



Nutrient Deficiencies and the Gluten-Free Diet

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Nutritional Deficiencies in Celiac Disease and Non-Celiac Gluten Sensitivity

Nutritional deficiencies can occur in individuals with celiac disease because of both low intake and poor absorption. Once the intestine has had a chance to heal, nutrient absorption improves, but intake may remain a problem. In the case of non-celiac gluten sensitivity, nutrient absorption is not compromised, but again foods consumed may be low in nutrients. Nutrient deficiencies which are common in gluten-related disorders, and their gluten-free food sources are listed in the table below.

Low intake: Very few gluten-free grain products are enriched or fortified with the vitamins and minerals that gluten-containing grain products are. Deficiencies in these vitamins and minerals can occur as a result. Some people with celiac disease also have lactose intolerance during the early stages of their treatment on a gluten-free diet, so there may be low intake of many of the nutrients provided by dairy foods (such as calcium, magnesium, and Vitamin D).

Gluten-free and dairy-free food sources of these vitamins and minerals include:

Vitamins and Minerals	Food Sources
Thiamin	Sunflower seeds, black beans, tuna, green peas, lentils
Riboflavin	Mushrooms, cooked spinach, venison, soybeans
Niacin	Mushrooms, avocados, broccoli, tuna, salmon, chicken breast
Folate	Green leafy vegetables (spinach, romaine lettuce, turnip greens), asparagus, lentils, beets, broccoli
Iron	All types of meat, lentils, soybeans, tofu
Calcium	Green leafy vegetables (spinach, turnip greens, collard greens), sardines, almonds, sesame seeds, seaweed (nori, kelp)
Vitamin D*	Salmon, sardines, shrimp, cod
Magnesium	Green leafy vegetables (spinach, Swiss chard), pumpkin seeds, sunflower seeds, black beans

*There are only a few food sources of Vitamin D. If you live in a northern climate, a supplement may be needed.

Tips for Maintaining Adequate Nutrition

- Have a variety of foods
- Eat foods with color
- Eat whole grains
- Make calories count by choosing nutrient-dense foods.
- Use a vitamin/mineral supplement if needed; consult with your personal healthcare team.
- See a dietitian at least once a year to review the adequacy of your diet.

Other Nutrition Tips

- Eat high fiber foods
- Eat low fat foods
- Limit salt
- Limit sugars
- Drink plenty of water

Poor absorption: When there is damage in the small intestine, the absorption of certain nutrients may be impaired. Vitamins and minerals which may be poorly absorbed include iron, calcium, folate, Vitamin B12, and all of the fat-soluble vitamins (Vitamin A*, Vitamin D, Vitamin E*, and Vitamin K*).

Gluten-free and dairy-free food sources of the nutrients not listed above include:

Vitamins	Food Sources
Vitamin B12	All types of meat and fish, eggs
Vitamin A*	Green leafy vegetables (spinach, turnip greens), sweet potato, carrots, red bell peppers
Vitamin E*	Green leafy vegetables (spinach, mustard greens, turnip greens), sunflower seeds, almonds, hazelnuts
Vitamin K*	Green leafy vegetables (kale, spinach, Swiss chard, collard greens), broccoli, Brussels sprouts

*An increased risk of these deficiencies only occurs when there is fat malabsorption.

Increasing Fiber on a Gluten-Free Diet

Eating enough fiber when following a gluten-free diet can sometimes be a challenge. However, there are many ways to increase your fiber intake because fiber is found in virtually all plant foods. Examples of gluten-free sources of fiber include:

- **Fruits:** apples, pears, oranges, figs, plums, prunes, berries
- **Gluten-Free Whole Grains:** amaranth, quinoa, buckwheat, quinoa, brown rice, teff, millet, corn
- **Legumes:** lentils, split peas, black beans, pinto beans, kidney beans, lima beans, garbanzo beans
- **Nuts & Seeds:** almonds, pistachios, pecans, flax seeds, sunflower seeds, chia seeds
- **Vegetables:** squash, broccoli, artichokes, peas, green leafy vegetables, carrots

Getting the Most Nutrients Out of Your Food

The nutrients in foods can vary a great deal. Here are some tips for making sure you're getting the most out of your food:

- **Eat Foods as "Whole" as Possible:** Whole, unprocessed foods have nutrients that processed foods no longer contain. Look for groceries around the perimeter of the store, because this is where most whole foods are located.
- **Cook Vegetables Lightly:** Nutrients are lost when a food is fried or boiled in water for an extended time. Lightly sauté, steam, or bake vegetables rather than frying them or boiling them in water.
- **Be Colorful:** Choose foods that are naturally bright in color. In general, each color represents a different nutrient. For example, while red tomatoes and pink watermelon have a nutrient called lycopene, orange sweet potatoes and pumpkin have a nutrient called beta-carotene. For a nutrient-rich and appetizing meal, try to include several different colors of fruits and vegetables.

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Other helpful information is available at www.GLUTEN.org.

Advances in celiac disease are fast-paced. If this document is more than 2 years old, please visit our website for updated documents.

This information should not be used to diagnose or treat gluten-related disorders or other medical conditions. For questions about these conditions consult your healthcare team when considering this information.

Please consider your local GIG support group as another resource.

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The Mission of the Gluten Intolerance Group is to empower the gluten-free community through consumer support, advocacy, and education.

To make a donation or become a volunteer to GIG, visit our website or call the office at 253-833-6655.