

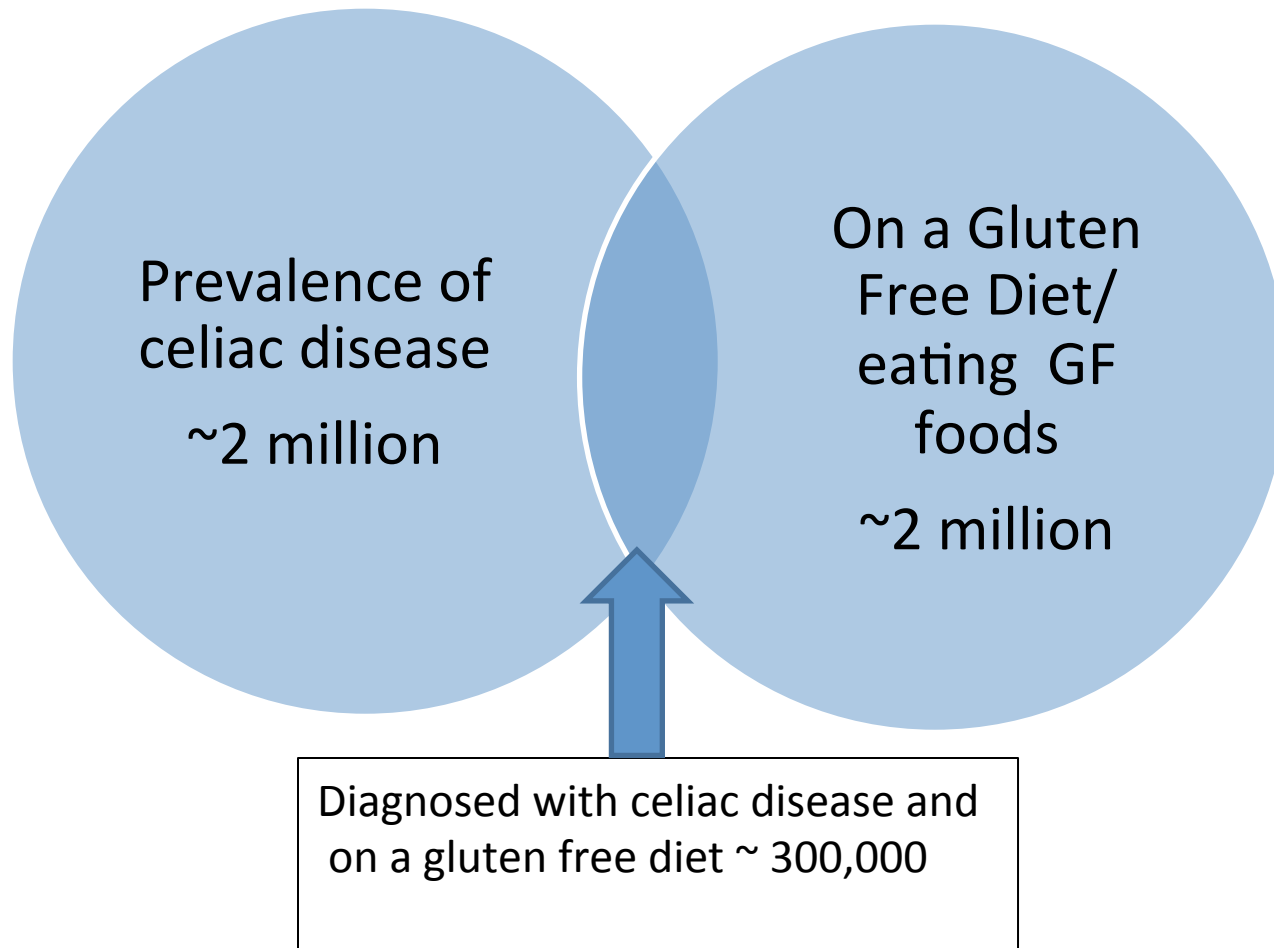
Whole Grains: Breaking Barriers

**Health Limitations of Gluten-Free and
Grain-Free Diets**

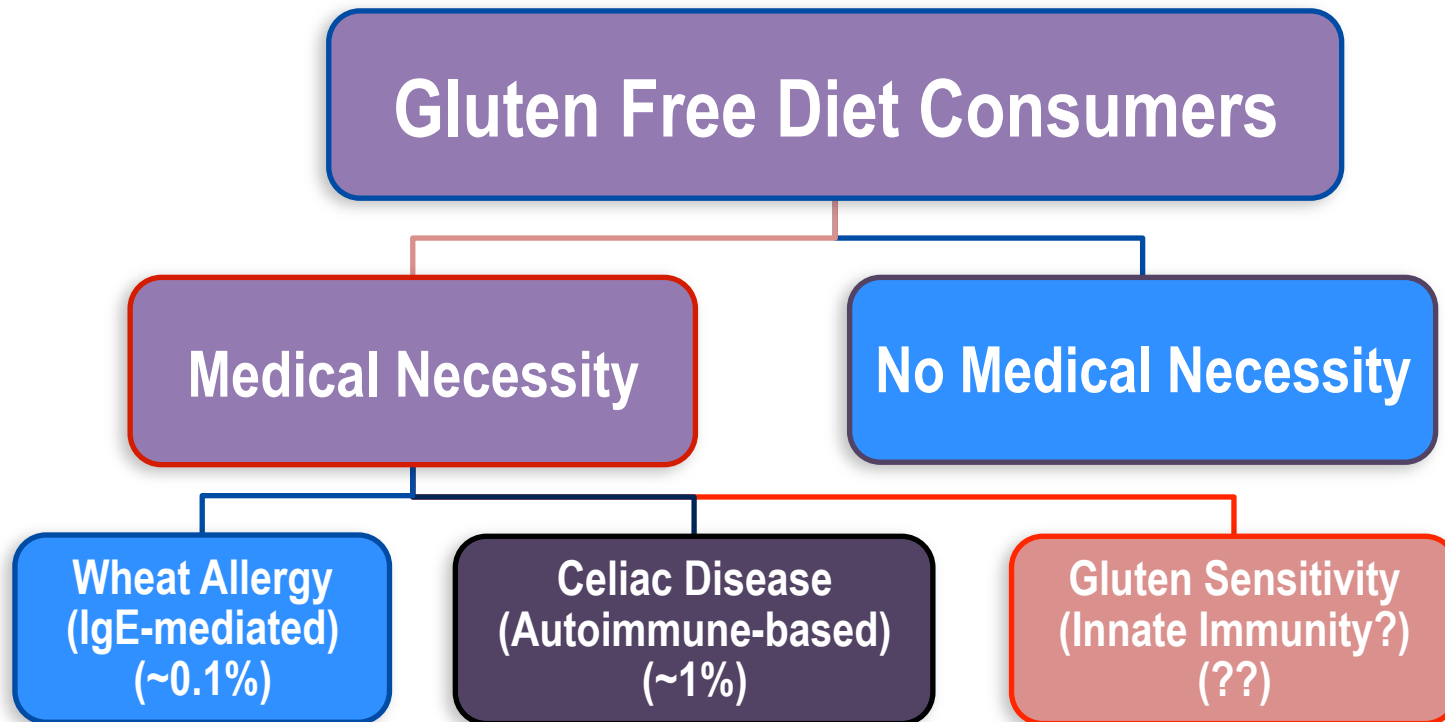
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Gluten Free Diet in the US



The Gluten Free Diet: Not Only Celiac Disease



Reasons for the Occasional Consumer: Not Medical necessary

- **Weight loss (?)**

- 27% of consumers who eat or used to eat gluten-free foods do so because they feel they aid in their weight loss efforts.*

- **Better nutrition & other health benefits (?)**

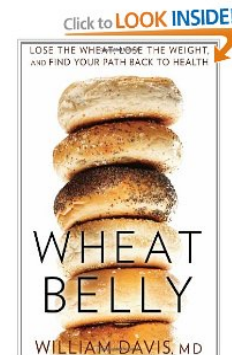
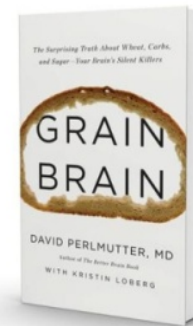
- 65% of consumers who eat or used to eat gluten-free foods do so because they think they are healthier*

- **Celebrity Endorsements**

- Lady Gaga, Miley Cyrus

- **Popular Press**

- Wheat Belly
- Grain Brain



*<http://store.mintel.com/gluten-free-foods-us-september-2013>



Never start the GFD before
proper testing is completed!

Encourage testing FIRST to rule out celiac disease

MUST BE INGESTING GLUTEN in order to be tested for CD

USDA 2010 Dietary Guidelines

- Recommends 6 to 11 servings (1- oz Servings)
 - Make half the grains whole
 - Fewer than 5% of Americans meet this goal
- Whole grains provide
 - Fiber
 - B Vitamins
 - Antioxidants
 - Zinc
 - Copper
 - Magnesium
 - Vitamin E

Nutritional Aspects of the GFD

- The GFD can be missing important nutrients needed for optimal health and wellness
 - Lacks fiber
 - Lacks iron
 - Lacks B vitamins- folate, niacin, B12
 - Lacks calcium
 - Phosphorous
 - Zinc
- Nutrition deficiencies lead to:
 - Reduced bone mineral density
 - Constipation
 - Iron deficiency anemia
- Special Dietary products (Gluten Free, Diabetic, Low Salt, etc.) are not required to enrich or fortify by the FDA.
- Gluten Free Diets average less than 6 g/day of fiber
 - Most American's usual intake averages only 11-15 g per day
- Weight gain on GFD due to high fat, sugar and calorie content

Gluten Free ~~=~~ Weight Loss

- Diet based on naturally gluten free foods
 - Fruit, vegetables, lean meats, low fat dairy, whole gluten free grains (quinoa, wild rice etc), healthy fats.
 - OR
- Replacing high calorie gluten foods for gluten free foods
 - Cakes, pies, brownies, cookies and cupcakes have the same high calories, sugar and fat in both

Weight Gain Research

- Leffler and colleagues showed that weight does change on the gluten-free diet
 - 679 subjects, whose diet adherence was scored by an expert dietitian
 - *Type of presentation, i.e. GI vs non-GI, was not linked to average baseline BMI or diet adherence*
 - 15.8% of subjects who began the study at a low or normal BMI *increased to an overweight BMI*
 - 22% of subjects who were overweight at the time of diagnosis *also gained weight*
 - The more closely subjects followed the gluten-free diet, the more likely they were to gain weight...*however, there is a link between obesity at diagnosis and subsequent poor dietary adherence*

Reasons for Weight Gain

- Weight gain on a gluten-free diet is due to a number of factors:
 - Better absorption and healing of the intestine
 - Patients feel better, and therefore eat more
 - Higher calorie food items on the gluten-free food, i.e. packaged, processed foods
 - “Portion distortion” - patients who were undiagnosed were often able to eat larger portions without gaining weight

Gluten-free products

- Traditionally used starches not whole grain flours
- Typically use white rice, potato, tapioca and corn
- Additional ingredients
 - Added oils and fat (commonly palm oil for texture)
 - Added sugar
 - Added protein (soy, eggs, whey protein)
 - Added gums for stability and moisture (guar, xanthum, cellulose)

Nutritional Deficiencies of Gluten-Free Diet

- Thompson, et al
 - Population 47 adults
 - Review of three day food intake records
 - Results:
 - RDA's:
 - Fiber: 46% females, 88% males
 - Calcium: 31% females, 63% males
 - Iron: 44% females, 100% males
- Grain intake is lower
 - 37% males to 79 % of females -Not enough grain products
 - **Majority of grain foods consumed were quick breads (donuts and muffins) followed by cold cereals and savory snacks**
 - **Rice was main side dish consumed**

» Thompson, 2005. Consumption Patterns of Americans, previously unreported data



A gluten free (GF) diet: is it nutritionally adequate?

- Lower caloric^{3,5} and fiber intake¹⁻², but a higher intake of total and saturated fat³⁻⁴ were observed in the diet of celiac patients compared to healthy control subjects;
- Lower levels of folate, niacin, vitamin B12, vitamin E, vitamin A, phosphorus, calcium, zinc and selenium were described in celiac individuals than in control subjects ^{1-3, 6-8}.
- Several studies reported that the celiac population do not introduce the recommended amounts of energy ³, fiber ^{3,4,7}, several minerals ^{3,4,7} and vitamins ^{3,4,7}.

¹Grehn et al., 2001; ²Wild et al., 2010; ³Kinsey et al., 2008; ⁴Dall'Asta et al., 2012; ⁵Bardella et al., 2000; ⁶Thompson et al., 2005; ⁷Stepherd and Gibson, 2012; ⁸Hallert et al, 2002.

Solution: Use the alternative grains

Surveys have found that adults with CD on a GFD consume less than recommended amounts of:

Fiber	Calcium	Iron	Folate & B vitamins
Buckwheat	Amaranth	Quinoa	Amaranth
Brown rice	Quinoa	Amaranth	Millet
Amaranth	Teff	Teff	Teff
Quinoa		Millet	Quinoa

Gluten Free ~~=~~ Grain Free

Alternate grains = Use a variety of grains and flours

Amaranth

Millet

Sorghum

Buckwheat

Quinoa

Teff

Corn

Rice

Wild Rice

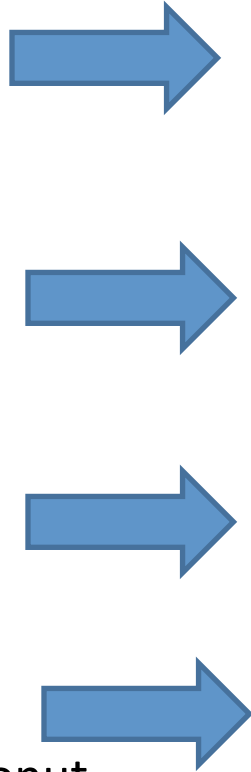
Nutritional Adequacy

- *The effect of substituting alternative grains in the diet on the nutrient profile of the gluten-free diet*
 - AR Lee, DL Ng, E Dave, J Ciaccio, PHR Green Journal of Human Nutrition and Dietetics 2009 22;359-353
- 50- 3 day food records & averaged into 1 person
- Substituted oats at breakfast, high fiber brown rice bread at lunch and Quinoa as a side dish at dinner

Comparisons of Dietary Patterns

Typical GFD

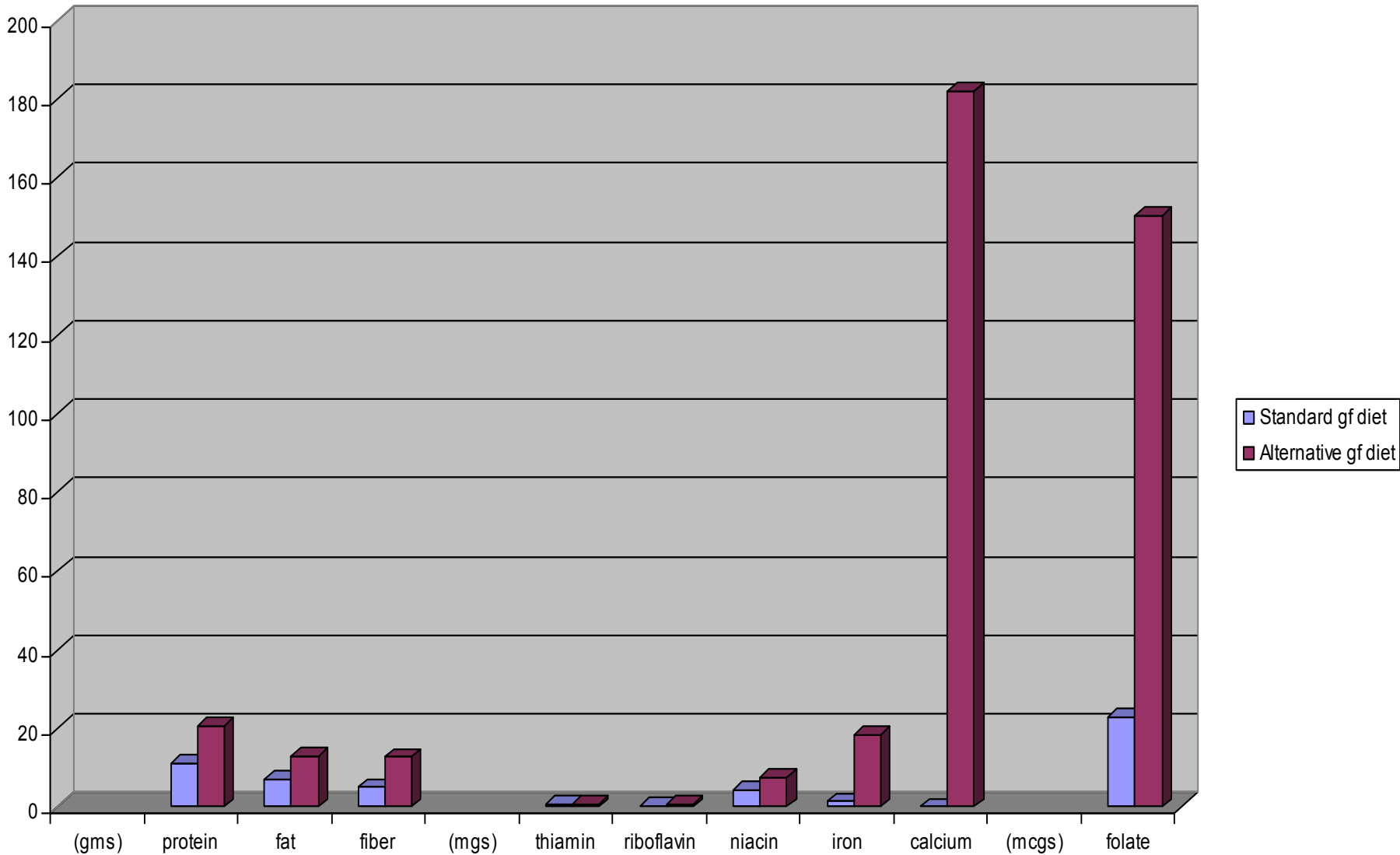
- Breakfast
 - Rice cereal
- Lunch
 - Tapioca bread
- Dinner
 - Rice/gf pasta
- Snacks
 - Chips, cookies, donut



Alternative grains in GFD

- Breakfast
 - GF Oatmeal
- Lunch
 - High Fiber gf bread
- Dinner
 - Quinoa
- Snacks
 - Chickpea flour cookie

Nutrient comparison of standard vs alternate diet



Nutritional Impact on Quality of Life

- Addition of alternate grains increases the nutrient density of the diet
 - increase in some nutrients
 - Protein
 - Iron
 - Calcium
 - Fiber
 - Folate
- Adds flavor, satiety and variety
 - May increase compliance
- May decrease economic burden of diet
 - GFF cost on average 242% more than non-GFF– range 5-1000%

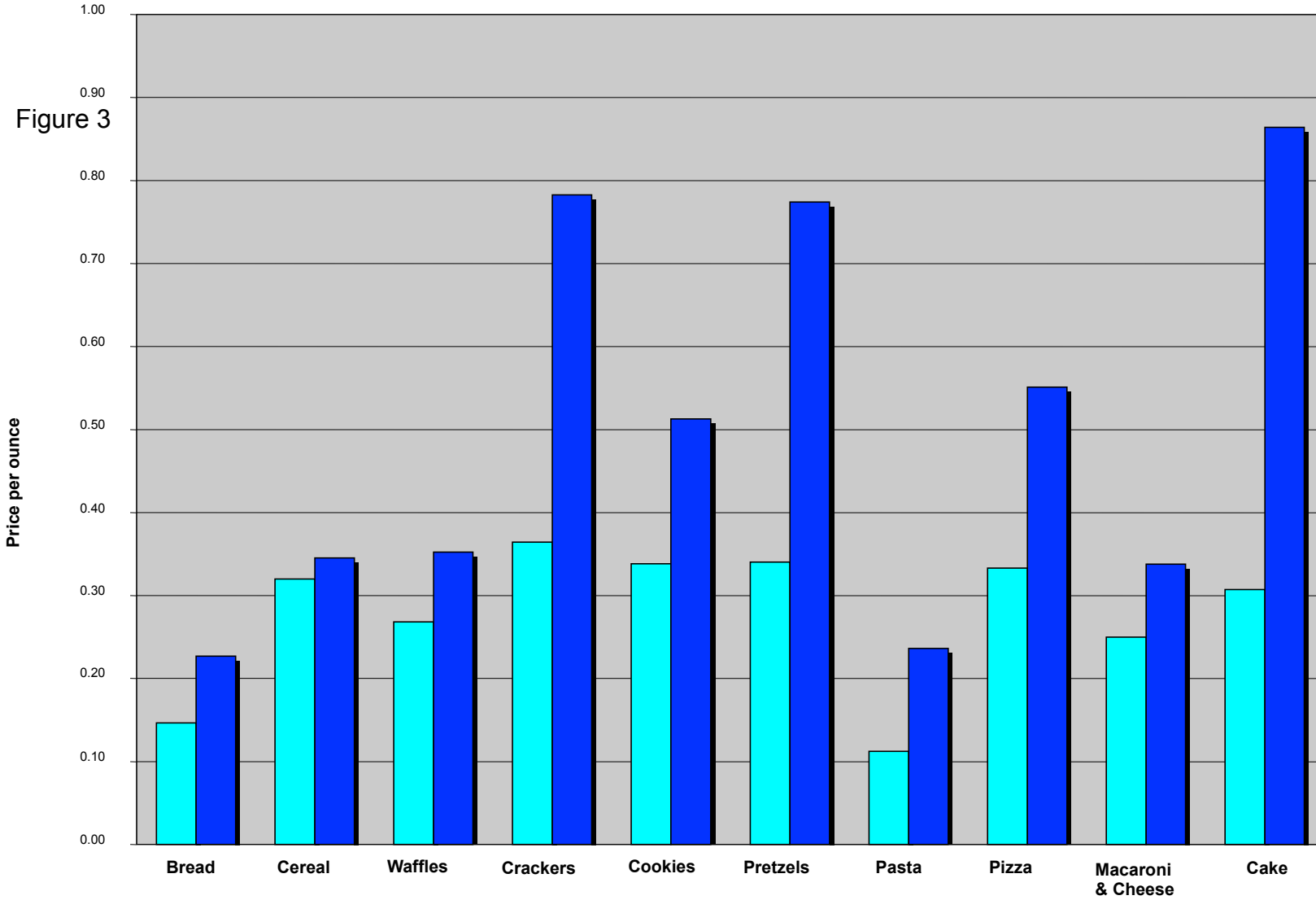
Lee AR, Ng DL, Dave E, Ciaccio EJ, Green PH. The effect of substituting alternative grains in the diet on the nutritional profile of the gluten-free diet. *Journal of human nutrition and dietetics : the official journal of the British Dietetic Association* 2009;22(4):359-63.

Zannini E. et al. *Annu Rev Food Sci Technol.* 2012;3:227-45

Comparison of Regular and Gluten-Free Products: Values are mean of price per ounce of all venues in all regions



Figure 3



Barriers to Compliance: Require Help from a Skilled Dietitian

- Diet too restrictive
 - Cross contamination
 - No allowance for occasional “cheating”
- Uncomfortable in social setting
 - Dining away from home
 - Religious considerations
- Too expensive
 - Gluten free foods can be 3 -5 X more expensive than their wheat counterpart
- Tasteless
- Too difficult
 - Elderly
 - Illiterate
 - Mental/psychological impairment

Gluten Free and Grain Free...
More Nutritional Difficulties

A Sample Paleo Menu For One Week

- **Breakfast:** Eggs and vegetables, fried in [coconut oil](#). One piece of fruit.
- **Lunch:** Chicken salad, with olive oil. Handful of nuts.
- **Dinner:** Burgers (no bun), fried in butter, with vegetables and some salsa.
- **Tuesday**
- **Breakfast:** Bacon and eggs, with a piece of fruit.
- **Lunch:** Leftover burgers from the night before.
- **Dinner:** Salmon, fried in butter, with vegetables.
- **Wednesday**
- **Breakfast:** Meat with vegetables (leftovers from night before).
- **Lunch:** Sandwich in a lettuce leaf, with meat and fresh vegetables.
- **Dinner:** Ground beef stir fry, with vegetables. Some berries.
- **Thursday**
- **Breakfast:** Eggs and a [fruit](#).
- **Lunch:** Leftover stir fry from the night before. A handful of nuts.
- **Dinner:** Fried pork, with vegetables.
- **Friday**
- **Breakfast:** Eggs and vegetables, fried in coconut oil.
- **Lunch:** Chicken salad with olive oil. Handful of nuts.
- **Dinner:** Steak with vegetables and sweet potatoes.
- **Saturday**
- **Breakfast:** [Bacon](#) and eggs, with a piece of fruit.
- **Lunch:** Leftover steak and vegetables from the night before.
- **Dinner:** Baked salmon with vegetables and avocado.
- **Sunday**
- **Breakfast:** Meat with vegetables (leftovers from night before).
- **Lunch:** Sandwich in a lettuce leaf, with meat and fresh vegetables.
- **Dinner:** Grilled chicken wings, with vegetables and salsa.
- There is usually no need to track calories or macronutrients (protein, [carbs](#) or fat) on the paleo diet, at least not in the beginning.
- However, if you need to lose a lot of weight then it is a good idea to cut carbs somewhat and limit your intake of nuts and potatoes.

Comparison of nutrients on Paleo vs diet with grains added

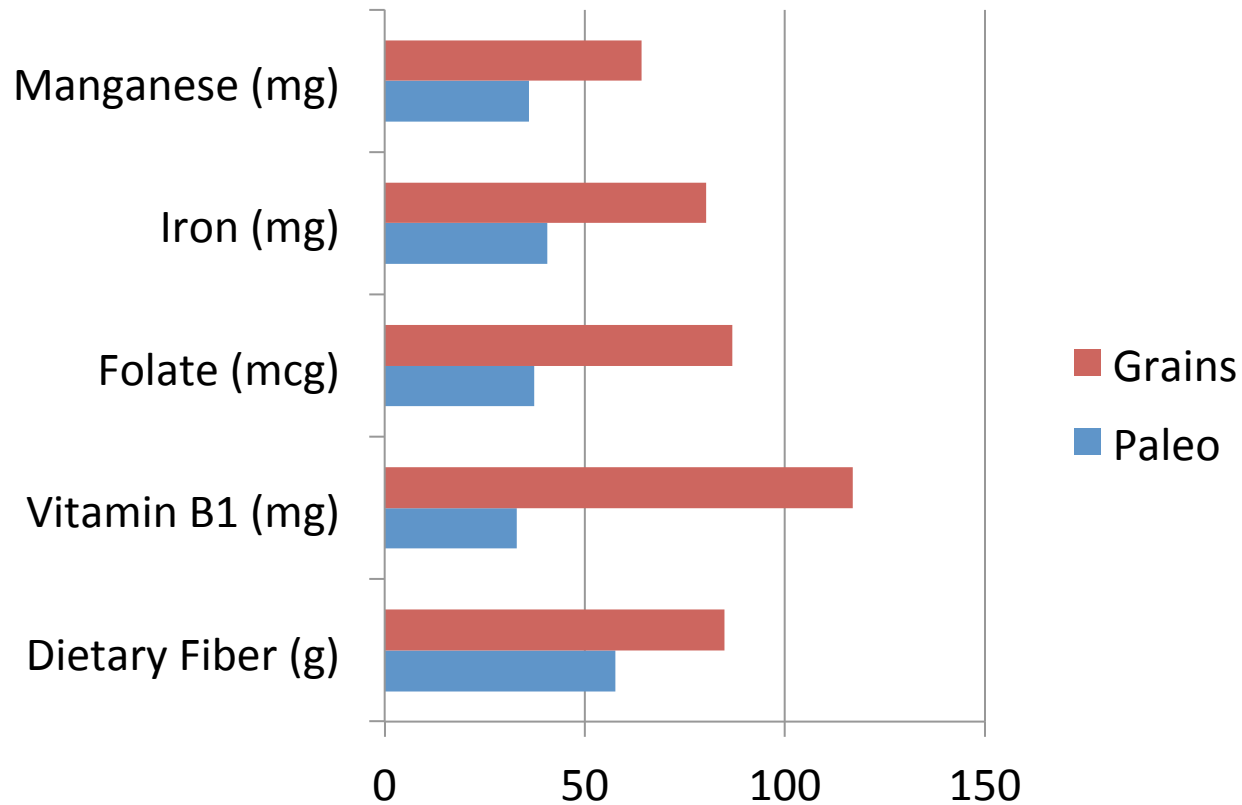
Ex: Paleo day

- **Breakfast:** Eggs and vegetables, fried in coconut oil . One piece of fruit.
- **Lunch:** Chicken salad, with olive oil. Handful of nuts.
- **Dinner:** Burgers (no bun), fried in butter, with vegetables and some salsa.

Added recommend grains

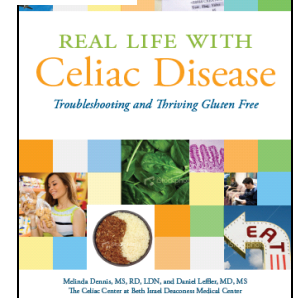
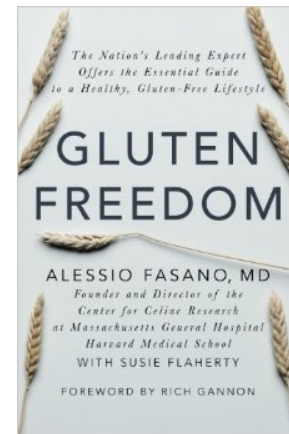
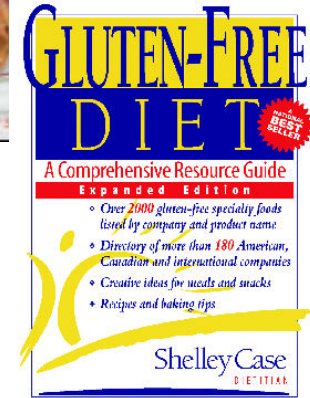
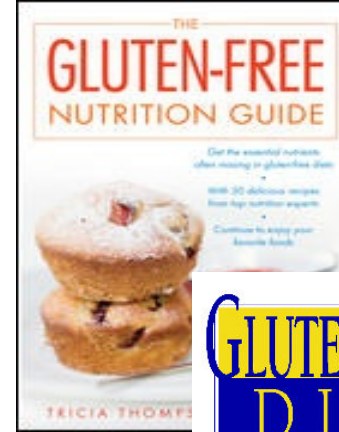
- **Breakfast:** Eggs and vegetables, fried in coconut oil. One piece of fruit. **2 slices whole grain toast**
- **Lunch:** Chicken salad, with olive oil. Handful of nuts. **1cup enriched pasta**
- **Dinner:** Burgers (no bun), fried in butter, with vegetables and some salsa. **2 hamburger buns**

Comparison of Nutrients in Paleo vs. Grain Diets (% Rcmd)



Analysis by Food Processor

Recommended Resources



- *The Gluten-Free Nutrition Guide* by Tricia Thompson
- *Gluten-Free Diet: A Comprehensive Resource Guide* by Shelley Case
- *Real Life with Celiac Disease* by Melinda Dennis and Daniel A. Leffler
- *Gluten Freedom* by Alessio Fasano
- Medical Nutrition Practice Group
 - Dietitians in Gluten Intolerance Diseases (DIGID)
 - www.mnpgdpg.org