yes, Styrofoam is a kind of plastic) whose generic name is polystyrene. The white foam used, for example, in hot beverage drinking cups (Styrofoam proper) isn't the only kind of polystyrene used for food: Clear plastic "clamshell" containers are also made of polystyrene.

Contrary to popular belief, some Styrofoam and other polystyrene containers can safely be used in the microwave. Just follow the same rule you follow for other plastic containers: Check the label.

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