



# Celiac Disease

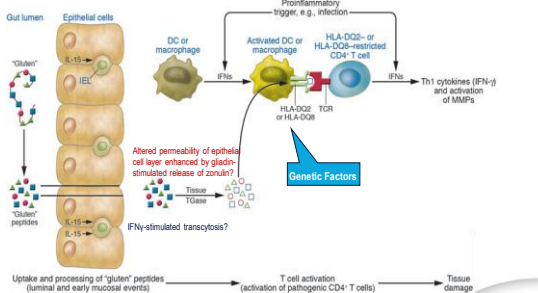


## Celiac Disease

- The most common genetically—induced food intolerance worldwide, with a prevalence around 1% (and growing!)
- An autoimmune condition triggered and sustained by the ingestion of gluten (wheat, rye, barley) in genetically predisposed individuals
- Causes an inflammatory damage of the mucosa of the small intestine resulting in a variety of clinical presentations
- Left untreated may lead to complications and increased mortality



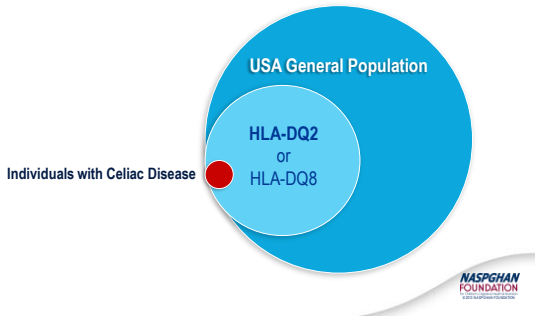
### Celiac Disease: Pathogenesis of a Model Immunogenetic Disease



Kagnoff MF. *J Clin Invest*. 2007;117(1):41-9.



### HLA-DQ2, DQ8 Are Necessary But Not Sufficient



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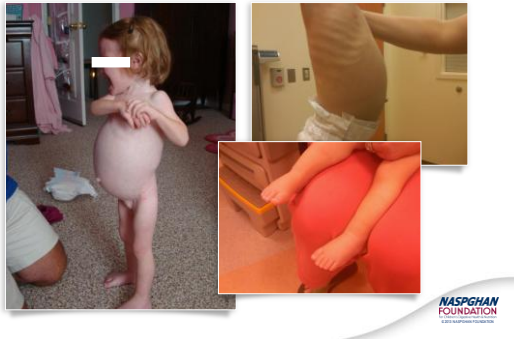
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### "Typical" Celiac Children



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### The Gastrointestinal Presentation

- Diarrhea
- Vomiting
- Failure to thrive or weight loss
- Abdominal bloating/pain
- Constipation



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## The Extra-Intestinal Presentations

- Dermatitis Herpetiformis and other skin disorders
- Short Stature (15% of our pts!)
- Delayed Puberty
- Dental enamel hypoplasia
- Osteopenia
- Iron-deficient anemia resistant to oral Fe
- Liver and biliary tract disease (High transaminases)
- Arthritis
- Neurological problems
  - Headaches
  - Peripheral Neuropathy
  - "Gluten Ataxia"
- Fatigue
- Behavioral changes/Psychiatric Disorders
- Reduced female fertility or pregnancy adverse events



## Current Classification of Celiac Disease Presentations

Type	Serology (TG and/or EMA)	Age affected	Symptoms	Pathology
Intestinal	Positive	Toddler, Young Child	Abdominal Pain, Distention Diarrhea Vomiting Anorexia Constipation	Marsh 2-3
Extra-Intestinal	Positive	Older Child Adult	Mostly extra-intestinal	Marsh 1-3
Silent	Positive	All Ages	None	Marsh 2-3
Potential	Positive	Any age	None Gastrointestinal Extra-intestinal	Marsh 0-1 (may or may not develop enteropathy if left on gluten)
Latent	Positive or Negative	Mostly Adults	None Gastrointestinal Extra-intestinal	Marsh 0-1 (previously had gluten-dependent enteropathy)



## Celiac Disease Is More Frequent In:

- Autoimmune disorders
  - Type 1 diabetes
  - Autoimmune Thyroiditis...
- Relatives of a celiac
- Genetic syndromes
  - Down
  - Turner
  - Williams



## Who Should Be Screened?

- **Subjects with suggestive GI complaints**
  - Diarrhea ( $\pm$ FTT)
  - Vomiting
  - Anorexia
  - Abdominal distention
  - Recurrent abdominal pain
  - Constipation
- **Subjects with extra-intestinal manifestations**
  - Dental enamel dysplasia
  - Short stature
  - High Transaminases
  - Fe-deficient anemia (unexplained)
  - Fatigue
  - Arthritis....




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Gluten Related Disorders Webinar

## Wheat Allergy




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### IgE-Mediated Wheat Allergy

- Food allergy, by definition, depends on an underlying immune-mediated process for its occurrence
- Food allergy is most common in the first year of life, decreasing in adolescence and adulthood
- Wheat is among the 10 most common allergens responsible for food allergy
- Prevalence rates in the first 3 years of life range 3-8%
- Most common allergens are milk, egg, corn and peanuts
- Discrepancy between parent's reports of suspected allergy and objective tests
- Clinical manifestations include: abdominal pain, nausea, vomiting, diarrhea, skin rashes, rhinitis, conjunctivitis

Wang et al. *J Clin Invest.* 2011;121(3):827-35.  
 Venter et al. *Allergy.* 2008;63(3):354-9.  
 Inomata et al. *Curr Opin Allergy Clin Immunol.* 2009;9:238-243.




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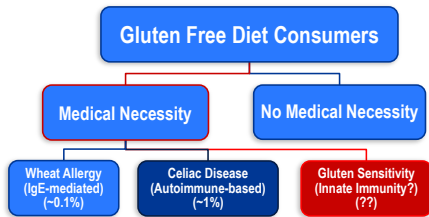
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# Non-Celiac Gluten Sensitivity



## The Gluten Free Diet: Not Only Celiac Disease



## Gluten Sensitivity: Definition

Cases of gluten reaction in which both allergic and autoimmune mechanisms have been ruled out (diagnosis by exclusion criteria)

- Negative immuno-allergy tests to wheat;
- Negative CD serology (EMA and/or tTG) and in which IgA deficiency has been ruled out;
- Negative duodenal histopathology;
- Presence of biomarkers of gluten immune-reaction (AGA+);
- Presence of clinical symptoms that can overlap with CD or wheat allergy symptomatology;
- Resolution of the symptoms following implementation of a GFD (double blind)

Sapone et al. BMC Medicine 2012, 10:13.



## Gluten Sensitivity: What Kind Of Symptoms?

### Symptoms:

- Abdominal pain: 68%
- Eczema and/or rash: 40%
- Headache: 35%
- "Foggy mind": 34%
- Fatigue: 33%
- Diarrhea: 33%
- Depression: 22%
- Anemia: 20%
- Numbness legs/arms/fingers: 20%
- Joint pain: 11%




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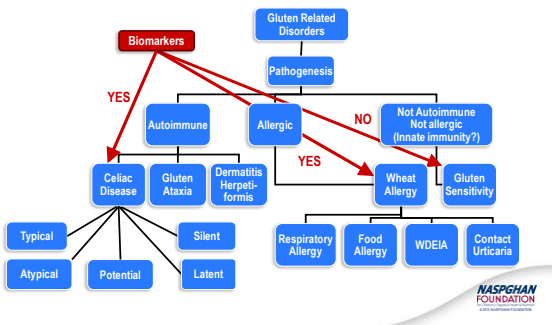
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## Proposed New Classification of Gluten Related Disorders




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### Gluten Related Disorders Webinar

## Diagnosis of Celiac Disease vs. Wheat Allergy vs. Non Celiac Gluten Sensitivity




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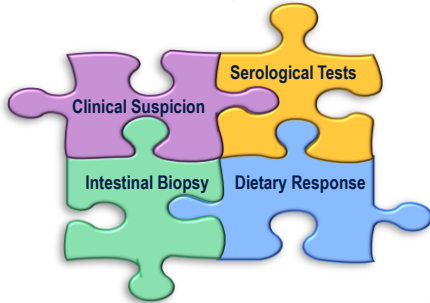
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### Celiac Diagnosis



Rubio-Tapia et al. *J Gastroenterol*. 2013; 108:656-676; doi:10.1038/ajg.2013.79; published online 23 April 2013. Hill et al. *J Pediatr Gastroenterol Nutr*. 2005;40:1-19. Husby et al. *J Pediatr Gastroenterol Nutr*. 2012;54:136-160.AGAInstitute. *Gastroenterology*. 2006;131:1977-1980.




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### Poll Question

- In a patient with symptoms of celiac disease but negative serological tests, would you advise a trial of a gluten free diet?

- A. Yes
- B. No




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### Serological Tests

- Antigliadin –IgA & IgG
- Endomysium – IgA (IgG)
- Tissue Transglutaminase – IgA (IgG)
- Deamidated Gliadin Peptides –IgA & IgG

Rubio-Tapia et al. *J Gastroenterol*. 2013; 108:656-676; doi:10.1038/ajg.2013.79; published online 23 April 2013. Hill et al. *J Pediatr Gastroenterol Nutr*. 2005;40:1-19. Husby et al. *J Pediatr Gastroenterol Nutr*. 2012;54:136-160.AGAInstitute. *Gastroenterology*. 2006;131:1977-1980.




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## Frequently Overlooked Foods That May Contain Gluten

- Broth
- Candy
- Communion wafers
- Imitation bacon
- Imitation seafood
- Marinades
- Processed meats
- Roux
- Sauces
- Soup base
- Soy sauce
- Thickeners
- Medications



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## Gluten Free Food Labeling

In 2004, the Food Allergen Labeling and Consumer Protection Act (FALCPA) requires that companies identify in "plain English" the eight most prevalent food allergens:

egg, fish, milk, peanuts, shell fish, soybean, tree nuts and **WHEAT**

### Including the ingredient list with parentheses

- *Ingredients: Enriched flour (wheat flour, malt flavoring, niacin, reduced iron, thiamin mononitrate, riboflavin, folic acid), sugar, partially hydrogenated soybean oil, high fructose corn syrup, whey (milk), eggs, salt, leavening*

### Use a "Contains" statement

- *Ingredients: Enriched flour (wheat flour, malt flavoring, niacin, reduced iron, thiamin mononitrate, riboflavin, folic acid), sugar, partially hydrogenated soybean oil, high fructose corn syrup, whey (milk), eggs, salt,*
- Contains **Wheat, Milk, Egg, and Soy**

<http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Allergens/default.htm>

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## FALCPA Does Not Include...

1. Barley (malt), rye or oat (but not "hidden" ingredients)
2. Meat products covered by USDA, including meats, poultry and certain egg products (although 90% of manufactures follow FALCPA guidelines)



3. FALCPA covers ingredients not the contamination of the product (oats)
4. Over the counter or prescription medications ([www.glutenfreedugs.com](http://www.glutenfreedugs.com))

5. Alcoholic beverages (Distilled beverages are gluten free)

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### FALCPA...Shopping Made Easier!

- For foods regulated by the FDA, the consumer should look for the terms in products **not** labeled gluten free:
  - Wheat
  - Barley
  - Malt
  - Rye
  - Oats
  - Brewer's yeast




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### Poll Question

Do you advise your patients not to purchase an item with the statement: Manufactured in a facility that contains wheat?

- A. Yes
- B. No




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### Allergen Advisory Statements

#### “Manufactured in a plant that contains wheat”

- *Voluntary* statements manufacturers use in labeling their products that could indicate the “potential” *unintended* presence of a food allergen
- Not reliable way to determine whether a food product is contaminated with gluten.
  - Products with this statement have been tested to less than 5 ppm while other products with no statement test above 20 ppms




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### Poll Question Results

Do you advise your patients not to purchase an item with the statement: Manufactured in a facility that contains wheat?

- A. Yes
- B. No

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### The Gluten Free Rule is Finally Here!

Summary of the FDA Gluten Free Label Rules enacted August 2013

- A food label gluten free must:
  - Be inherently gluten free (raw vegetables, water, 100% juice)
  - Does not contain an ingredient that is a gluten containing grain such as wheat , rye , barley
  - Does not contain an ingredient derived from a gluten containing grain that has not been processed to remove gluten
  - May contain an ingredient derived from a gluten containing grain that has been processed to remove gluten (wheat starch) as long as the food does not contain more than 20 ppm gluten
  - The food product contains less than 20 parts per million gluten
- Any unavoidable presence of gluten in the food is less than 20 ppm gluten




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### Summary of the FDA Gluten Free Label Rules

- Terms synonymous with gluten free are:
  - No gluten
  - Free of gluten
  - Without gluten
- Oats are not considered a gluten containing grain
- Applies to foods that are regulated by the FDA
  - Does not cover pet food, cosmetics, drugs, foods regulated by the USDA and beverages regulated by Alcohol Tobacco Tax and Trade Bureau (TTB)
- Manufactures are not required to test either the ingredients or the end product.
- Manufactures must be in compliance with the rule by August 2014




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### Relationship Between Gluten Amount and Disease Activity

0      10      50      500 mg      1g > 1 g of gluten/day

Normal biopsy Normal serology Symptoms generally absent (beside some "ipersensitive" cases)	Minor/small intestinal Damage Normal serology or rarely altered Symptoms generally absent	Altered biopsy Abnormal serology Symptoms sometime present
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### Translating 20 ppm

20 parts per million = 2 mg/100 gm (<0.002%)

1 slice of Bread =2500 mg of gluten or  
125,000 ppm gluten

One minute in two years




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### Tolerable Daily Intake of Gluten and ppm of Gluten in Food for Celiacs

	50 g	100 g	200 g	300 g
200 ppm	10 mg	20 mg	40 mg	60 mg
100 ppm	5 mg	10 mg	20 mg	30 mg
50 ppm	2.5 mg	5 mg	10 mg	15 mg
20 ppm	1 mg	2 mg	4 mg	6 mg




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## 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:
  - Iron deficiency anemia
  - Reduced bone mineral density
  - Constipation
- Many gluten free foods are not enriched or fortified as their wheat counterpart
- Weight gain on GFD can be due to high fat, sugar and calorie content

<http://www.adaevidencelibrary.com>




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## Recommended Standard CD Labs

- CBC (hemoglobin, hematocrit, etc)
- 25 OH Vitamin D
- B12
- Folate
- Iron and Ferritin
- Zinc
- Lipids
- Total IgA, IgA-tTG
- Magnesium
- Calcium

As Needed	
Parathyroid hormone	Fat soluble vitamins A,E,K
Folate	Lipids
Other B vitamins	Selenium, Copper




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## Common Nutritional Problems on GFD

- Lactose intolerance
  - 30-60% in newly diagnosed
  - Caused by intestinal injury in untreated CD
  - May resolve on GF diet
- Constipation
  - Change in diet, low fiber from high fiber can cause constipation: abdominal pain, cramping, bloating
- Weight gain




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## Weight Gain Research

- Dr. Dan Leffler and colleagues showed that weight does change on the gluten-free diet
  - 679 subjects, whose diet adherence was scored by an expert diettitian
    - 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

Kabbani et al. *Aliment Pharmacol Ther.* 2012 ; 35(6):723-9.




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## 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




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## "Non-responsive" Celiac Disease

Persistent or recurrent signs/symptoms despite confirmed & treated CD occurs in ~10% of patients (range 10 – 30%)

- Gluten Exposure 36 – 51%
- IBS 18%
- Refractory 2%
  - Type 1 benign prognosis , more common
  - Type 2 refractory very rare, associated with T-cell lymphoma
- Di/monosaccharidase Deficiency 9%
- Microscopic Colitis 7%
- Small Intestinal Bacterial Overgrowth 6%
- Eating Disorder 6%
- Other 8% Peptic ulcer disease, Crohn's disease, Food allergy, Gastroparesis




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## Gluten Exposure

- Recheck labels of favorite everyday foods as ingredients can change. Check label of foods not labeled gluten free for ingredients
- Look for sources of contamination at home and away from home.
  - Toaster, condiment containers, colanders
  - Meal prep: making gluten free along side gluten containing foods
  - Eating at restaurants, school, daycare or social events




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## Barriers to Compliance

- 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




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## Academy of Nutrition and Dietetics Resources

- Evidence Analysis Library (EAL) on CD  
[www.adaevidencelibrary.com](http://www.adaevidencelibrary.com)



- Celiac Disease Toolkit  
Companion to AND's EAL on CD

- Dietitians in Gluten Intolerance Diseases (DIGID)
  - a subunit of the Medical Nutrition Practice Group
  - [www.mnpgdpg.org](http://www.mnpgdpg.org)




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## Books and Guides

- NASPGHAN Foundation Book: A Clinical Guide to Gluten-Related Disorders

by Alessio Fasano



- Celiac Disease Nutrition Guide

by Tricia Thompson

- ADA Pocket Guide to Gluten-Free Strategies for clients with Multiple Diet Restrictions

by Tricia Thompson



- Gluten Free Diet Guide for Families (English and Spanish)

by NASPGHAN Foundation




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## Credit Claiming

You must complete a brief evaluation of the program in order to claim your credits and download your certificate. The evaluation will be available on [www.CE.TodaysDietitian.com](http://www.CE.TodaysDietitian.com) for 3 months; you do not have to complete it today.

### Credit Claiming Instructions:

1. Go to [www.CE.TodaysDietitian.com/GlutenDisorders](http://www.CE.TodaysDietitian.com/GlutenDisorders) OR Log in to [www.CE.TodaysDietitian.com](http://www.CE.TodaysDietitian.com) and go to My Account→ My Activities→ Courses (in Progress) and click on the webinar title.
2. Click "Continue" on the webinar description page. Note: You must be logged-in to see the "Continue" button.
3. Select the Evaluation icon to complete and submit the evaluation.
4. Download and print your certificate.

**Please Note:** If you access the Evaluation between 3-4 pm ET on 5-28, you may experience a slow connection due to a high volume of users.




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