K-STATE Research and Extension

Leader's Guide

Gluten and Your Gut's Good Health

Sandy Procter, Ph.D., R.D., and Katelyn N. Dixon

Objectives:

After completing this lesson, participants will:

- know what gluten is and its role in foods,
- distinguish common and lesser-known sources of gluten in the diet,
- identify potential health effects related to gluten in the diet,
- understand reasons behind current gluten-free diet trends, and
- recognize skills needed and products available supporting gluten-free living.

Intended audiences: Older teens and adults with interest in topic, Family and Community Education groups, Extension Family and Consumer Science leaders and audiences

Before the lesson, consider these teaching suggestions:

Read the *Gluten and Your Gut's Good Health* fact sheet (MF3226) and leader's guide (MF3227). Familiarize yourself with terms used in them.

Since reading food product or Nutrition Facts labels is an important part of living gluten-free, you will want to collect a variety of gluten-free products or packages to display and reference as part of the lesson. Of particular interest are foods that may be labeled "gluten-free," but contain wheat in the ingredients label.

Additionally, prepare and offer some gluten-free foods for tasting. Suggestions include crackers, bread and/or cake, baking substitutes, as well as recipes for dishes made with a naturally gluten-free alternative grain such as quinoa, millet, or buckwheat. Provide gluten-centered information about products and grains you feature.

Introduction

Gluten, the protein found in wheat, barley, rye, and some related grains, such as spelt, kamut, and triticale (a cross between wheat and rye), has long been valued by consumers and bakers for the elastic, chewy properties it provides breads and other baked products. Recently, gluten has rocketed to the top of nutrition and diet discussions, and "gluten-free" claims can be found on labels of hundreds of foods in grocery stores and highlighted on menus of fast food restaurants as well as fine dining establishments. What

is gluten, and what is at the base of the gluten-free trend that has swept the United States?

The word gluten comes from the Latin word gluten, meaning "glue." It is this glue characteristic that allows bread dough to rise, much as a balloon expands to contain air. The more gluten a flour contains, the stronger and chewier the baked product made from it will be. For tender batters and doughs, flour with less gluten — for example, pastry or cake flour — is preferred.

Wheat gluten is a protein made up of two sub-proteins or prolamins: glutenin and gliadin. While the prolamins in rice and corn gluten are safe for celiac patients, those in wheat, barley, and rye are not. Other grains containing gluten are Kamut, spelt, and triticale. Oats are questionable, because they are usually cross-contaminated during processing with gluten from unsafe grains. The term "gluten-free" means a product is completely free of wheat gluten occurring both naturally and as a food additive in the form of a flavoring, stabilizing, or thickening agent.

As a component of whole-grain foods, gluten has long been considered part of a sound diet for healthy people. However, for some people, good health depends on the elimination of gluten and wheat foods from the diet. Here is the history of a gluten-free diet:

The use of a gluten-free diet for treatment of patients with celiac disease goes back to Holland in the mid-1930s. A physician, Willem-Karel Dicke, reported that the young mother of a celiac patient noted her child's rash improved rapidly if bread was removed from the diet. Further studies during the famine and deprivation of World War II convinced Dicke that eating less grain improved the clinical

condition of his patients with celiac disease. In further support of his theory, the patients' health deteriorated again when Allied planes started dropping bread in the Netherlands. Dicke's research on the effect of the gluten-free diet on patients with celiac disease continued until his death in 1962.

Consider the health conditions that have traditionally been treated with a gluten-free diet. The earliest noted illness, and the most widely studied, is celiac disease.

Celiac disease

Celiac disease affects about 1 percent of the total population, including about 3 million Americans. It is an autoimmune disorder, and the only one where the trigger is known. Celiac damages the villi of the small intestine, resulting in decreased absorption of nutrients from food due to an inflamed small bowel. The inflammation may cause diarrhea, constipation, bloating, weight loss, iron-deficiency anemia, osteoporosis, and has been shown to slightly increase a celiac patient's risk for bowel cancer. Not everyone with celiac disease will experience the same, or in some cases, any gastrointestinal symptoms.

Celiac is a genetic disorder, which means that more than one family member may have symptoms, and the disease is likely to pass along from one generation to the next. Presently, there is no cure for celiac (sometimes spelled "coeliac") disease, but strict removal of gluten sources from the diet decreases or eliminates the symptoms and halts the damage the disease causes.

Dermatitis herpetiformis

This is a type of celiac disease that not only results outwardly in a painful skin rash when gluten is eaten, but also damages the small intestine of most people with this condition. Blood tests and a skin biopsy are used to accurately diagnose dermatitis herpetiformis. A gluten-free diet is required to treat this form of the disease.

Non-celiac gluten sensitivity

Some people cannot tolerate gluten and experience symptoms similar to persons with celiac disease, but do not test positive for the disease itself. Unlike celiac, non-celiac gluten sensitivity (abbreviated as NCGS and also called gluten sensitivity) does not result in intestinal damage. Many symptoms of NCGS are similar to those of celiac disease, but research has shown that people with NCGS report non-GI (gastrointestinal) symptoms that include headache, joint pain, "foggy mind," and numbness in the legs, arms, or fingers. A major difference between the two conditions is that non-celiac gluten sensitivity does not result in increased intestinal permeability as celiac does, so there is not the chance of infection from intestinal contents seeping into the bloodstream. Instead, NCGS often results in decreased intestinal permeability. This decreased permeability or lowered ability for nutrients to be absorbed from the gut may result in gastro-intestinal symptoms including bloating, abdominal pain, and diarrhea. Elimination of gluten from the diet brings relief from symptoms for persons with gluten sensitivity.

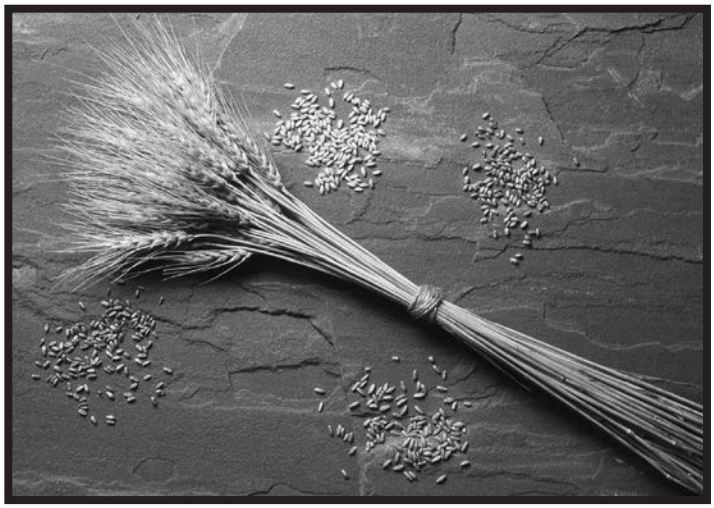
Much research is currently focused on NCGS, its increasing occurrence, and possible causes. Because of the ambiguity of definition, the wide array of symptoms and the difficulty in diagnosis, it is unclear just how widespread NCGS may be. It is this lack of clarity that seems to be key in today's growing interest in gluten in the diet, though eating certain carbohydrates as well as other parts of wheat (besides gluten) may play a role in NCGS symptoms.

It is important that those who suspect they may have one of the above conditions visit with their health-care provider before starting a gluten-free diet. The diagnosis of celiac disease, based on blood tests and a biopsy of the small intestine, may not be accurate if a gluten-free diet is started before testing. It is the practice of self-imposed gluten elimination that has led to today's diet trend. According to some scientists examining the recent gluten-free trend, what began as an interest in gluten could be evolving into a misguided social health concern that gluten is toxic for most of the population.

Wheat allergy

Different from both celiac disease and NCGS, wheat allergy is an allergic reaction to wheat or its components, such as starches, proteins, and even fat. A true wheat allergy will bring about near-immediate or slightly delayed symptoms following a wheat-containing meal. Like other allergies, wheat allergy symptoms are often respiratory in nature (nasal congestion, wheezing, watery eyes) but may escalate to breathing difficulty and shock. People diagnosed with wheat allergy need to avoid foods that contain wheat ingredients. It is important to note that some gluten-free foods may contain other wheat components, especially in Europe and the United Kingdom.

In short, wheat allergy and gluten intolerance are two completely different problems with similar, but not



identical, treatments. Because of the varied symptoms different people experience with gluten intolerance, and the overlap of symptoms with other health issues, accurate diagnosis is difficult and may take years. It is the challenge of diagnosis coupled with each individual's motivation to feel (and look) better that has in part fueled the huge recent growth of "going gluten-free."

Gluten-Containing Grains/ Thickeners	Gluten-Free Grains/ Thickeners
Wheat	Corn
Kamut	Rice
Spelt	Tapioca (cassava)
Barley (malt, including malt extract, malt vinegar)	Amaranth
Rye	Buckwheat
Farro	Arrowroot
Oats*	Millet
Triticale (a cross between wheat and rye)	Montina
Brewer's yeast	
Wheat starch (not processed)	Lupine
	Flax
	Quinoa
	Soy
	Sorghum
	Taro
	Teff
	Chickpea (gram flour)

*Technically, oats are gluten free but are often contaminated during processing.

The gluten-free diet trend

Today's widespread gluten-free trend can be traced to several convergent factors. While many people who avoid gluten find real relief from persistent, widely varied symptoms, many others seem most strongly influenced by numerous celebrities touting a gluten-free diet as a catch-all solution to unspecified health issues, including excess body weight. There are no published scientific reports supporting the idea of weight loss as a result of a gluten-free diet in people without celiac disease or gluten sensitivity. Research continues to examine the health effects of gluten as part of the human diet as well as the impact of its removal from the diet.

The gluten-free diet's popularity continues to explode. As early as 2008, 15 percent to 25 percent of U.S. consumers wanted gluten-free foods, and marketing researchers report the gluten-free foods market is on target to exceed $6.6 billion by 2017. Though typically costlier than similar wheat-based products, gluten-free items are increasingly available on grocery shelves, now often found alongside the original food rather than tucked away in a special section of the store.

In August 2013, the Food and Drug Administration (FDA) issued a final rule that defined what characteristics a food needs in order to have a "gluten-free" label. The rule also requires that foods labeled "without gluten," "free of gluten," and "no gluten" follow the same standard. Manufacturers and food processors had one year to bring their labels into compliance. As of August 2014, any food product bearing a gluten-free claim must meet the rule's requirements.

What is the definition of "gluten-free"? The FDA set a gluten limit of less than 20 parts per million in foods that carry this label. This level is at the low limit that gluten can be detected in foods and is consistent with standards set by other countries and international groups that establish food safety standards. Additionally, a product may be labeled gluten-free if it does not contain:

- an ingredient that is any type of wheat, rye, barley, or crossbreeds of those grains;
- an ingredient derived from these grains and that has not been processed to remove gluten; or
- an ingredient derived from these grains and that has been processed to remove gluten, if it results in the food containing 20 or more parts per million gluten.

For those following a gluten-free diet, it is essential to read product labels each time a food is purchased. Gluten may be hidden in unexpected places (for example, in one variety of pasta sauce but not another) and in nonfood items (for example, certain lip gloss, play-dough type products, and vitamin supplements), and product formulation may change from one purchase to the next.

Terms defined

Autoimmune disorder — A condition in which a person's immune system attacks the body's own cells, causing tissue destruction.

Dermatitis herpetiformis (hur-peh-tuh-FOR-mis) — A type of celiac disease that affects the skin and typically also the small intestine.

Gluten (GLOO-tin) — The general name for proteins found in wheat (durum, emmer, spelt, farina, faro, kamut, Khorasan wheat, and einkorn), rye, barley, and triticale.

Triticale (trit i CAY lee) — A hybrid grain produced by crossing wheat and rye.

NCGS — Non-Celiac Gluten Sensitivity — A syndrome experienced by persons who react to dietary gluten, without evidence of celiac disease or wheat allergy.

Prolamin (PRO-luh-meen) — A plant storage protein found in the seeds of cereal grains. Some prolamins, notably gliadin (GLY-uh-din), may bring about celiac disease in persons who are genetically predisposed.

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