



# Medical Nutrition Therapy in Lower Gastrointestinal Diseases: Celiac Disease

فاطمه رمضانی

فوق دکترا و متخصص تغذیه ورژیم درمانی

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# Outline

Intestine Structure & function

Gut Microbiome & dysbiosis

Celiac disease & gluten related disorders

Inflammatory bowel disease

- Ulcerative Colitis

- Crohn's disease

Irritable Bowel Disease

Diverticular Diseases

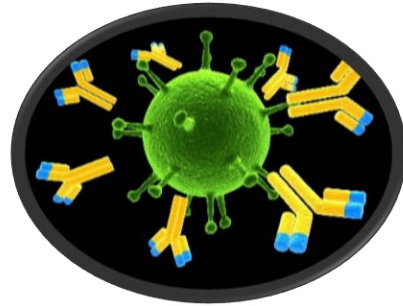
- Diverticulosis

- Diverticulitis

# Celiac Disease

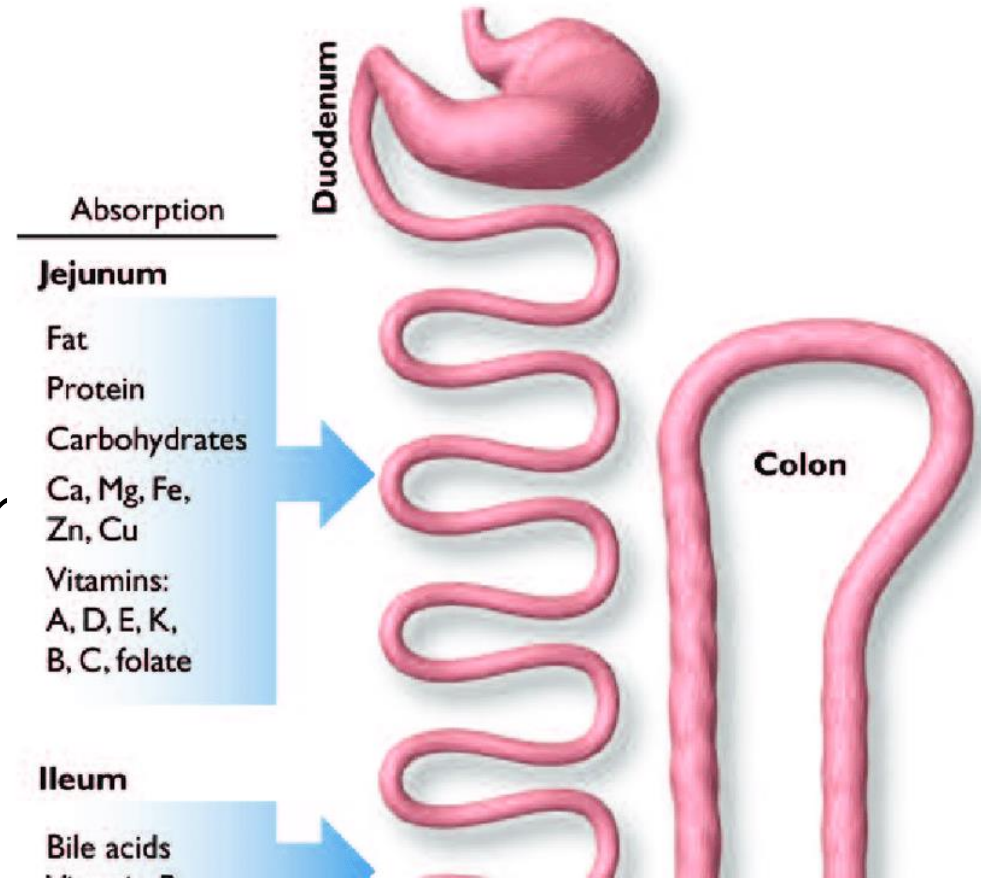
❖ Celiac (Coeliac) disease, celiac sprue or gluten-sensitive enteropathy

❖ Gluten = antigen



❖ Genetically predisposed people

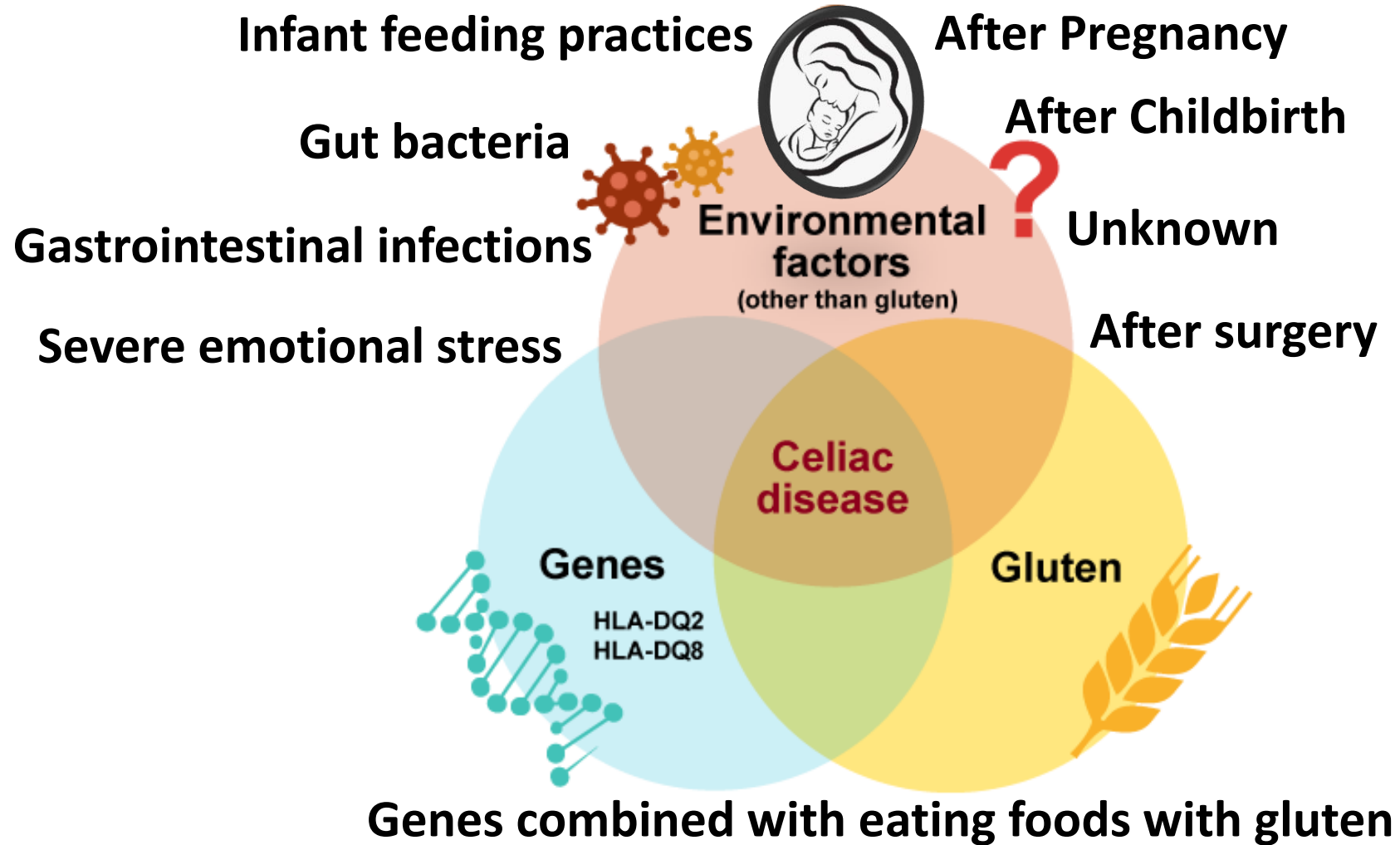
❖ Damages proximal part of the small intestine



# Gluten Related Disorders

- ❖ Celiac Disease: an autoimmune disease, gluten intake damages small intestine (3.2 million Americans; ~2.5 million undiagnosed)
- ❖ Wheat **NOT GLUTEN** Allergy: The immune system overreacts to wheat which can be life-threatening (0.4% of Americans)
- ❖ Non-Celiac Gluten Sensitivity (Gluten Intolerance): negative test for celiac disease but reacting severely to gluten intake (6% of Americans)

# Celiac Disease: Causes



# Celiac Disease: Risk factors



# Sign & Symptoms

## **Gastrointestinal s/s:**

- Malabsorption of nutrients (Iron, Calcium, Folate, vitamin D)
- Weight loss
- Diarrhea
- Bloating, gas & constipation
- Abdominal pain
- Nausea & vomiting



# Signs & Symptoms

## **Non-Gastrointestinal s/s:**

- Anemia (Iron deficiency)
- Osteoporosis: Loss of bone density
- Osteomalacia: softening of bone
- Skin disorder: Dermatitis herpetiformis
- Mouth ulcers
- Nervous system injury (numbness & tingling, problems with balance, & cognitive impairment)
- Joint pain
- Hormonal symptoms: (Painful and/or irregular periods, Infertility, Low libido, Headaches, Fatigue, Weight gain, Mood swings and irritability, Insomnia)



# Celiac Disease vs. Gluten Intolerance

- ✓ Nearly identical symptoms with gluten intake
- ✓ Improved symptoms with a gluten-free diet in both of them
  
- ❖ “Celiac disease” is an immune system disorder but “gluten intolerance” is a digestive disorder
  
- ❖ “Celiac disease” damages the small intestine with even a tiny amount of gluten but no damage with “gluten intolerance”
  
- ❖ Celiac disease runs in families but not in gluten intolerance

# Celiac disease or gluten intolerance vs. wheat allergy

✓ A mild “wheat allergy” = “celiac disease” or “gluten intolerance”

❖ Severe wheat allergy signs & symptoms:

- Anaphylaxis; causes swelling and trouble breathing
- Headache
- Runny nose, congestion, or sneezing
- Wheezing or asthma attack

❖ Eating, **smelling, or inhaling** wheat triggers severe allergy but not in “celiac disease” and “gluten intolerance”.

# Preparing for your test

- ❖ Until appointment, continue eating a normal diet
- ❖ Cutting gluten before testing for celiac disease can change the test results



# Celiac Disease Diagnosis: Blood & Genetic Test

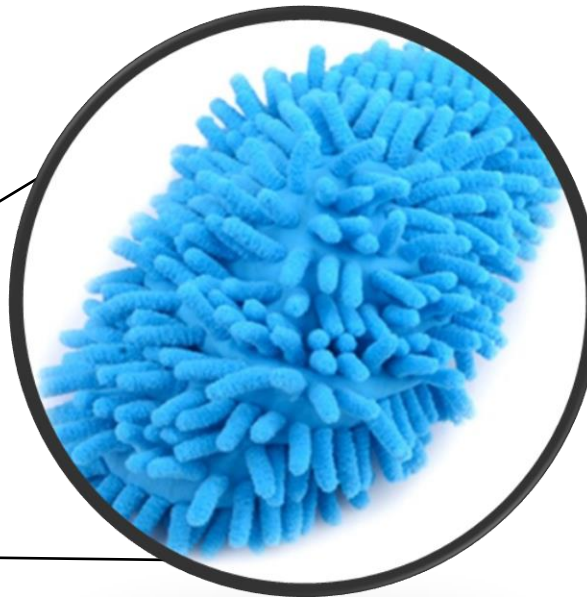
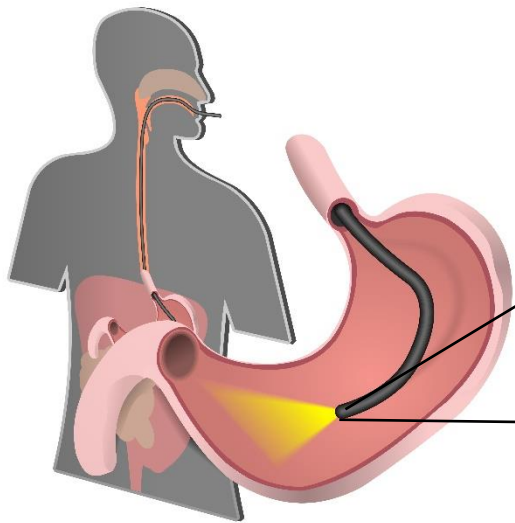
- **Serology testing** (Antibody testing):  
Anti-tissue transglutaminase antibody IgA TTG  
(first test recommended)
- **Genetic testing** for human leukocyte antigens (HLA-DQ2 and HLA-DQ8).



# Celiac Disease Diagnosis: Endoscopy

❖ Diagnostic standard confirmation

❖ Upper gastrointestinal endoscopy



Normal Intestine



Celiac Disease

# Celiac Disease Diagnosis: Biopsy

Taking a small tissue sample to analyze for damage to the villi

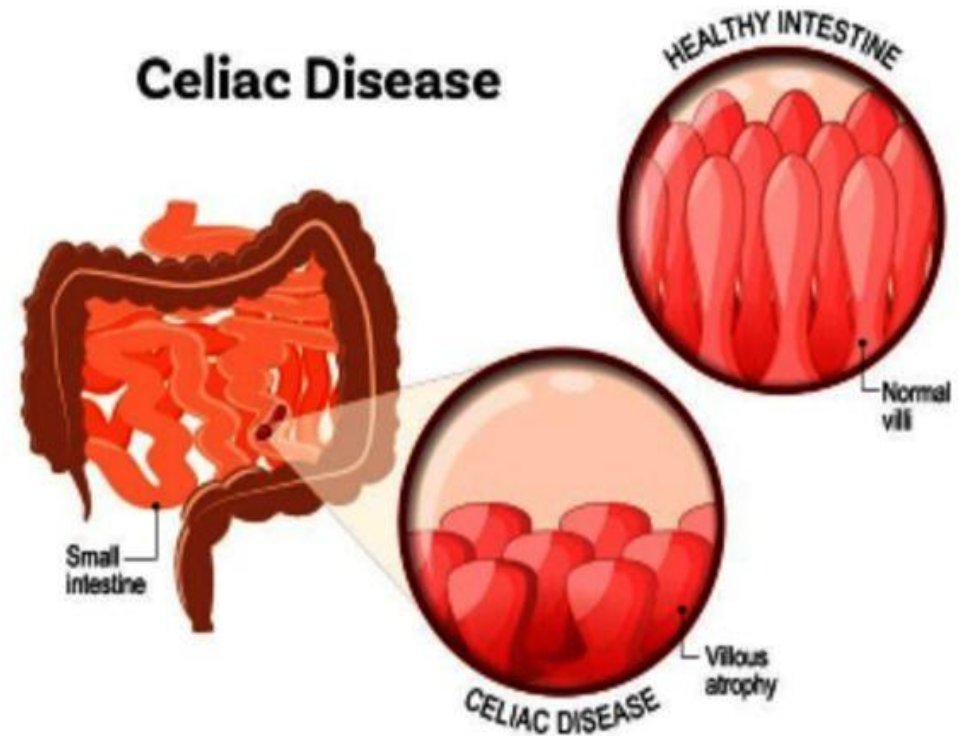


# Celiac Disease Diagnosis: Capsule Endoscopy Camera

- ❖ Is about the size of a large vitamin pill
- ❖ Contains lights & a tiny wireless camera



Capsule endoscopy



# Wheat allergy diagnosis

- ❖ Blood tests: Ig E
- ❖ Skin-prick test
- ❖ Oral food challenge





# Gluten Intolerance Diagnosis

✓ There isn't a gluten intolerance test

1- Negative blood tests for celiac disease and wheat allergy following 6 weeks of gluten diet

2- Improved symptoms with a gluten-free diet for at least 6 weeks

3- Returned symptoms with gradual reintroduce of gluten back into diet

# Celiac Disease: Similar Symptoms, Different Care

**Other digestive problems mimicking celiac disease:**

- ❖ Crohn's disease
- ❖ Irritable bowel syndrome
- ❖ Ulcerative colitis
- ❖ Infected colon (diverticulitis)
- ❖ Intestinal infections
- ❖ Small intestinal bacterial overgrowth
- ❖ Gastroparesis
- ❖ High FODMAP foods

# Medical Nutrition Therapy in Celiac disease

## **Goals:**

- Promote optimal health
- Improve gastrointestinal symptoms
- Prevent & treat malabsorption/malnutrition and other comorbidities
- Improve quality of dietary intake
- Maintenance or achievement of a normal body mass index or weight
- Improve celiac disease-related antibodies
- Improve inflammatory and immunological indicators
- Improve quality of life

# Gluten-Free Diet

- ❖ A strict, lifelong gluten-free diet (elimination gluten from diet) is the only way to manage both celiac disease & gluten intolerance.
- ❖ Wheat allergy: avoiding wheat in diet

# What is Gluten?

- Wheat: Glutenin, Gliadin



- Rye: Secalin



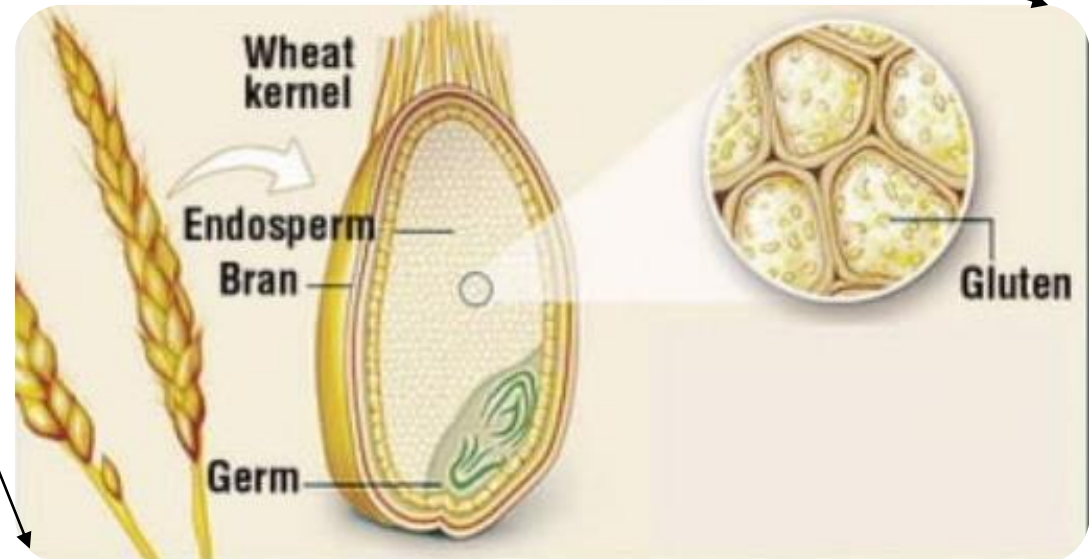
- Barley: Hordenine



- Oat: Avenine



A structural protein (Sticky)



# Bread, Cereal and grain

- Wheat
- Whole wheat flour
- Enriched flour
- Soft wheat flour
- High gluten flour
- High protein flour
- Whole wheat berries
- Wheat starch
- All flour containing wheat
- Wheat germ
- Durum
- Durum flour
- Farina
- Bread crumbs
- Pretzels
- Barley
- Bulgur
- Malt
- Rye
- Semolina
- Bran
- Kasha
- Spelt
- Kamut
- Triticale
- Couscous
- Seitan
- Groats
- Matzo
- Commercially prepared mixes with biscuit
- Corn bread
- Muffins
- Waffles
- Gelatinized starch (wheat protein)
- Commercial oat products contaminated with wheat in processing
- Pasta
- Regular noodles
- Spaghetti
- Macaroni
- Pack aged rice dishes
- Cracker meals



## Milk/Dairy

- Malted milk, Ovaltine, chocolate milk with cereal additives
- Some Sour cream
- Some yogurt with complementary ingredients
- Some nondairy creamers
- Product containing lactose



## Meat/ Fish/ poultry

- Meats prepared with wheat, rye, and barley (bologna, chili, hot dogs, luncheon meats, sandwich spreads)
- Creamed meats
- Breaded, bread-containing products (croquettes, Swiss steak, meatloaf)
- Meats injected w/ hydrolyzed vegetable protein
- Tuna in vegetable broth
- Meat/ meat alternatives containing gluten stabilizers
- Egg in sauce with gluten



## Fruits and vegetables

- Breaded/ creamed vegetables or vegetable in sauce
- Canned, baked beans
- Some commercially prepared vegetables and salads
- Thickened or prepared fruits
- Some pie fillings



## Fats, Oil, Sweets

- Some commercially prepared salad dressing
- Some commercial candies, chocolate-coated nuts
- Commercial cakes, cookies, pies, doughnuts made with wheat, rye, barley
- Prepared dessert mixes including cookies, cakes
- Pudding thickened with wheat flour
- Ice cream sherbet with gluten stabilizer, Ice cream containing cookies, crumbs, cheesecake, ice cream cones





## Miscellaneous

- Herbal teas with malted barley or other grain with gluten
- Most canned soups
- Most cream soups
- Most soup mixes
- Bouillon
- Some curry powder
- Dry seasoning mixes
- Gravy extracts
- Meat sauces
- Catsup
- Mustard
- Horseradish
- Chewing gum
- Distilled white vinegar
- Cereal extract
- Cereal beverages (Postum)
- Root beer
- Yeast extract
- Malt syrup
- Malt vinegar
- Commercial infant dinners w/ flour thickeners
- Caramel color and MSG may not be tolerated
- Soy sauce
- Chip dip



# Alcohol

- Ale
- Beer
- Whiskies
- Vodka distilled from grain



# Nonresponsive Celiac Disease

- ❖ Contamination of the diet with gluten: even trace amounts can be damaging with no signs or symptoms
- ❖ Bacteria in the small intestine (bacterial overgrowth)
- ❖ Microscopic colitis
- ❖ Poor pancreas function (pancreatic insufficiency)
- ❖ Irritable bowel syndrome
- ❖ Difficulty digesting sugar found in dairy products (lactose), table sugar (sucrose), or a type of sugar found in honey and fruits (fructose)

# Cross-Contamination Prevention

Risk of cross-contamination in shared kitchens and dining environments

- ❖ Use separate cooking utensils, cutting boards, and toasters
- ❖ Recommend thoroughly cleaning surfaces, utensils, and cookware before preparing gluten-free meals

# Hidden Sources of Gluten

Foods, Medications & nonfood products:

- ❖ Modified food starch, preservatives, & food stabilizers
- ❖ Prescription & over-the-counter medications
- ❖ Vitamin and mineral supplements
- ❖ Herbal & nutritional supplements
- ❖ Lipstick products
- ❖ Toothpaste & mouthwash
- ❖ Envelope & stamp glue



# Dining out

- Avoid packaged foods unless they're labeled as gluten-free or have no gluten-containing ingredients,
- Packaged foods that can contain gluten include:
  - ✓ Beers, lagers, ales & malt vinegars
  - ✓ Candies
  - ✓ Gravies
  - ✓ Imitation meats or seafood
  - ✓ Processed luncheon meats
  - ✓ Rice mixes
  - ✓ Salad dressings and sauces (soy sauce)
  - ✓ Seasoned snack foods, such as tortilla & potato chips
  - ✓ Seitan
  - ✓ Self-basting poultry
  - ✓ Soups


# How to Read Food labels

Read Food labels for ingredients made from parts of one of the grains:

- ❖ Cereal
- ❖ Starch
- ❖ Flour
- ❖ Thickening agents
- ❖ Emulsifiers
- ❖ Stabilizers
- ❖ Hydrolyzed vegetable proteins
- ❖ Caramel coloring
- ❖ Monosodium glutamate
- ❖ Maltodextrin



# FDA Regulations for Food Labels

- ❖ FDA (2014): a clear standard for claims on food labels with no gluten
- ❖ Any foods that carry the label “gluten-free,” “no gluten,” “free of gluten,” or “without gluten” must contain <20 ppm of gluten.
- ❖ A “gluten-free” claim isn’t required to be on a food package, 
- ❖ For naturally gluten-free foods, it may not appear even if the food is, in fact, gluten-free
- ❖ If a gluten-free claim fails to meet the requirements of the regulation is subject to regulatory action by the FDA.



# Potential Misuse of Gluten-free Claims

Report a problem with a food or its labeling:

1. Contact MedWatch, FDA's Safety Information and Adverse Event Reporting Program, at

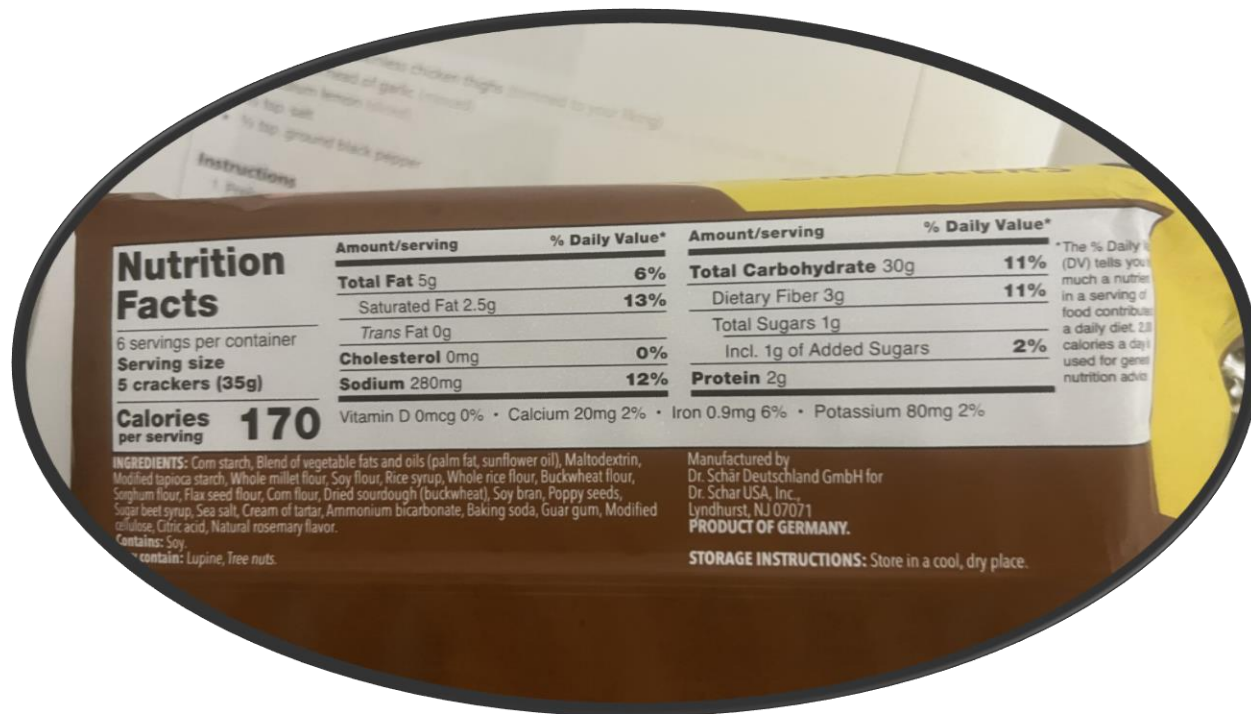
- 800-332-1088, or file a MedWatch voluntary report at <http://www.fda.gov/MedWatch>

2. Contact the consumer complaint coordinator in their area.

The list of FDA consumer complaint coordinators is available at

<http://www.fda.gov/Safety/ReportaProblem/ConsumerComplaintCoordinators>

# Report a Potential misuse of Gluten-free Claim



# FDA Regulations for Food Labels

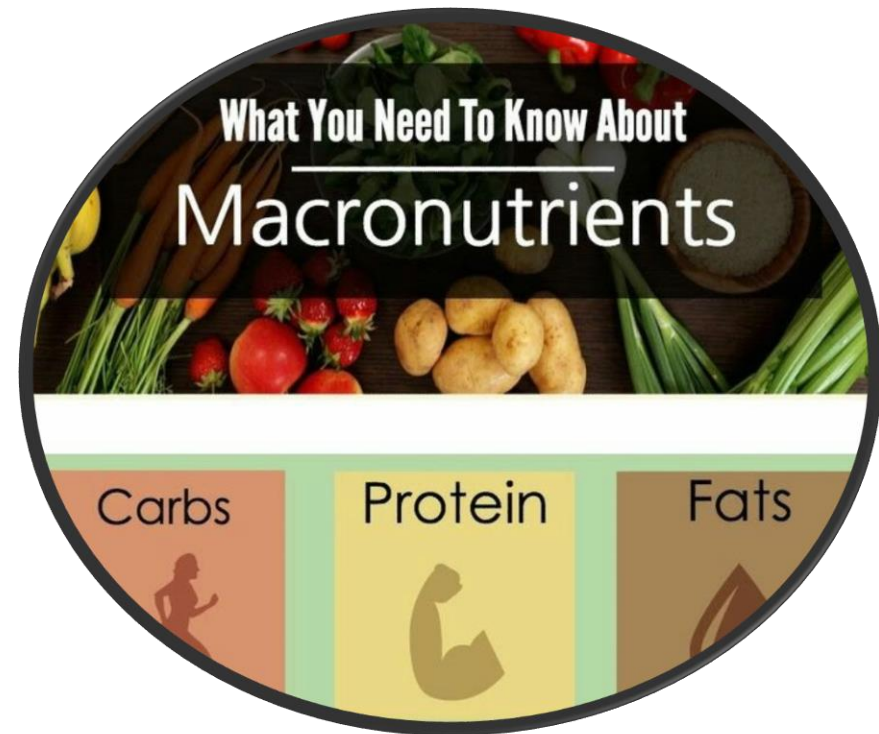
- ❖ State and local governments play an important role in oversight of restaurants.
- ❖ FDA continues to work with state and local government partners with respect to gluten-free labeling in restaurants.

# Gluten-free Diet: Only for Medical Conditions

- ❖ There's no benefit to a gluten-free diet unless you have a medical condition that requires it
- ❖ No evidence that eating gluten will trigger celiac disease
- ❖ Lower fiber intake, which is necessary for healthy digestion
- ❖ Vitamin or mineral deficiencies because gluten-free products aren't required to be enriched like gluten products are
- ❖ Gluten-containing grains are enriched with essential nutrients like B vitamins and iron

# Macronutrient needs

- ❖ Protein
- ❖ Energy (growth deficit/weight loss)
- ❖ Fiber
- ❖ Lactose intolerance
- ❖ Fat malabsorption



# Gluten-free Vitamin & Mineral Supplements

- Copper
- Folate
- Iron
- Vitamin B-12
- Vitamin D
- Vitamin K
- Zinc
- Calcium
- Magnesium
- Niacin
- Reboflavin



# How Long Does it Take to Heal

- ❖ Inflammation in the small intestine will gradually reduce with a strict gluten free diet leading to feeling better and eventually healing (weeks to months).
- ❖ Children tend to heal more quickly than adults (3 - 6 months)

# In Serious Damages

- ❖ Severe damage in the small intestine or refractory celiac disease might be treated with steroids to:
  - ❖ Control inflammation
  - ❖ Ease severe signs and symptoms of celiac disease
  - ❖ Heal intestine
- ❖ Other drugs might be used:
  - Azathioprine (Azasan, Imuran)
  - Budesonide (Entocort EC, Uceris)



# Follow-up Care

- ❖ If no symptoms: Ensure that symptoms have responded to a gluten-free diet using repeating blood tests.
- ❖ If continues to have symptoms or symptoms recur, an endoscopy may be needed

# Complications and Quality of Life

## ❖ **Malnutrition:**

- ❖ Anemia
- ❖ Weight loss

## ❖ **Gastrointestinal issues**

## ❖ **Bone weakening**

## ❖ **Infertility and miscarriage**

## ❖ **Cancer**

## ❖ **Nervous system problems**

# Coping & Support

- ❖ **Get educated and teach family and friends.** They can support your efforts in dealing with the disease.
- ❖ **Follow your RDN's recommendations.** It's critical to eliminate all gluten from your diet.
- ❖ **Find a support group:**
  - ❖ Celiac Disease Foundation
  - ❖ Gluten Intolerance Group
  - ❖ National Celiac Association
  - ❖ Beyond Celiac

# ADIME Celiac disease

## **Assessment:**

UW, decreased appetite and intake

Abdominal pain, nausea, diarrhea, steatorrhea, other non GI symptoms

Diet Hx, avoidance of specific foods

Lab value: anti-TTG antibodies, IgA, IgG, serum protein, H/H, specific nutrients

# ADIME Celiac disease

## **Nutrition diagnosis**

- Impaired nutrition utilization R/T malabsorption (Celiac, AEB steatorrhea, 7.5% UW x 3 months)

# ADIME Celiac disease

## **Interventions:**

Protein 1.0-2.0 g/kg energy for repletion of lost weight

Correct deficiencies (folate, vitamin D, Ca, Fe)

Gradually increase fiber after initial treatment

Avoid lactose if LI

MCT if fat malabsorption

Instruction on Gluten free diet

# ADIME Celiac disease

## **Monitoring and Evaluation:**

Weight

Diarrhea, steatorrhea

PO intake (Protein)

Lab value for specific nutrients

Control of GI system



**Case Study**



**Talbot, Kelly**, Female, 26 y.o.

**Allergies:** NKA

**Pt. Location:** University Gastroenterology Clinic

**Physician:** R. Smith

**Date:** 1/5

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**Patient Summary:** 26-year-old female here for evaluation of symptoms of abdominal pain, diarrhea, and joint pain

**History:**

*Onset of disease:* Patient relates having diarrhea off and on since high school but it is worse now. She has occasional abdominal pain and now has joint pain. These symptoms have made it hard for her to work, and she generally feels uncomfortable. She visited her family physician, who, after conducting screening tests, referred Mrs. Talbot to the gastroenterologist for follow-up care.

*Medical history:* 2 pregnancies—1 live birth, 1 miscarriage at 22 weeks. No other significant medical history.

*Surgical history:* N/A

*Medications at home:* Vitamins

*Tobacco use:* Yes

*Alcohol use:* No

*Family history:* What? CAD. Who? Father.

## Demographics:

*Marital status:* Married—lives with husband and 1 son; *Spouse name:* Michael

*Number of children:* 1

*Years education:* Bachelor's degree

*Language:* English only

*Occupation:* Kindergarten teacher

*Hours of work:* 7:30–3:30

*Ethnicity:* Caucasian

*Religious affiliation:* None

## Physical Exam

*General appearance:* Pale woman who complains of fatigue, diarrhea, abdominal pain, and recent onset of joint pain.

*HEENT:* Eyes: PERRLA sclera pale; fundi benign

Throat: Pharynx clear without postnasal drainage

*Genitalia:* Deferred

*Neurologic:* Intact; alert and oriented

*Extremities:* No edema, strength 4/5

*Skin:* Pale

*Chest/lungs:* Lungs clear to percussion and auscultation

*Peripheral vascular:* Pulses full—no bruits

*Abdomen:* Not distended; bowel sounds present

**Vital Signs:** Temp: 98.2

BP: 108/72

Pulse: 78

Height: 5'3"

Resp rate: 17

Weight: 125 lbs

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**Assessment and Plan:**

26-year-old female with fatigue, diarrhea, and abdominal pain with new joint pain.

**Dx:** R/O Celiac disease and anemia

**Medical Tx plan:** IgA-tTG, total serum IgA, IgG-tTG, Chem 24, hematology with differential

Gluten-free diet

Nutrition consult

..... R. Smith, MD

**Nutrition:**

*History:* Pt denies any specific problems with appetite or individual foods. States her greatest nonpregnant weight was prior to her last pregnancy, when she weighed 150 lbs. She gained 25 lbs with her pregnancy, and her full-term son weighed 6 lbs 6 oz.

*Usual dietary intake:* Likes a variety of foods.

*24-hr recall* (prior to admission):

*AM:* Toast—ww 2 slices, 1 tsp butter, hot tea with 2 tsp sugar

*Lunch:* 1 c chicken noodle soup, peanut butter & jelly sandwich (2 slices ww bread, 2 tbsp peanut butter, 2 tsp grape jelly), 1 c applesauce, 12 oz Sprite

*Dinner:* 1 c ww pasta, ½ c marinara sauce (no meat), 1 c sautéed green beans, 1 slice garlic bread, ½ c rainbow sherbet

*Food allergies/intolerances/aversions:* Maybe NutraSweet?

*Previous nutrition therapy?* No

*Food purchase/preparation:* Self

*Vit/min intake:* Multivitamin/mineral

### Laboratory Results

	Ref. Range	1/5
<b>Chemistry</b>		
Sodium (mEq/L)	136–145	141
Potassium (mEq/L)	3.5–5.1	3.7
Chloride (mEq/L)	98–107	101
Carbon dioxide (CO <sub>2</sub> , mEq/L)	23–29	27
Bicarbonate (mEq/L)	23–28	27
BUN (mg/dL)	6–20	9
Creatinine serum (mg/dL)	0.6–1.1 F 0.9–1.3 M	0.7
BUN/Crea ratio	10.0–20.0	12.85
Uric acid (mg/dL)	2.8–8.8 F 4.0–9.0 M	4.3
Est GFR, non-Afr Amer (mL/min/1.73 m <sup>2</sup> )	>60	120
Glucose (mg/dL)	70–99	72
Phosphate, inorganic (mg/dL)	2.2–4.6	2.7
Magnesium (mg/dL)	1.5–2.4	1.6
Calcium (mg/dL)	8.6–10.2	9.1
Osmolality (mmol/kg/H <sub>2</sub> O)	275–295	294
Bilirubin total (mg/dL)	≤1.2	1.0
Bilirubin, direct (mg/dL)	<0.3	0.2
Protein, total (g/dL)	6–7.8	6.0
Albumin (g/dL)	3.5–5.5	3.5
Prealbumin (mg/dL)	18–35	16 !↓
Ammonia (NH <sub>3</sub> , µg/L)	6–47	10
Alkaline phosphatase (U/L)	30–120	125 !↑
ALT (U/L)	4–36	12
AST (U/L)	0–35	8
CPK (U/L)	30–135 F 55–170 M	128
Lactate dehydrogenase (U/L)	208–378	354
Cholesterol (mg/dL)	<200	117
tTg IgA antibody (U/mL)	<4	11 !↑
tTg IgG antibody (U/mL)	<6	8 !↑

### Laboratory Results (Continued)

	Ref. Range	1/5
T <sub>4</sub> (µg/dL)	5–12	9.1
T <sub>3</sub> (µg/dL)	75–98	81
HbA <sub>1c</sub> (%)	<5.7	5.1
<b>Hematology</b>		
WBC (×10 <sup>3</sup> /mm <sup>3</sup> )	3.9–10.7	8.5
RBC (×10 <sup>6</sup> /mm <sup>3</sup> )	4.2–5.4 F 4.5–6.2 M	3.9 !↓
Hemoglobin (Hgb, g/dL)	12–16 F 14–17 M	10.5 !↓
Hematocrit (Hct, %)	37–47 F 41–51 M	34 !↓
Mean cell volume (µm <sup>3</sup> )	80–96	71 !↓
Mean cell Hgb (pg)	28–32	22 !↓
Mean cell Hgb content (g/dL)	32–36	24 !↓
RBC distribution (%)	11.6–16.5	17.1 !↑
Platelet count (×10 <sup>3</sup> /mm <sup>3</sup> )	150–350	289
Transferrin (mg/dL)	250–380 F 215–365 M	395 !↑
Ferritin (ng/mL)	20–120 F 20–300 M	17 !↓
Iron (mg/dL)	65–165 F 75–175 M	54 !↓
Vitamin B <sub>12</sub> (ng/dL)	24.4–100	65
Folate (ng/dL)	5–25	18

**Note:** Values and units of measurement listed in these tables are derived from several resources. Substantial variation exists in the ranges quoted as “normal” and these may vary depending on the assay used by different laboratories.

## Case Questions

### I. Understanding the Disease and Pathophysiology

1. What is the etiology of celiac disease? Is anything in Mrs. Talbot's history typical of patients with celiac disease? Explain. The prevalence of celiac disease appears to be increasing. What does the current literature suggest as contributors to this change in celiac disease prevalence?
2. tTG antibodies are used in serological testing to diagnose celiac disease. Each test is sensitive and specific for the antibody it measures. The tTG test has a sensitivity of more than 90%. What does this mean? It also has a specificity of more than 95%. What does this mean?
3. Mrs. Talbot presents with some nondescript symptoms of celiac disease. List the nongastrointestinal as well as the gastrointestinal clinical manifestations of celiac disease.
4. Biopsy of the small intestine continues to be the "gold standard" for diagnosis of celiac disease. Briefly describe the procedure.
5. How does celiac disease damage the small intestine?

### II. Understanding the Nutrition Therapy

6. Gluten restriction is the major component of the medical nutrition therapy for celiac disease. What is gluten? Where is it found?
7. Can patients on a gluten-free diet tolerate oats?
8. Are there any known health benefits of following a gluten-free diet if a person does not have celiac disease?
9. Can patients with celiac disease also be lactose intolerant?

10. There is a high prevalence of anemia among individuals with celiac disease. How can this be explained? What tests are used for anemia?

### III. Nutrition Assessment

11. Calculate this patient's total energy and protein needs.
12. Evaluate Mrs. Talbot's laboratory measures for nutritional significance. Identify all laboratory values that are indicative of a potential nutrition problem.
13. Are the abnormalities identified in question #12 related to the consequences of celiac disease? Explain.
14. Are any symptoms from Mrs. Talbot's physical examination consistent with her laboratory values? Explain.

### IV. Nutrition Diagnosis

15. Select two nutrition problems and complete the PES statement for each.

### V. Nutrition Intervention

16. For each of the PES statements that you have written, establish an ideal goal (based on the signs and symptoms) and an appropriate intervention (based on the etiology).
17. What type of diet would you initially prescribe, considering the possibility that Mrs. Talbot has suffered intestinal damage?

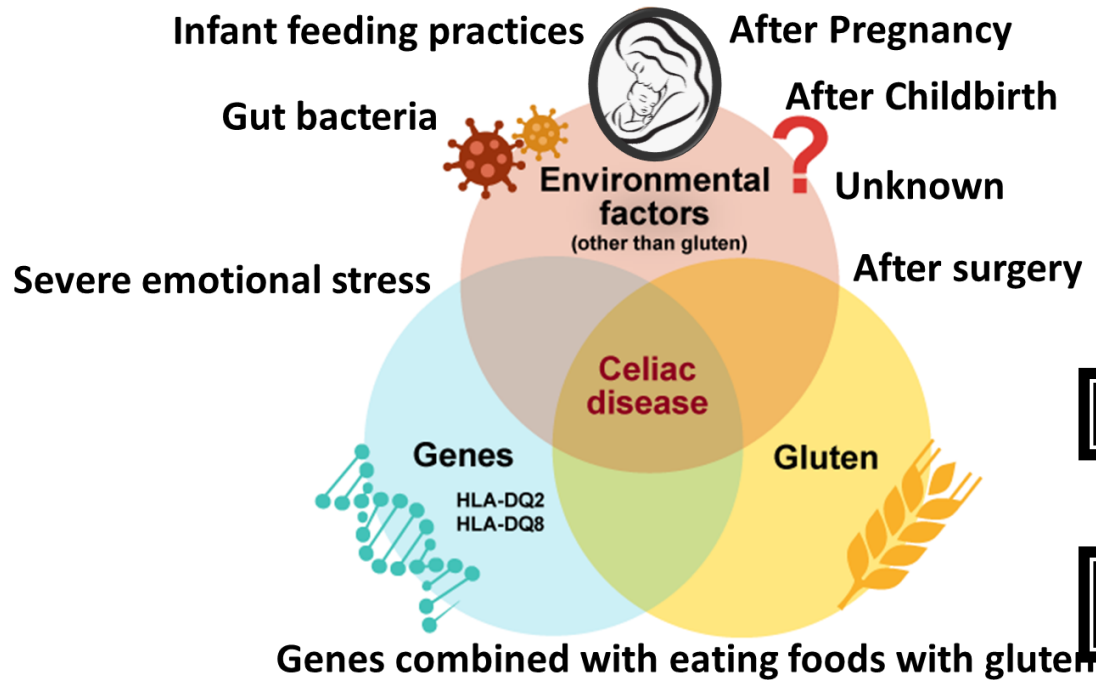
### VI. Nutrition Monitoring and Evaluation

18. Evaluate the following excerpt from Mrs. Talbot's food diary. Identify the foods that might not be tolerated on a gluten-/gliadin-free diet. For each food identified, provide an appropriate substitute.

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- ❖ Celiac Disease: an autoimmune disease, gluten intake damages small intestine (3.2 million Americans; ~2.5 million undiagnosed)

2. tTG antibodies are used in serological testing to diagnose celiac disease. Each test is sensitive and specific for the antibody it measures. The tTG test has a sensitivity of more than 90%. What does this mean? It also has a specificity of more than 95%. What does this mean?

**حساسیت** نشان می‌دهد که یک آزمایش در چه شرایطی یک نوع بیماری را که واقعا در فرد بیمار وجود دارد، تشخیص می‌دهد در آزمایش با حساسیت بالا، اعلام نتیجه مثبت، واقعا مثبت است.

**ویژگی** به توانایی یک آزمایش برای رد وجود یک نوع بیماری در کسی که آن بیماری را ندارد، اشاره می‌کند. به عبارت دیگر، در یک آزمایش با ویژگی بالا، نتیجه منفی واقعا منفی است. می‌توان گفت که آزمایشی با ویژگی پایین، بیش از حد مشتاق به یافتن نتایج مثبت است

3. Mrs. Talbot presents with some nondescript symptoms of celiac disease. List the nongastrointestinal as well as the gastrointestinal clinical manifestations of celiac disease.

**Non-Gastrointestinal s/s:**

- Anemia (Iron deficiency)
- Osteoporosis: Loss of bone density
- Osteomalacia: softening of bone
- Skin disorder: Dermatitis herpetiformis
- Mouth ulcers
- Nervous system injury (numbness & tingling, problems with balance, & cognitive impairment)
- Joint pain
- Hormonal symptoms: (Painful and/or irregular periods, Infertility, Low libido, Headaches, Fatigue, Weight gain, Mood swings and irritability, Insomnia)

**Gastrointestinal s/s:**

- Malabsorption of nutrients (Iron, Calcium, Folate, vitamin D)
- Weight loss
- Diarrhea
- Bloating, gas & constipation
- Abdominal pain
- Nausea & vomiting



4. Biopsy of the small intestine continues to be the “gold standard” for diagnosis of celiac disease. Briefly describe the procedure.
5. How does celiac disease damage the small intestine?

## Celiac Disease Diagnosis: Biopsy

Taking a small tissue sample to analyze for damage to the villi



## II. Understanding the Nutrition Therapy

6. Gluten restriction is the major component of the medical nutrition therapy for celiac disease. What is gluten? Where is it found?

### What is Gluten?

- Wheat: Glutenin, Gliadin



- Rye: Secalin



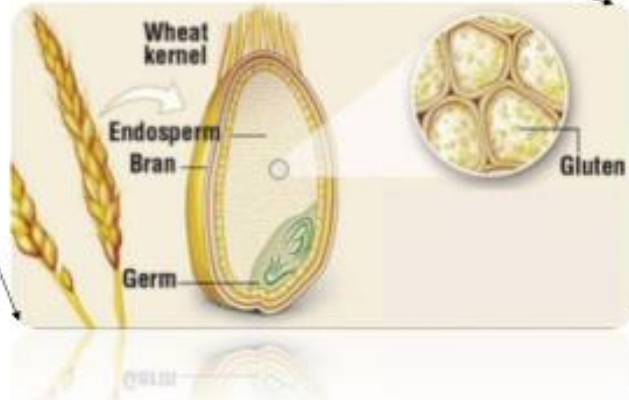
- Barley: Hordenine



- Oat: Avenine



A structural protein (Sticky)



7. Can patients on a gluten-free diet tolerate oats? YES
8. Are there any known health benefits of following a gluten-free diet if a person does not have celiac disease? NO
9. Can patients with celiac disease also be lactose intolerant? YES
10. There is a high prevalence of anemia among individuals with celiac disease. How can this be explained? What tests are used for anemia?

- ❖ Poor appetite
- ❖ Poor absorption due to intestinal damage
- ❖ Increased needs
- ❖ Increased losses
- ❖ Dietary restriction

12. Evaluate Mrs. Talbot's laboratory measures for nutritional significance. Identify all laboratory values that are indicative of a potential nutrition problem.

13. Are the abnormalities identified in question #12 related to the consequences of celiac disease? Explain.

Laboratory Results

	Ref. Range	1/5
<b>Chemistry</b>		
Sodium (mEq/L)	136-145	141
Potassium (mEq/L)	3.5-5.1	3.7
Chloride (mEq/L)	98-107	101
Carbon dioxide (CO <sub>2</sub> ) (mEq/L)	23-29	27
Bicarbonate (mEq/L)	23-28	27
BUN (mg/dL)	6-20	8
Creatinine serum (mg/dL)	0.6-1.1 F 0.9-1.3 M	0.7
BUN/Crea ratio	10.0-20.0	12.85
Uric acid (mg/dL)	2.8-8.8 F 4.0-9.0 M	4.3
Est. GFR, non-Afr Amer (mL/min/1.73 m <sup>2</sup> )	>60	120
Glucose (mg/dL)	70-99	72
Phosphate, inorganic (mg/dL)	2.2-4.6	2.7
Magnesium (mg/dL)	1.5-2.4	1.6
Calcium (mg/dL)	8.6-10.2	9.1
Osmolality (mmol/kg H <sub>2</sub> O)	275-295	294
Bilirubin total (mg/dL)	≤1.2	1.0
Bilirubin, direct (mg/dL)	<0.3	0.2
Protein, total (g/dL)	6-7.8	6.0
Albumin (g/dL)	3.5-5.5	3.5
Prealbumin (mg/dL)	18-35	16 ↓
Ammonia (NH <sub>3</sub> ) (µg/L)	6-47	10
Alkaline phosphatase (U/L)	30-120	125 ↑
ALT (U/L)	4-36	12
AST (U/L)	0-36	8
CPK (U/L)	30-135 F 55-170 M	128
Lactate dehydrogenase (U/L)	208-378	354
Cholesterol (mg/dL)	<200	117
tTg IgA antibody (U/mL)	<4	11 ↑
tTg IgG antibody (U/mL)	<6	8 ↑

Osteomalacia

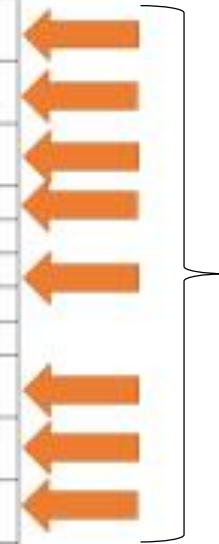
Celiac Disease

Laboratory Results (Continued)

	Ref. Range	1/5
T <sub>4</sub> (µg/dL)	5-12	9.1
T <sub>3</sub> (µg/dL)	75-98	81
HbA <sub>1c</sub> (%)	<5.7	5.1
<b>Hematology</b>		
WBC (×10 <sup>3</sup> /mm <sup>3</sup> )	3.9-10.7	8.5
RBC (×10 <sup>6</sup> /mm <sup>3</sup> )	4.2-5.4 F 4.5-6.2 M	3.9 ↓
Hemoglobin (Hgb, g/dL)	12-16 F 14-17 M	10.5 ↓
Hematocrit (Hct, %)	37-47 F 41-51 M	34 ↓
Mean cell volume (µm <sup>3</sup> )	80-98	71 ↓
Mean cell Hgb (pg)	28-32	22 ↓
Mean cell Hgb content (g/dL)	32-38	24 ↓
RBC distribution (%)	11.6-16.5	17.1 ↑
Platelet count (×10 <sup>3</sup> /mm <sup>3</sup> )	150-350	289
Transferrin (mg/dL)	250-380 F 215-365 M	395 ↑
Ferritin (ng/mL)	20-120 F 20-300 M	17 ↓
Iron (mg/dL)	65-165 F 75-175 M	54 ↓
Vitamin B <sub>12</sub> (ng/dL)	24.4-100	65
Folate (ng/dL)	5-25	18

**Note:** Values and units of measurement listed in these tables are derived from several resources. Substantial variation exists in the ranges quoted as "normal" and these may vary depending on the assay used by different laboratories.

Anemia



14. Are any symptoms from Mrs. Talbot's physical examination consistent with her laboratory values? Explain.

**Demographics:**

*Marital status:* Married—lives with husband and 1 son; *Spouse name:* Michael

*Number of children:* 1

*Years education:* Bachelor's degree

*Language:* English only

*Occupation:* Kindergarten teacher

*Hours of work:* 7:30–3:30

*Ethnicity:* Caucasian

*Religious affiliation:* None

Physical Exam

*General appearance:* Pale woman who complains of fatigue, diarrhea, abdominal pain, and recent onset of joint pain.

*HEENT:* Eyes: PERRLA sclera pale; fundi benign

Throat: Pharynx clear without postnasal drainage

*Genitalia:* Deferred

*Neurologic:* Intact; alert and oriented

*Extremities:* No edema, strength 4/5

*Skin:* Pale

*Chest/lungs:* Lungs clear to percussion and auscultation

*Peripheral vascular:* Pulses full—no bruits

*Abdomen:* Not distended; bowel sounds present

**Vital Signs:** Temp: 98.2

BP: 108/72

Pulse: 78

Height: 5'3"

Resp rate: 17

Weight: 125 lbs

#### **IV. Nutrition Diagnosis**

15. Select two nutrition problems and complete the PES statement for each.

Impaired nutrition utilization R/T malabsorption (Celiac) AEB abnormal lab results regarding anemia and osteomalacia

## **V. Nutrition Intervention**

**16.** For each of the PES statements that you have written, establish an ideal goal (based on the signs and symptoms) and an appropriate intervention (based on the etiology).

- ❖ Improve gastrointestinal symptoms
- ❖ Prevent & treat malabsorption and other comorbidities
- ❖ Improve celiac disease-related antibodies

## VI. Nutrition Monitoring and Evaluation

18. Evaluate the following excerpt from Mrs. Talbot's food diary. Identify the foods that might not be tolerated on a gluten-/gliadin-free diet. For each food identified, provide an appropriate substitute.

*24-hr recall (prior to admission):*

*AM:* Toast—ww 2 slices, 1 tsp butter, hot tea with 2 tsp sugar

*Lunch:* 1 c chicken noodle soup, peanut butter & jelly sandwich (2 slices ww bread, 2 tbsp peanut butter, 2 tsp grape jelly), 1 c applesauce, 12 oz Sprite

*Dinner:* 1 c ww pasta, ½ c marinara sauce (no meat), 1 c sautéed green beans, 1 slice garlic bread, ½ c rainbow sherbet

*Food allergies/intolerances/aversions:* Maybe NutraSweet?

*Previous nutrition therapy?* No

*Food purchase/preparation:* Self

*Vit/min intake:* Multivitamin/mineral



19. Mrs. Talbot asks what steps she should take to keep herself from being exposed to gluten in her kitchen since her family does not have celiac disease. What advice would you give her? Are there other potential environmental sources of gluten that you would alert Mrs. Talbot to?

## Cross-Contamination Prevention

Risk of cross-contamination in shared kitchens and dining environments

- ❖ Use separate cooking utensils, cutting boards, and toasters
- ❖ Recommend thoroughly cleaning surfaces, utensils, and cookware before preparing gluten-free meals

19. Mrs. Talbot asks what steps she should take to keep herself from being exposed to gluten in her kitchen since her family does not have celiac disease. What advice would you give her? Are there other potential environmental sources of gluten that you would alert Mrs. Talbot to?

## Hidden Sources of Gluten

Foods, Medications & nonfood products:

- ❖ Modified food starch, preservatives, & food stabilizers
- ❖ Prescription & over-the-counter medications
- ❖ Vitamin and mineral supplements
- ❖ Herbal & nutritional supplements
- ❖ Lipstick products
- ❖ Toothpaste & mouthwash
- ❖ Envelope & stamp glue



A watercolor illustration of wheat stalks, with the word "THANK YOU" written in a stylized, multi-colored font (green and blue) across the center. The wheat stalks are golden yellow and green, with some leaves and heads of grain visible.

THANK  
YOU

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