

Celiac Disease in Older Adults: Definition, Diagnosis and Diet

**Mary S. Hartwig, PhD, APN
BC, Advanced Diabetes Management
Director of Nursing Education
UAMS/AHEC-Northeast
Jonesboro, Arkansas**

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Workshop Goal

To increase individuals' and healthcare providers' competence to assess risk factors for celiac disease, work with their health care provider to accurately diagnose celiac disease, and knowledgeably manage a gluten-free diet and environment.



Objectives

1. Discuss typical clinical features and classifications of celiac disease
2. Identify the current criteria for diagnosing celiac disease
3. Identify specific guidelines for selecting foods and personal care items allowed on a gluten-free diet



Objective 1

Discuss typical clinical features and classifications of celiac disease

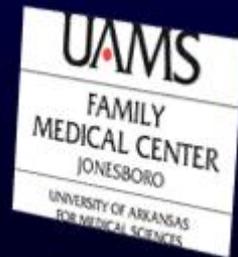


Definition of Celiac Disease

- Autoimmune disorder in which the absorptive surface of the small intestine is damaged in genetically susceptible individuals by the ingestion of gluten.

IT IS NOT A TRUE FOOD ALLERGY

- Immune system responds to gluten as a toxin.



The prevalence of celiac disease in the U.S. is:

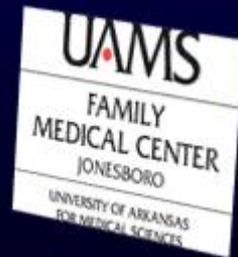
A. 1:133

B. 1:250

C. 1:1100

D. 1:10,000

“Celiac disease is the most common genetic disease of humankind.” --Gastroenterology & Endoscopy News, September 2002.



Nearly one out of every 133 Americans suffer from celiac disease, according to a study by the University of Maryland Center for Celiac Research in Baltimore. The research indicates that celiac is twice as common as Crohn's disease, ulcerative colitis and cystic fibrosis combined.



Fasano, Alessio, et al. Arch Intern Med. 2003;163:286-292

Methodology:

Serum antigliadin antibodies

Anti-endomysial antibodies (EMA)

If EMA + :

- **Measured human tissue transglutaminase IgA antibodies and CD-associated HLA antigen DQ2/DQ8 haplotypes**
- **Intestinal biopsy for all EMA(+) subjects**



Prevalence of Celiac Disease in At-Risk and Not-at-Risk Groups in the U.S.

Total screened: 13,145

<u>Group</u>	<u>Prevalence of CD</u>
4508 1 st - degree relatives	1:22
1275 2 nd - degree relatives	1:39
3236 symptomatic patients	1:56
4126 not-at-risk patients	1:133



Celiac disease is under- diagnosed

- “For every person diagnosed with celiac disease, 89 will go undiagnosed”
--Center for Celiac Research, U of Maryland
- “Mortality rate is twice as high as the general public, and a delayed diagnosis results in a higher mortality rate.”
--Center for Celiac Research, U of Maryland



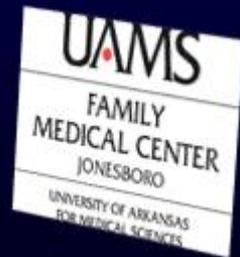
ITALY: celiac disease is common

* All children are screened by age 6

* Italians of any age are tested for the disease as soon as they show symptoms.

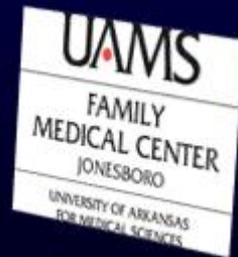
* The time from symptom onset to diagnosis averages just 2 -3 weeks.

(U.S. average diagnosis lag is 10-11 years)



Epidemiology of Celiac Disease

- Genetic predisposition.
- Activated by a stressor:
 - Surgery or illness
 - Viral infection
 - Pregnancy
 - Major life stressor



Genetics

- More than 95% of persons diagnosed with celiac disease have HLA-DQ2, and 5% have DQ8 Class II antigens (group of genes that reside on chromosome 6)
- 35-40% of the U.S. population have DQ2 or DQ8 alleles
- Type 1 diabetes and celiac disease are found on the same region on a specific HLA gene, along with other autoimmune diseases.

Setty M, Hormaza L, Guandalini S. Celiac disease; risk assessment, diagnosis, and monitoring. *Mol Diagn Ther* 2008;12(5):289-98.



Risk for Other Autoimmune Disorders in Patients with Celiac Disease

<u>Age until Gluten-Free</u>	<u>Risk of AD</u>
2-4 years	10.5%
4-12 years	16.7%
12-20 years	27%
>age 20	34%

Ventura, A., Magazzu, G., Greco, L., SIGEP Study Group for Autoimmune Disorders in Celiac Disease. *Gastroenterology* 117 (2), 297-303 (August 1999).



Pathology of Celiac Disease

- Autoimmune response to gluten
- Villi in the small intestine are flattened.
- Digestive enzymes are destroyed so food passes through the gut unabsorbed.



What is gluten?

A cohesive, elastic protein that is left behind after starch is washed away from a dough made of wheat, barley and rye.

Prolamins: Alcoholic extracts of gluten that are rich in proline and glutamine. Each prolamins in a given grain has its own amino acid composition & sequencing.

Wheat

gliadin

Barley

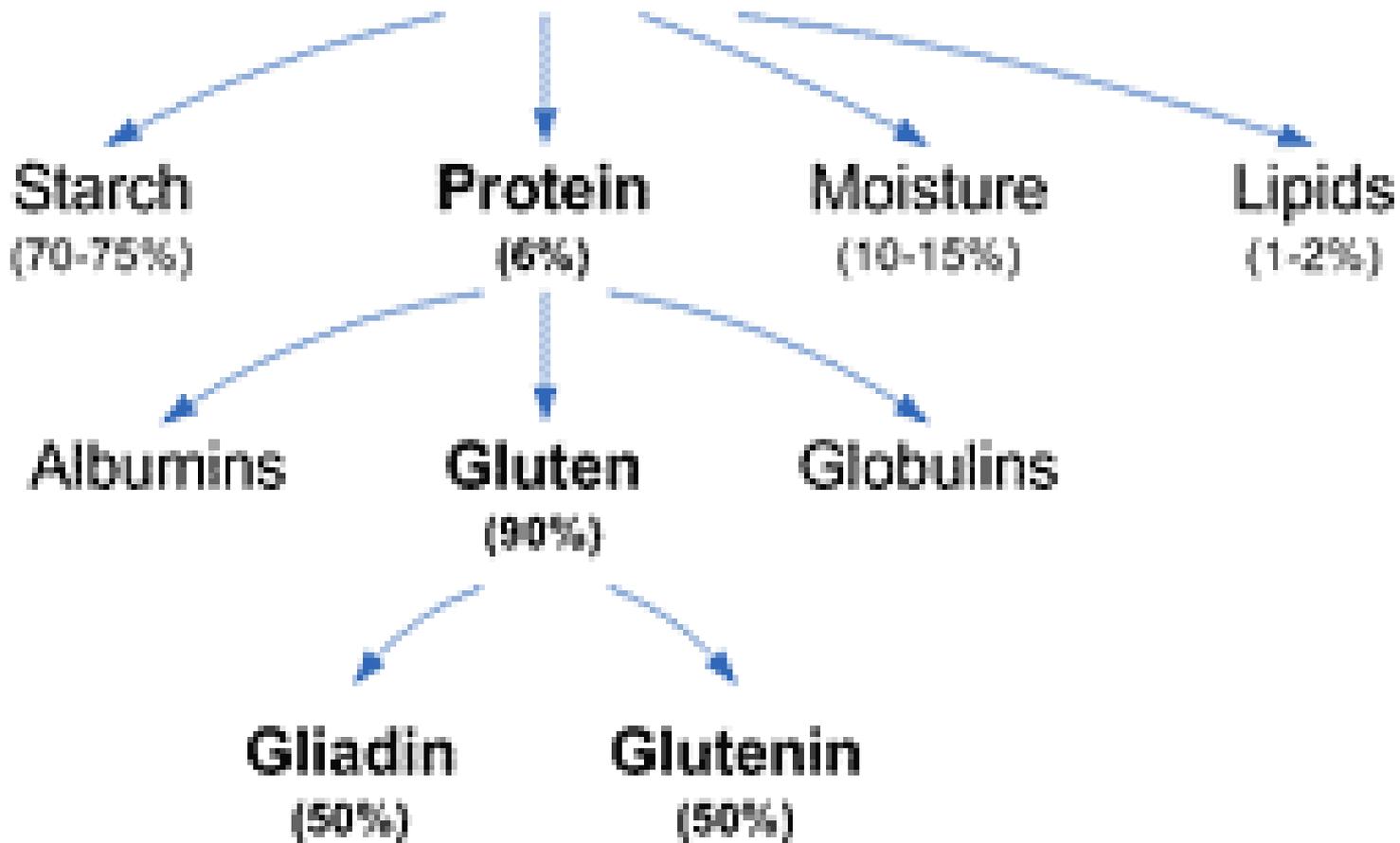
hordein

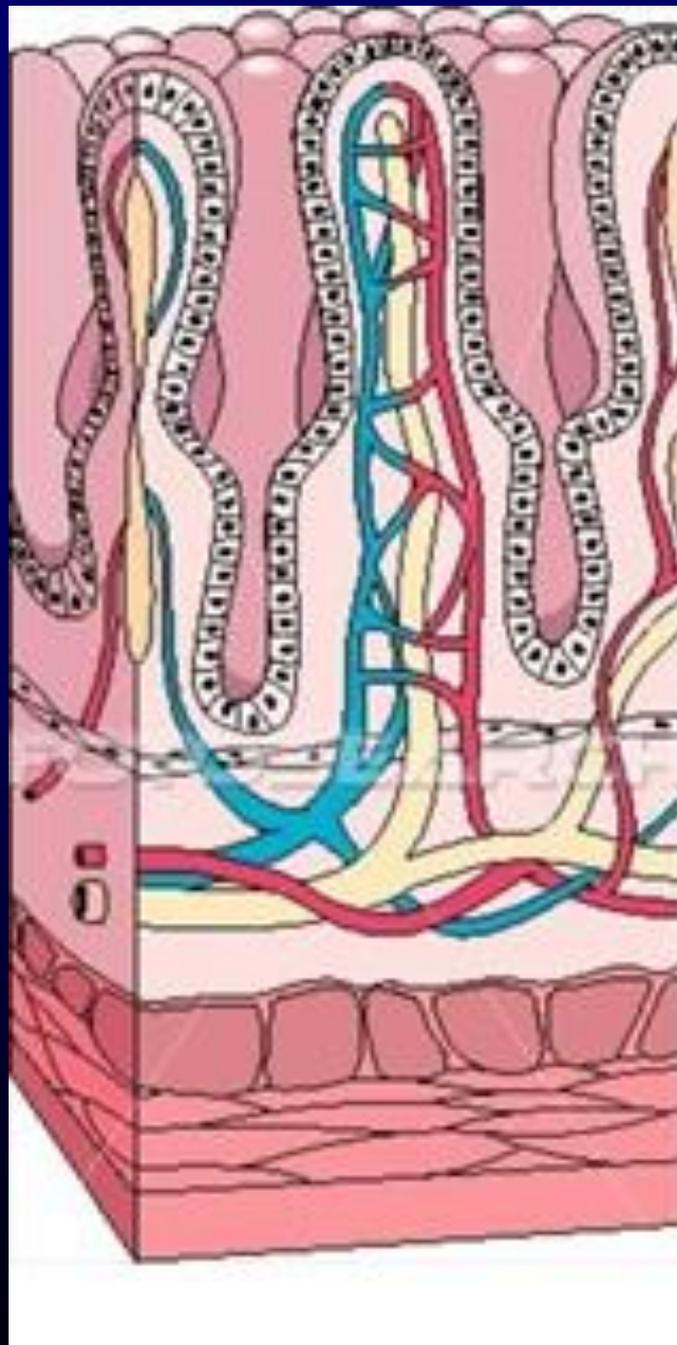
Rye

secalin

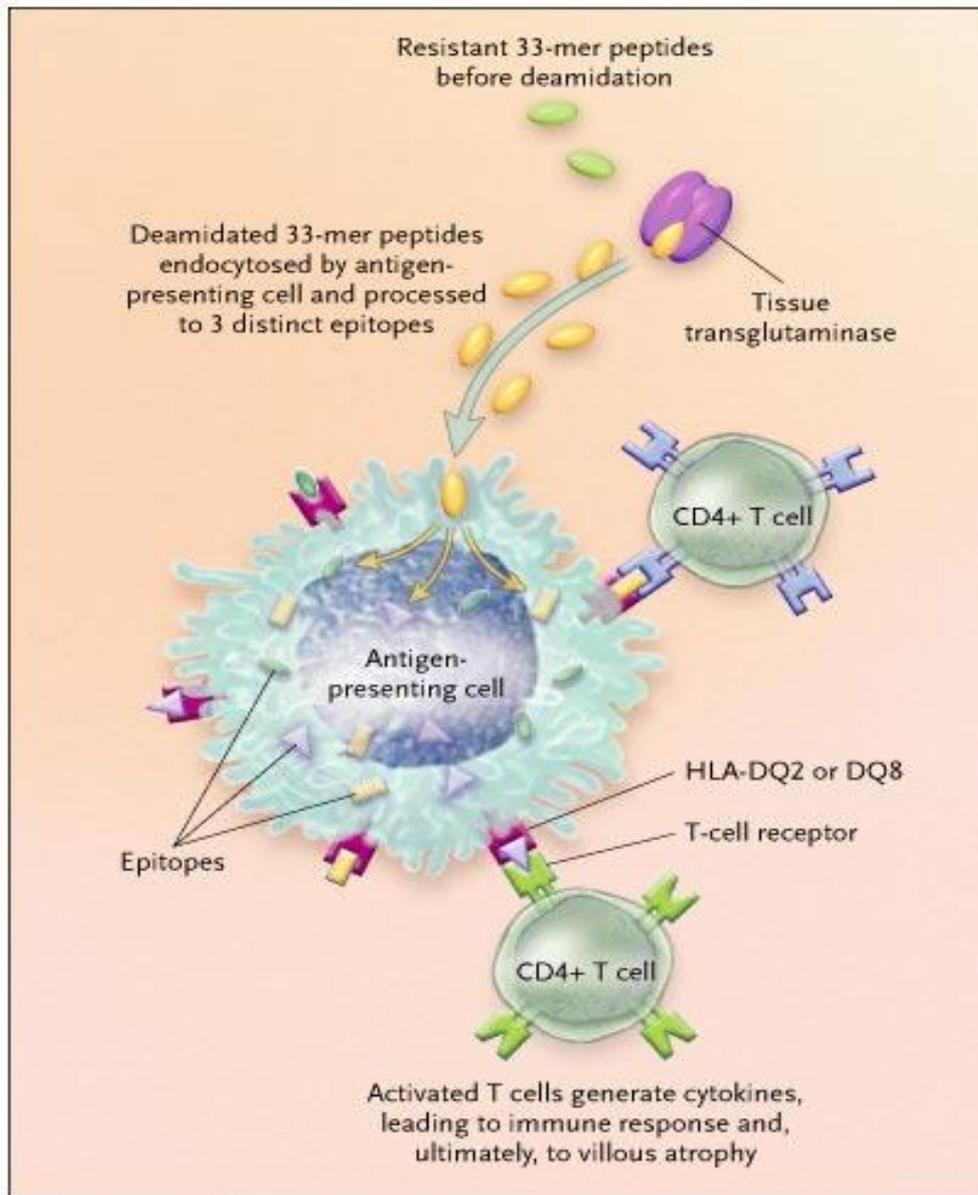


Grain Flour

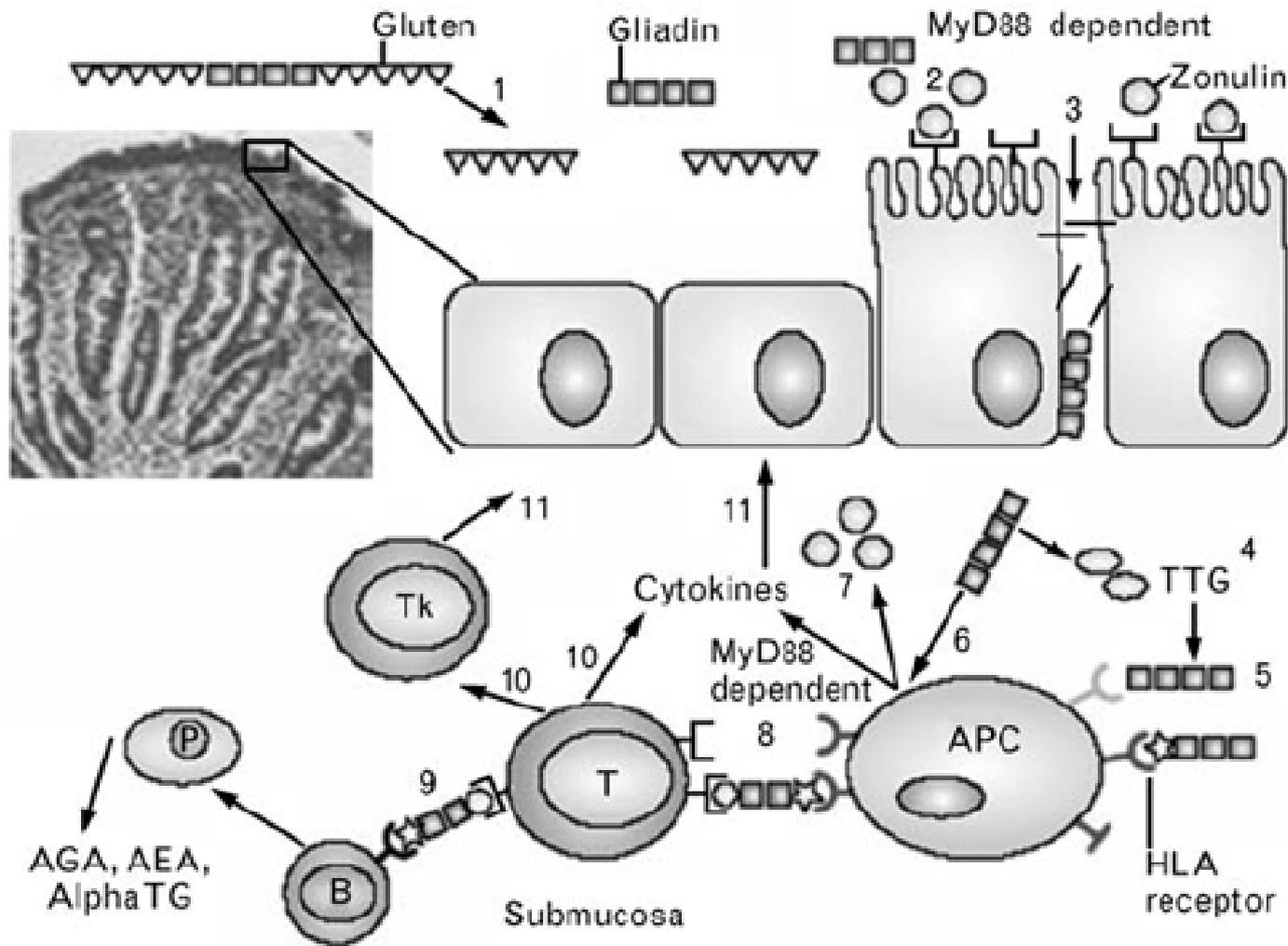




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The immune mechanism of celiac disease



Source: Skirt Citation: Source: Curr Opin Gastroenterol © 2006 Lippincott Williams & Wilkins

Fasano A. "Systemic autoimmune disorders in celiac disease. Curr Opin Gastroenterol. 2006;22 (6):674-679. Lippincott Williams & Wilkins



Mucosal abnormalities in gluten-sensitive enteropathy: Marsh scoring system (0-IIIC).

[Marsh 0 = normal mucosal architecture, without significant intraepithelial lymphocytic infiltration.]

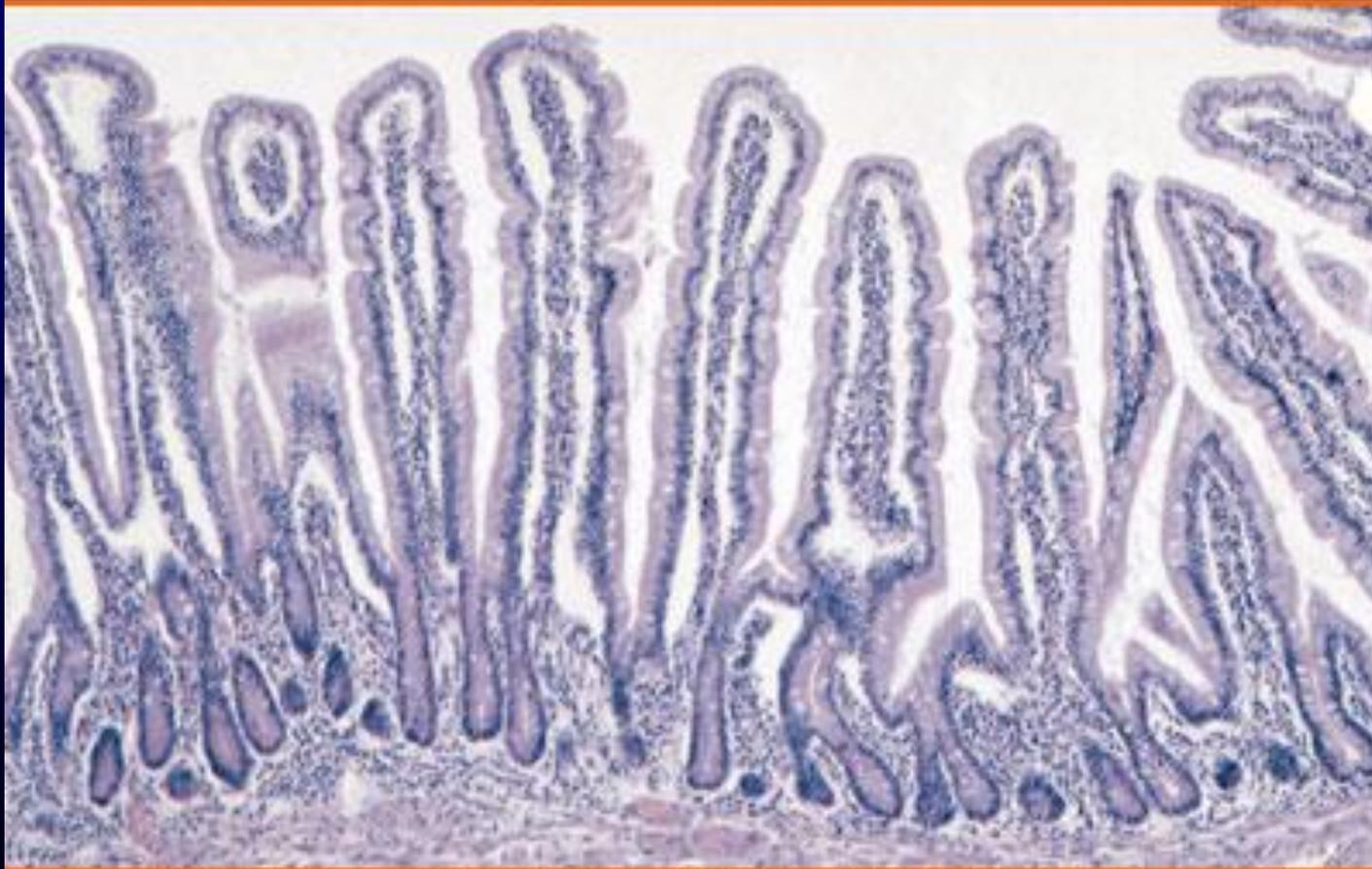
Wahab, Peter J., Meijer, Jos W.R., Mulder, Chris J.J.
Histologic Follow-Up of People with Celiac Disease on a Gluten-Free Diet: Slow and Incomplete Recovery American Journal of Clinical Pathology 118(3):459-463, 2002.



Marsh I, lymphocytic enteritis

Medscape®

www.medscape.com



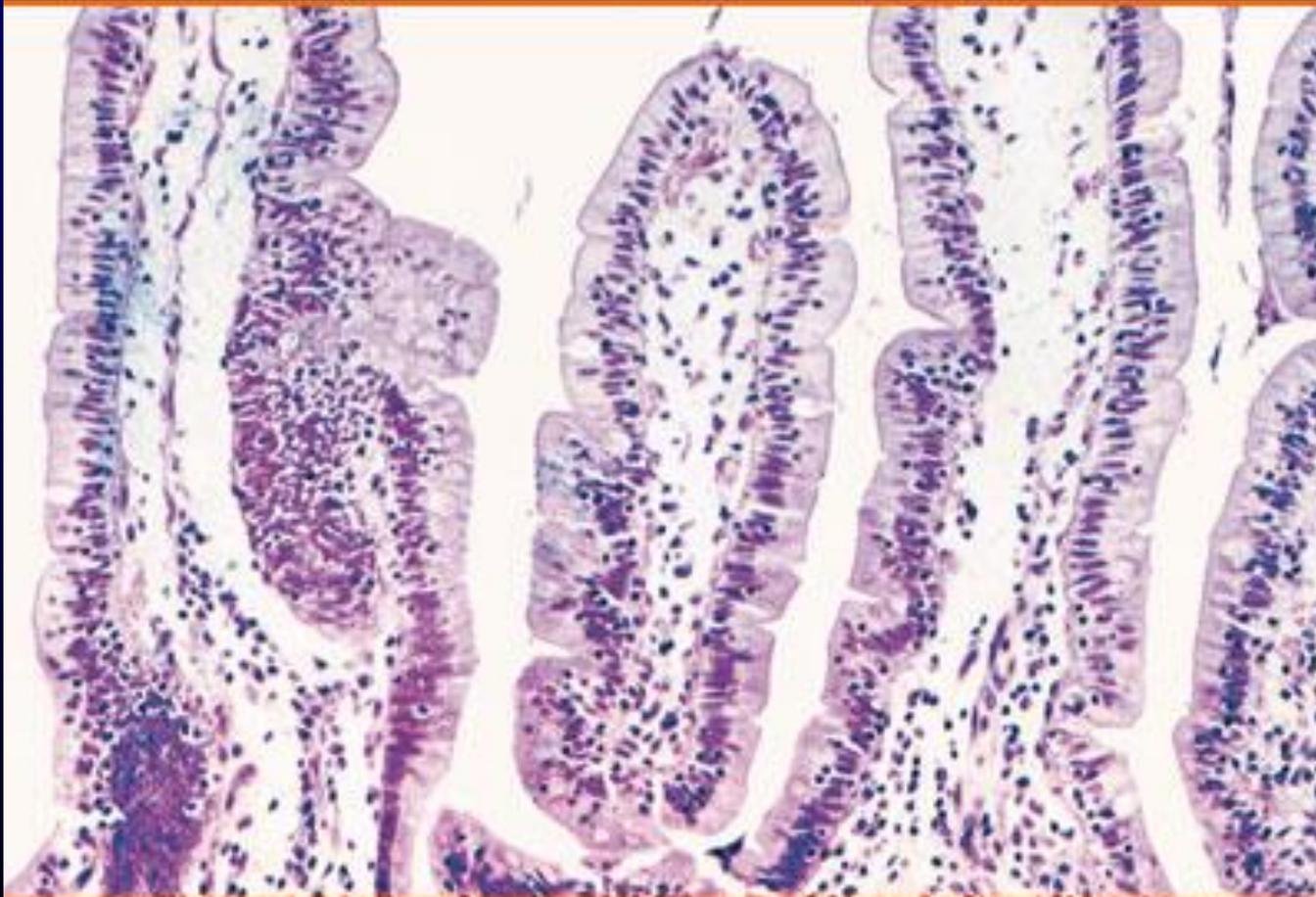
Source: Am J Clin Pathol © 2002 American Society of Clinical Pathologists, Inc.

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Marsh I, intraepithelial lymphocytosis

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Source: Am J Clin Pathol © 2002 American Society of Clinical Pathologists, Inc.



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Marsh IIIA, partial villous atrophy

Marsh II, lymphocytic enteritis with crypt hyperplasia



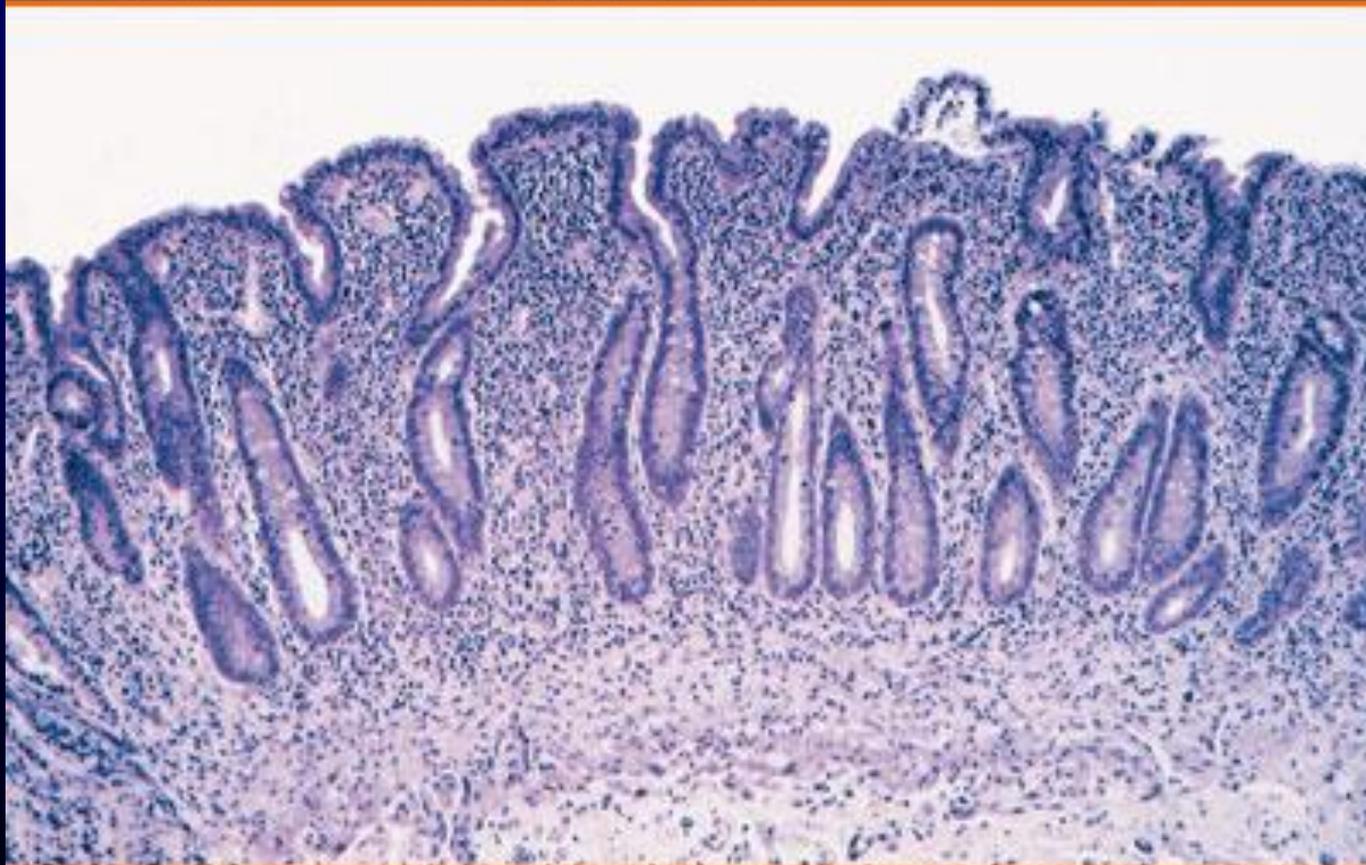
Source: Am J Clin Pathol © 2002 American Society of Clinical Pathologists, Inc.



Marsh III B, subtotal villous atrophy

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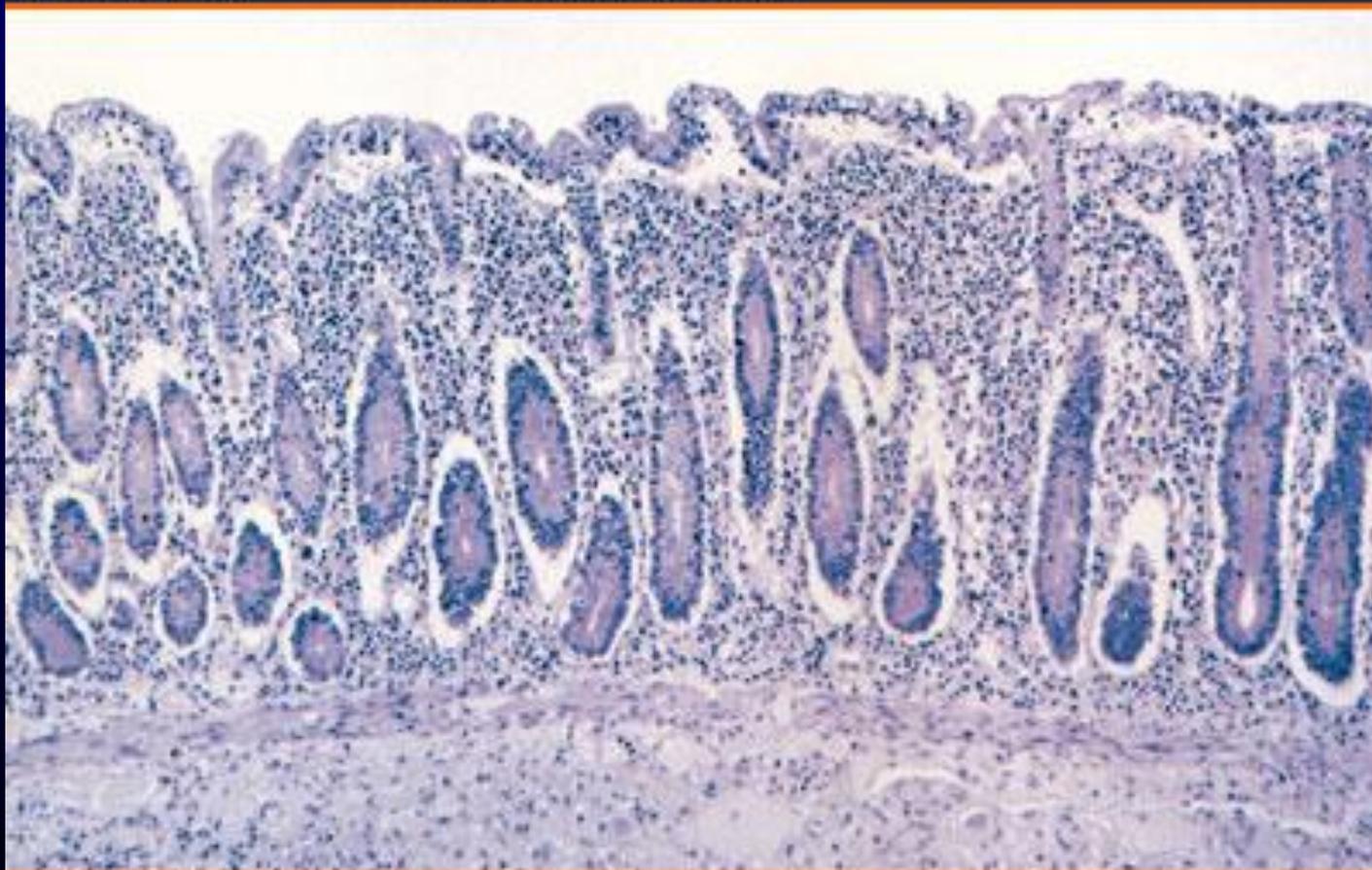
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Marsh IIIc, total villous atrophy

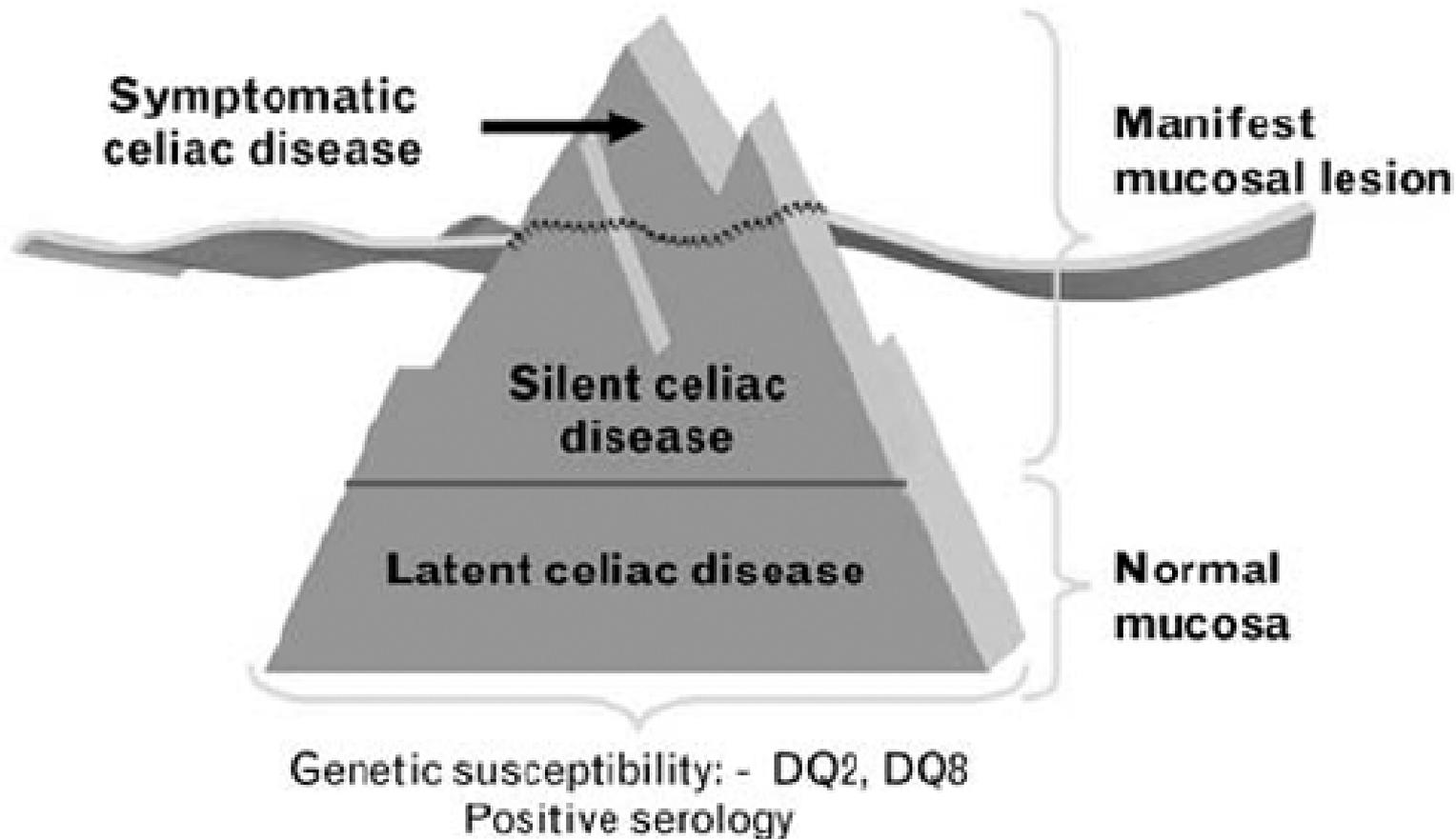
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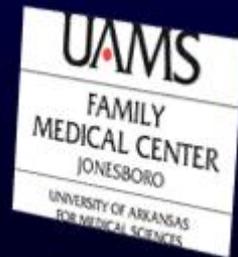
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http://www.medscape.com/viewarticle/547107_print



Overview of celiac disease according to type

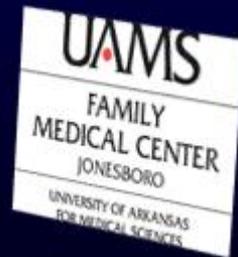
- Classic** Diarrhea, abdominal pain, vomiting, bloating, constipation, weight loss
- Atypical** Few or no GI symptoms, but extra-intestinal sx are present: dermatitis herpetiformis, iron deficiency, osteoporosis. Most common form of the disease!



Overview of celiac disease according to type

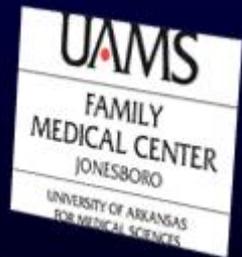
Silent No GI symptoms, but may have mild non-GI changes. Villous atrophy is present in small intestine on biopsy.

Latent GI symptoms first appear at some point after eating a normal diet, or recur after a period of ability to process gluten without symptoms. Produces a positive IgA EMA or tTG, but small bowel biopsy results are normal.



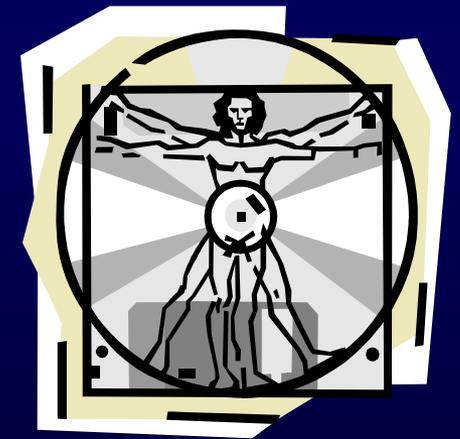
Nomenclature

- Celiac disease
- Gluten intolerance
- Gluten-sensitive enteropathy
- Gluten sensitivity
- Sprue (non-tropical)



Symptoms of Celiac Disease

- diarrhea—may be steatorrhea
- weight loss
- abdominal pain, gas
- chronic fatigue
- weakness
- malnutrition
- eczema, dry skin, flushed color, itchiness
- iron deficiency anemia

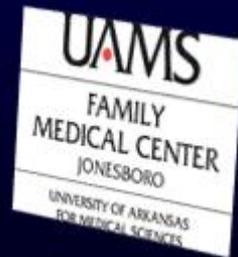


Other Symptoms

- Feels lethargic, agitated, “on edge”
- Has “circles under the eyes”
- Wheezing, shortness of breath, sinus problems, throat clearing, dry cough
- Frequent “flu-like” symptoms
- Joint pain, muscle aches, migraines
- Finds it difficult to focus or concentrate

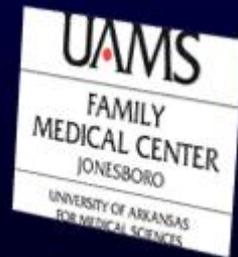
Symptoms of Celiac Disease in children

- failure to thrive: an inability to grow and put on weight
- irritability
- inability to concentrate
- diarrhea and bloating



Dermatitis Herpetiformis (DH)

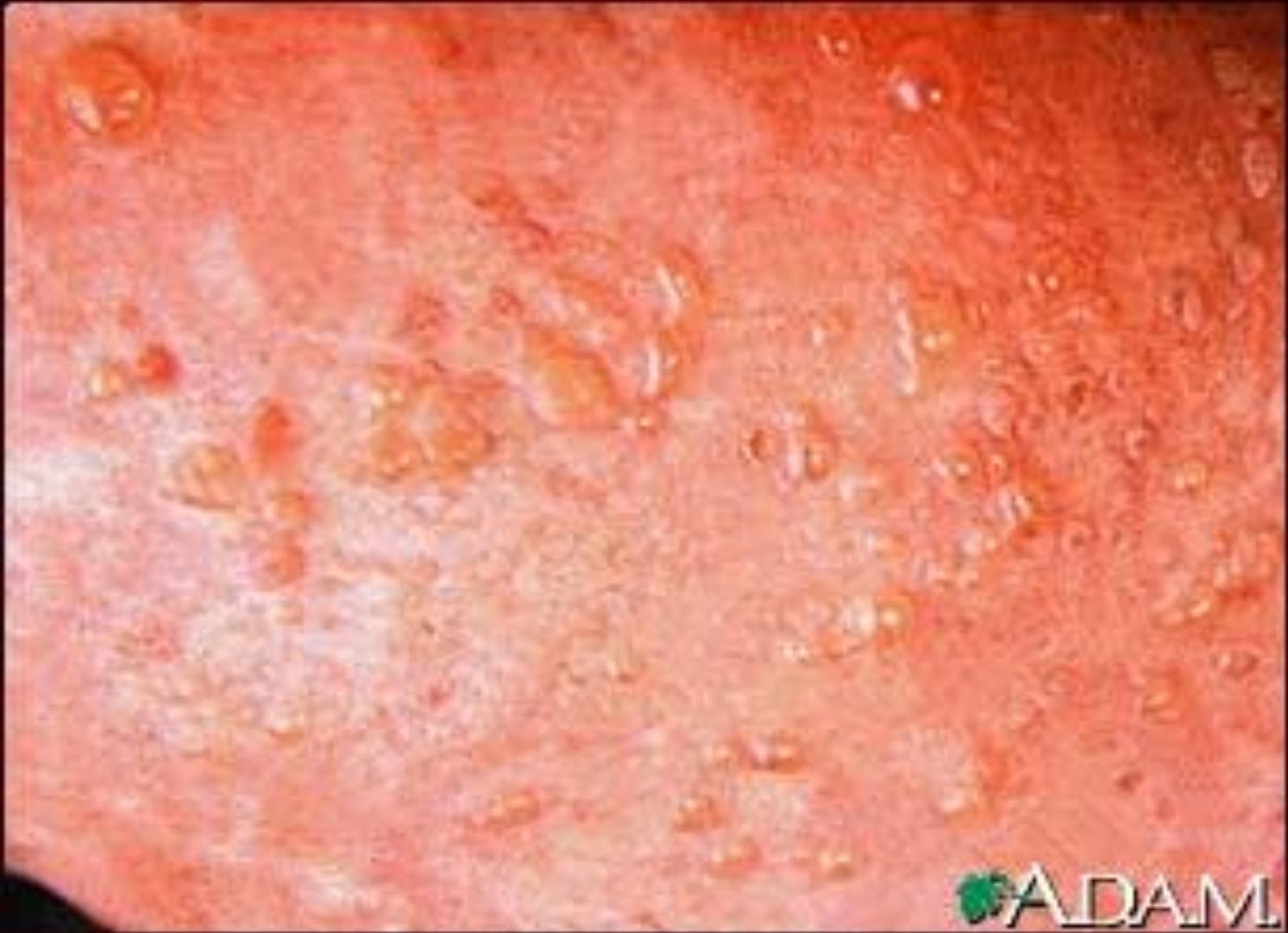
- Another autoimmune disease caused by gluten intolerance
- Characterized by itchy, blistering skin, usually on elbows, knees, buttocks, back
- Diagnosed by skin biopsy and characteristic nature of lesions



Dermatitis Herpetiformis (DH)

- DH is found in 10-30% of gluten-sensitive individuals
- May also be sensitive to fluoride, bromine, iodine
- Medication: Dapsone relieve skin irritation in some persons; does not prevent damage to the small intestine.





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Dermatitis herpetiformis lesions of the knee



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**DH lesions
of the arms
and legs**



Objective 2

Identify the current criteria for
diagnosing celiac disease



Related Conditions and Diseases

- Crohn's disease
- Ulcerative colitis
- Irritable bowel disease
- If untreated, often leads to lactose intolerance
- Average time from symptom onset to diagnosis is 11 years



A high % of persons with CD suffer from the following conditions:

Anemia (3-6%)

Arthritis (20%)

Ataxia (40%)

Cancer---non-Hodgkins lymphoma (39%)
(enteropathy-associated T-cell lymphoma - EATL)

Diabetes---type 1 (12%)

Irritable bowel syndrome (20%)

Nerve disease or peripheral neuropathy (51%)

Osteomalacia/low bone density (70%)



AGAI Guidelines on testing

Consider in symptomatic individuals at high risk:

Unexplained iron deficiency anemia (IDA)

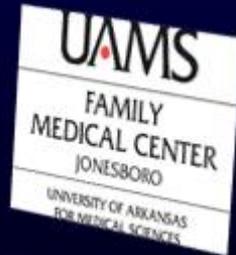
Premature onset of osteoporosis

Down syndrome

Unexplained elevations in liver transaminase levels

Primary biliary cirrhosis

Autoimmune hepatitis



AGAI Guidelines on testing

Selectively consider during medical evaluation, especially if symptoms of CD are present:

Type 1 diabetes mellitus

Autoimmune thyroid disease

Sjogren's syndrome

Unexplained recurrent fetal loss

Unexplained delayed puberty

Selective immunoglobulin (Ig)A deficiency

Irritable bowel syndrome

Turner's syndrome

Peripheral neuropathy

Cerebellar ataxia

Recurrent migraine



Diagnosing CD:

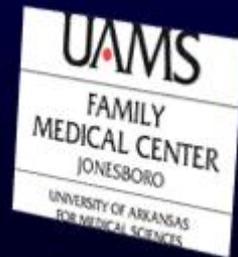
If CD is strongly suspected despite negative serologic test results:

Test for CD-associated DQ2 & DQ8 HLA alleles
--If present, request small intestinal mucosal biopsy

OR

Proceed directly to upper intestinal endoscopy & small bowel biopsy if S/S that suggested CD would otherwise warrant those procedures.

--AGAI, 2006



Diagnostic Tests Recommended by AGAI

- * Intestinal biopsy is traditional gold standard
- * Serologic testing:

Less sensitive & not recommended:

- Antiagliadin antibody (IgA)

[Anti-endomysial antibody (EMA)—rarely used now because time-consuming and expensive, though specificity is 99.6%]

More sensitive (90-96%) & specific (>95%)

- anti-tissue transglutaminase autoantibodies (IgA tTG)

“Most efficient single serologic test for detection of CD.”



Diagnostic Criteria

Possible to detect salivary transglutaminase autoantibodies with a non-invasive, simple-to-perform, reproducible and sensitive method.

--*Journal of Pediatrics*. May 2004
:144(5):632-6.

See also Scott Adams www.celiac.com



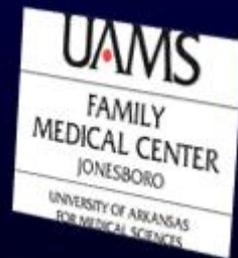
How is DH diagnosed?

✓ Skin biopsy (test for IgA antibody)

This is definitive. With a positive biopsy, it is not necessary to perform intestinal biopsy to establish diagnosis of celiac disease.

--University of Chicago Celiac Disease Center

<http://www.celiacdisease.net/diagnosis-endoscopic-biopsy>



Diagnostic Pearls

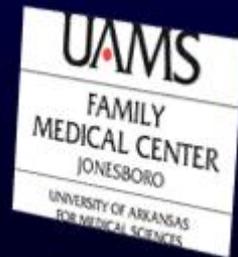
A gluten-free diet should not be started before the serology tests or biopsy, as the mucosal healing due to absence of gluten can interfere with making the correct diagnosis.

“Latent” celiac: a person with a positive blood test but normal intestinal biopsy.



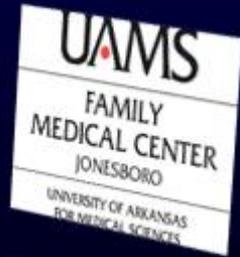
Objective 3

Identify specific guidelines for selecting foods and personal care items allowed on a gluten-free diet



Celiac facts:

1. There are no pharmaceutical cures for celiac disease.
2. A strict gluten-free diet is the only treatment for celiac disease.



Nutrition



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Sources of Gluten: WBR (All of the genus *Triticum*)

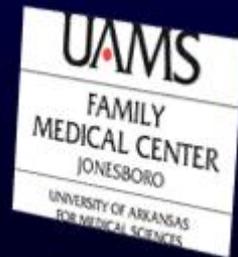
- Wheat
- Barley
- Rye



What about oats?

Though also of the genus *Triticum*, “...research shows that oats, in moderation, does not appear to be harmful to persons with gluten intolerance. The specific reactive peptide in gluten intolerance is not the same as that found in the amino acid sequencing of oats.”

--Cynthia Kupper, CRD, Executive Director, Gluten Intolerance Group, personal letter, 2001.



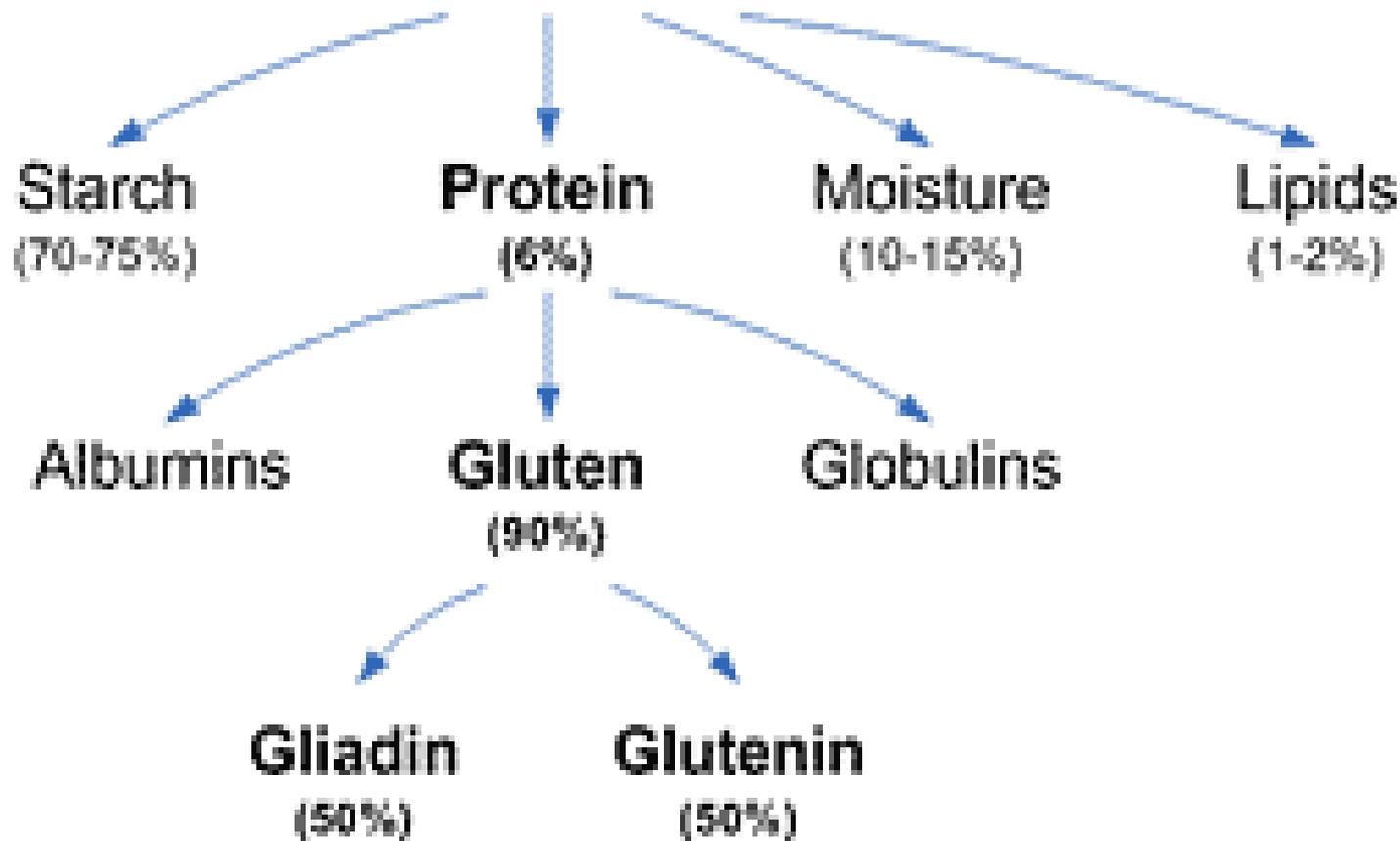
What about oats?

However, contamination of oats with other grains in U.S. sources caused *Journal of American Diabetic Association* to caution celiac patients that in practice, oats generally contains contamination from gluten (March 2003).

The same concern was reiterated in a study by Tricia Thompson, M.S., R.D., published in the *New England Journal of Medicine* (Nov. 4, 2004) entitled “Gluten Contamination of Commercial Oat Products in the United States.”



Grain Flour



Non-toxic grain proteins:

Corn zein

Oats avenin (careful!)

Rice oxyzenin



Nutritional implications: Malabsorption

- Fat soluble vitamins A, D, E, K
- Folate, Vitamin B₁₂
- Iron
- Calcium—at least 1500 mg/day
- Therefore, vitamin and mineral supplementation is an essential part of treatment
- Monitor oral medications for absorption



Inpatient gluten-free diet

- Think of the “kosher” concept: separate utensils, dishes, etc.
- There really is more to a good gluten-free menu than white rice and unseasoned, dry chicken!



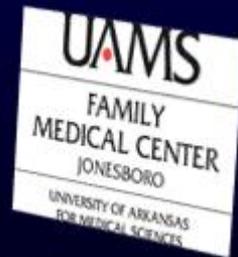
Educating the patient

- Reinforce strict adherence for life
- Hidden sources of gluten and cross-contamination
- Keep it basic
- Keep it positive
- Medically-required diet: tax-deductible, if expenditures (minus insurance reimbursements) exceed 7.5% of adjusted gross income



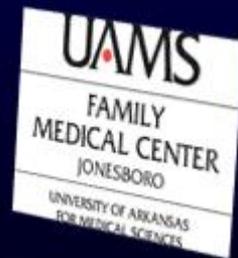
Overview of learning program

- Eating out/label-reading (read the small print)
- Foods to avoid
- What can be eaten
- Cross-contamination
- Medications
- Miscellaneous (lipstick, toothpaste, creams)
- Can the individual take communion?



The Four Cs of Gluten –Free Food Preparation

- Content: ingredients
- Contact: clean utensils, equipment, surfaces
- Contamination
 - It takes about 24 hours for flour dust to settle from the air.
 - What else is fried in the French fry vat?
- Communication: importance of gluten-free products



Adherence to the diet

- GOAL: **Zero** gluten in the diet
- Patients want to follow this diet (they see consequences of nonadherence and immediate results from adherence)



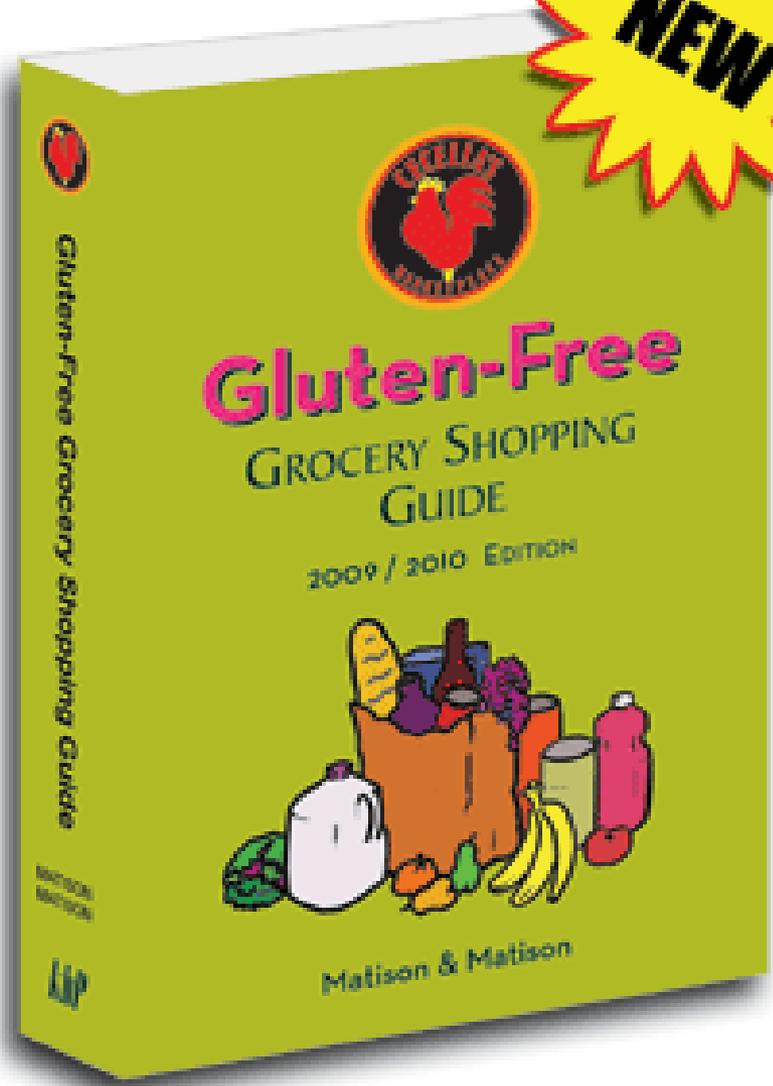
The Food Allergen Labeling and Consumer Protection Act (FALCPA) was signed into law on August 2, 2004 (Public Law 108-282). The law requires:

- food statements to list any of the eight main food allergens (milk, egg, peanuts, tree nuts [such as walnuts & pecans], fish, crustacean shellfish, soy, and wheat) that are contained in the product.
- allergens to be listed if used in spices, natural or artificial flavorings, additives, and colorings.



- FDA to examine how best to address the problem of unintentional contamination and cross-contact of foods and determine the best way to inform consumers with food allergies about the risk of cross-contact
- the Secretary of HHS to establish rules (by August 2, 2008) for the voluntary labeling of products as “gluten-free.”

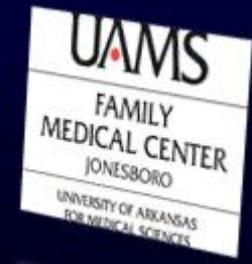




>30,000 gluten-free products are listed

**VOTED BEST SELLER
!!!**

**by GlutenFreeMall.com
and Celiac.com**



**Betty Crocker® is proud to
bring you these delicious, classic
dessert mixes, gluten free!**



Made in a Gluten Free Processing Facility



Rice
Chex

Chocolate
Chex

Cinnamon
Chex

Corn
Chex

Honey Nut
Chex

Strawberry
Chex



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FOOD PRODUCTS INTL.

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Standard for gluten-free foods:

Gluten-free foods=dietary food that:

✓ Consists of or is made only from 1 or more ingredients that do not contain wheat, rye, barley, or their crossbred varieties. The gluten level does not exceed 20 mg/kg (20 parts per million-(ppm) in total,

&/or

✓ Consists of 1 or more ingredients from wheat, rye or barley or a crossbred hybrid that have been specially processed to remove gluten & the gluten level does not exceed 20 mg/kg in total, based on the food as sold or distributed to the consumer.

2008 Codex Alimentarius Commission



Misbranding:

- A food that bears the claim “gluten-free” in its labeling and does not meet standards for gluten-free foods.
- The food is inherently or naturally free of gluten and is labeled “gluten-free” without referring to all foods of that same type. E.g., “milk, a gluten-free food” or “all plain rice is gluten-free.”



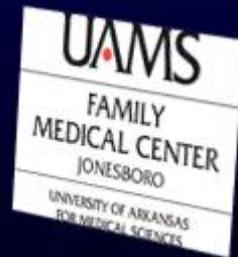
Foods to avoid

Wheat (bulgur, durum, farina, graham, kamut, semolina, spelt, bulgur, farina)

Rye

Barley (and, in the U.S., oats)

Triticale (a hybrid of wheat & rye)



Unsafe ingredients

- Breading, coating mixes
- Brown rice syrup (often has a barley malt enzyme)
- Croutons
- Malt or malt flavoring
- Malt vinegar (made from barley)
- Modified starch
- Modified food starch (modified corn starch ok in U.S.)



Questionable ingredients

- Dextrin
- Hydrolyzed vegetable protein (HVP)
- Texturized vegetable protein (TVP)
- Hydrolyzed plant protein (HPP)
- Vegetable broth (U.S. is ok)
- Blue cheese



Miscellaneous products to avoid

- Most soy sauces
- Some chewing gum
- Most seasoning mixes
- Imitation ground pepper



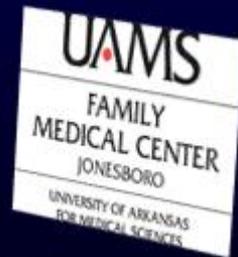
Miscellaneous products to avoid

- Communion wafers (unless pure rice)
- Herbal supplements
- Marinades
- Pastas
- Play dough
- Stuffings
- Thickeners



What can one eat on a gluten-free diet?

- rice cakes, crackers, corn tortillas, corn bread without wheat flour
- pasta made of rice, quinoa, potato, corn flour
- simply-prepared dinner entrees with allowed ingredients. Remember: no breading, no croutons, no wheat-based spices



What grains and starches are allowed?

THE MAINSTAYS: Rice, corn, potatoes

Almond flour

Amaranth

Arrowroot

Atole (finely ground roasted blue corn flour)

Beans such as fava, garbanzos

Buckwheat

Coconut flour

Garfava

Guar gum



What grains and starches are allowed?

THE MAINSTAYS: Rice, corn, potatoes

Millet

Montina

Nut flours

Potato flour

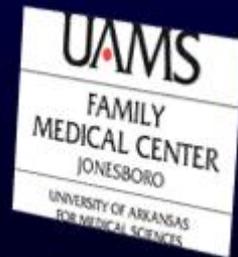
Quinoa grain and flour

Sorghum flour

Soy flour

Tapioca

Tef (teff) flour



Meat, Fish, Poultry

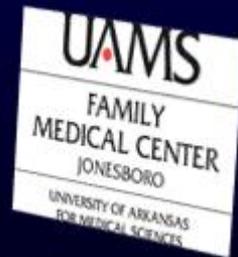
Avoid prepared products containing wheat, rye, oats, barley, hydrolyzed protein, hydrolyzed vegetable protein, imitation crab, bacon, processed luncheon meats, self-basting poultry.

Think about ingredients (meat loaf may have bread crumbs or crackers).



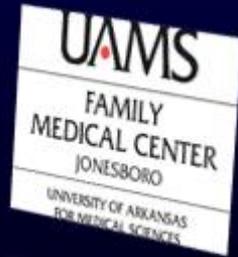
Dairy

- Avoid malted milk, commercial drinks, some nondairy creamers
- Rule out dairy food sensitivity
- Cheeses: be careful!
 - some shredded cheese is rolled in flour or wheat-based starch to prevent sticking
 - blue cheese may be made of bread mold



Fruits

- Generally, all are allowed
- Exceptions:
 - Thickened or prepared fruit, unless you know non-gluten starch was used
 - Pie filling (modified food starch)



Vegetables

- Avoid creamed, commercially prepared
- May use all fresh, plain or canned
- Be careful: frozen hash browns and French fries are usually dipped in flour to prevent sticking together



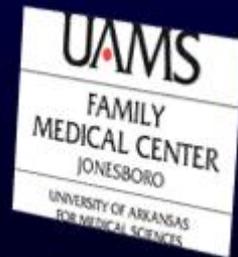
Desserts



- Flour is often used in boxed sweets
- Licorice contains wheat!

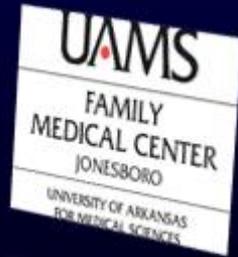
Allowed Beverages

- Coffee
- Decaf coffee: Swiss water process is best
- Gluten-free beer
- Hard cider
- Most soft drinks, read labels
- Rum
- Tequila
- Vodka (made from grapes or potatoes)
- Wine, brandy



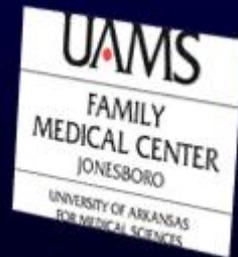
Beverages to Avoid

- Avoid all grain beverages:
 - Malted milk
 - Beer ale
 - Flavored coffees, some herbal teas have barley malt added (avoid natural flavoring)
 - Some soft drinks



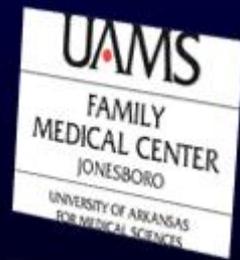
At Home

- Ideal to have a gluten-free kitchen
- Separate toaster
- Separate hand towel
- Separate refrigerator shelf
- Separate peanut butter, butter, jam jars, etc.



At Home

- Separate toothpaste, dental floss
- Clean the refrigerator door frequently
- Clean kitchen counter, water faucet handle, microwave oven door handle frequently
- Avoid using wooden spoons



Eating Out

- Select restaurants where language is not a barrier
- Finer restaurants generally are able to accommodate special diet needs
- Use an “allergy” card
- When in doubt, leave it out



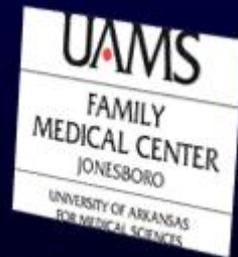
Eating Out: Foods Generally Safe

- Nachos (with real cheese)
- Salads without croutons or bacon bits
- Grilled chicken cooked on a dedicated plain-meat grill)
- Prime rib (question au juice)
- Chili—but avoid the crackers



Shopping

- Read labels every time you buy the product
- Look for ingredients. Words with “glut” may be OK (e.g., corn gluten).
- Call manufacturers
- Find the source of starch



- Gluten-free special products are available:

Pastas

Pizza crust (brown rice flour)

Bread (higher carb and fat content)

Convenience dinners

Brownie, cookie mixes



Traveling

- Bring your own food if traveling during meal times (airlines now provide gluten-free food only on international trips)

Possibilities:

Fresh fruit

Mixed nuts (plain)

Rice crackers with nut butter

Soup in a cup



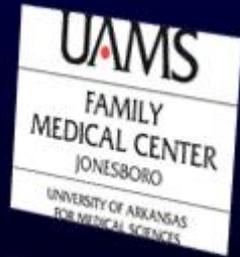
Hidden Sources of Gluten

- Licking envelopes
- Cosmetics
- Medications
- Toothpaste
- Shampoo



Medications

- Possible sources of gluten:
 - Flour
 - Starch pre-gelatinized starch
 - Sodium starch glycol ate
 - Dextri-maltose
 - Dextrin
 - Malto Dextrin



How long does recovery take?

Usually 6-12 months.

Wahab, et al., found a much longer period is required:

- 65% remission within 2 years
- 85.3% within 5 years, 89.9% in long-term follow-up of up to 15 years
- Children recovered more quickly and more completely than adults.

Wahab, Peter J., Meijer, Jos W.R., Mulder, Chris J.J. *Histologic Follow-Up of People with Celiac Disease on a Gluten-Free Diet: Slow and Incomplete Recovery* American Journal of Clinical Pathology 118(3):459-463, 2002.



Shopping

- Gluten-free diet costs 20% more than usual diet
- Gluten-free foods are, on average, 242% more expensive than their non-GF counterparts
- USDA projection: GF industries' revenues will reach \$1.7 billion by the end of 2010



<http://celiac-disease.com/facts-statistics-about-celiac-disease>

Example: Price difference for plain flour

\$3.25 for 1 ½# white rice flour \$2.17/lb

\$2.45 for 5# reg white wheat flour \$0.49/lb

Difference per pound \$1.68

% increase: $1.68/0.49 = 3.42$ (342%)



The market for gluten-free food and beverage products grew at a compound annual growth rate (CAGR) of 28 percent from 2004 to 2008, to finish with almost \$1.6 billion in retail sales last year, according to market research publisher Packaged Facts in the report, “The Gluten-Free Food and Beverage Market: Trends and Developments Worldwide, 2nd Edition.” March 12, 2009.

<http://www.progressivegrocer.com>



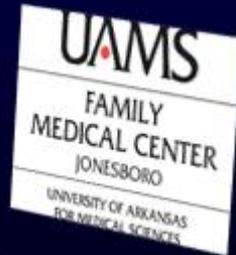
Resources

- **Gluten Intolerance Group (GIG).**
 - www.gluten.net Seattle phone 206-246-6652
- **Celiac Disease Foundation**
 - www.celiac.org
- **Celiac Sprue Association**
 - www.csaceliacs.org
- **Celiac Sprue Research Foundation**
 - www.celiacsprue.org
- **National Foundation for Celiac Awareness**
 - www.celiaccentral.org



References

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- Fasano, A. and Catassi, C. Current Approaches to Diagnosis and Treatment of Celiac Disease: An Evolving Spectrum. *Gastroenterology* 2001;120:636-651.



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