



# CELIAC DISEASE

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**BS (FOOD AND NUTRITION)**

# WHAT IS CELIAC ?

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The word celiac (ce·li·ac also coe·li·ac) is derived from the Latin word coeliacus, meaning of or relating to the abdomen or abdominal cavity.

## WHAT IS CELIAC DISEASE?

“Celiac disease, pronounced se-le-ak, is a condition in which the mucosa (lining) of the small intestine is damaged by ingestion of gluten in genetically susceptible individuals.”

# PATHOGENESIS:

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Celiac disease results from an abnormal interaction between **gluten**, the **immune system** and the **gut** in genetically susceptible individuals.

## WHAT IS GLUTEN?

\* Gluten (from Latin gluten meaning “glue”) is a protein found in wheat, rye and barley and their crossbred grains.

\* Wheat is about 10 to 15% protein and contains several types of gluteins.

\* The most common gluten fractions in wheat are gliadins and glutenins. The gliadins and glutenins are primarily responsible for the wheat dough’s properties of thickness/stretching and stickiness/strength respectively.

# THE GASTROINTESTINAL TRACT (GUT)

The human gastrointestinal tract consists of the mouth, esophagus , stomach, small intestine, and the large intestine (colon)

## WHAT ARE VILLI?

\* To increase the surface area for the nutrients to be absorbed in the body, the lining of the small intestine is thrown into circular wrinkles or folds (mucosal folds).

\* These mucosal folds are further covered with millions of

tiny finger-like projections called villi. Thereby further increasing the surface area available for absorption.

\* Damage to the villi can potentially lead to deficiency of the nutrients.

# THE IMMUNE SYSTEM:

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\* The immune system has different types of white blood cells, each specialized to perform a specific function.

These cells are present in the blood and most other organs of the body including the intestine. ■

## WHAT IS AN AUTO-IMMUNE DISEASE?

The immune system develops a problem and recognizes a part of the body as a foreign agent. It will then attack that part of the body, eventually destroying it much like killing a virus or bacteria e.g. type 1 diabetes.

**Celiac disease** is also an autoimmune disease in which the immune system attacks the intestines.

Celiac disease is unique amongst all other autoimmune diseases in that the trigger that initiates this process is known. That trigger is **Gluten**

## **ROLE OF GENES:**

- ❑ Celiac disease is a genetic disorder
- ❑ Celiac disease is strongly associated with certain human leukocyte associated(HLA) genes.
- ❑ The two HLA genes that are important in celiac disease are HLA DQ2 and DQ8
- ❑ Laboratory testing for these genes is available but is currently expensive.

# WHAT HAPPENS IN CELIAC DISEASE ?

- \* A protein in the epithelium called zonulin is believed to play a role in regulating the process of binding the cells together tightly lining the epithelium.
- \*Celiac patients seem to have an abnormality in the action of zonulin, which leads to increased permeability (“leaky gut”).
- \*When there is increased permeability, gluten (gliadin) is able to make its way through the epithelium
- \*In the intestinal mucosa, an enzyme called tissue transglutaminase (TTG) is responsible for joining and modifying proteins.

\*In celiac disease, the TTG converts the gliadin into a form that activates the immune cells.

\* If the right genetic marker is present (i.e. HLA DQ2 or DQ8), this deamidated gliadin binds strongly to the HLA on these cells.

\*lymphocytes cause a release of a variety of substances (cytokines).

\*These cytokines initiate an inflammatory response causing damage to the epithelium and thus leading to villous atrophy(flattening or destruction).

\* These TTG antibodies in the blood are very good markers for the presence of celiac disease



## **PREVALANCE:**

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\* Celiac disease is one of the most common chronic gastrointestinal disorders in the world estimated to affect

0.5% to 1% of the population.

\* Celiac disease has been reported from North and South America, Europe, Australia, Africa, Middle East, Iran and India.

\* Although the exact prevalence of celiac disease in Pakistan

is not known, it is felt to be a common disorder present in all four provinces.

# SYMPTOMS OF CELIAC DISEASE:

## Common Symptoms

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- Abdominal pain
- Diarrhoea
- Indigestion and gas
- Constipation
- Nausea and vomiting
- Abdominal distension/bloating
- Weight loss
- Anemia
- Weakness and Fatigue
- weak bones (osteoporosis)



# Neurological Symptoms

- Depression
- Recurrent oral ulcers
- Dental enamel defects
- Menstrual irregularities
- Infertility

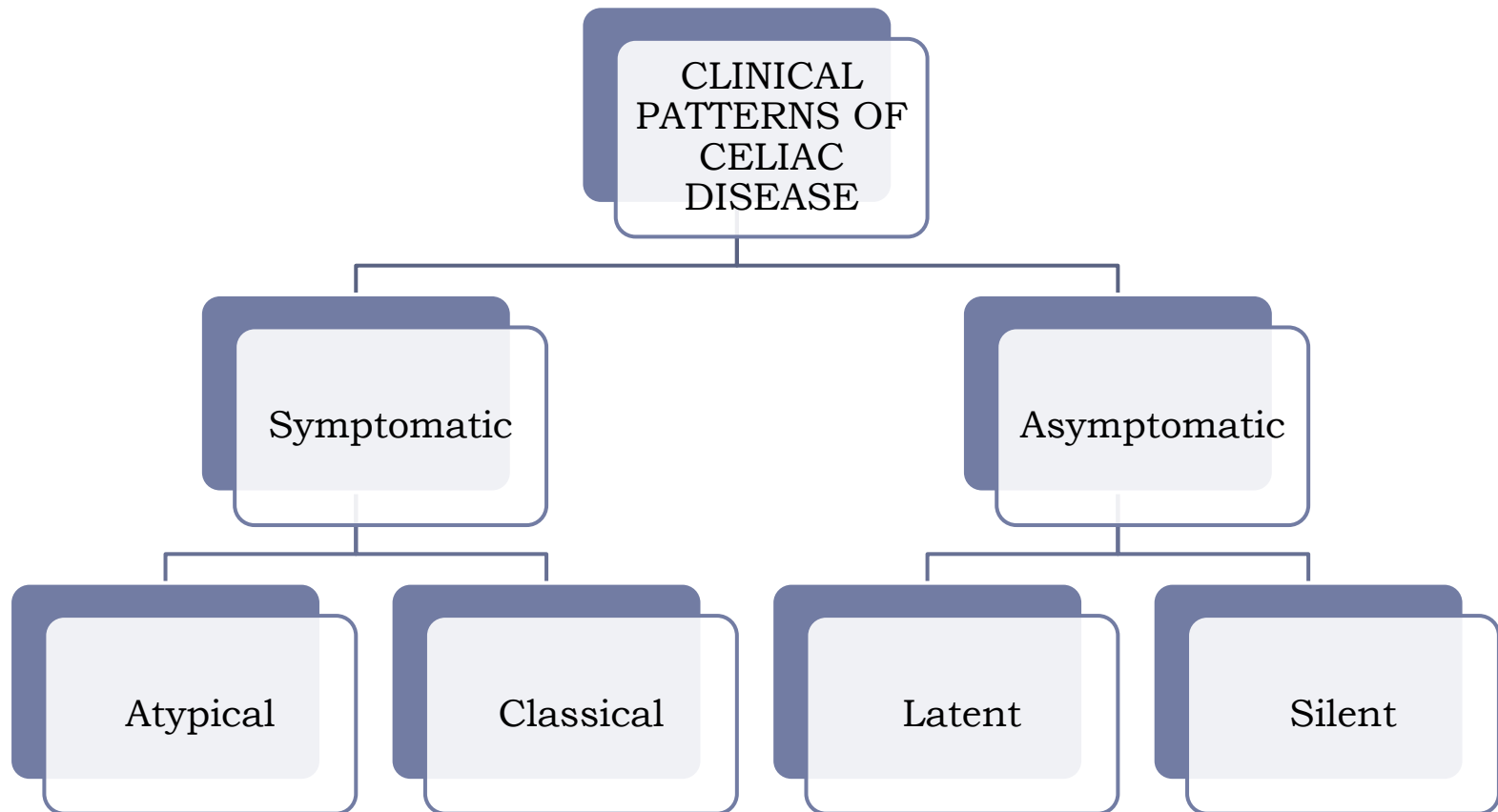
## Additional Symptoms In Children:

- Irritability
- Growth failure/delayed puberty
- Short stature
- Dental enamel defects
- Indigestion and Gas



# THE CELIAC ICEBERG:

Celiac disease is a multi-system disorder in which other organs of the body are also affected, directly or indirectly.



# SYMPTOMATIC CELIAC DISEASE (CLASSICAL, ATYPICAL):

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- \* Patients with classical celiac disease present with gastrointestinal symptoms of malabsorption i.e diarrhoea, abdominal pain and weight loss.
- \* Atypical symptoms are nongastrointestinal in nature.
- \* Atypical presentations are now becoming more typical.
- \* The serology (antibody blood test) will be positive in the majority of cases and a small intestinal biopsy will also be abnormal.

# ASYMPTOMATIC CELIAC DISEASE:

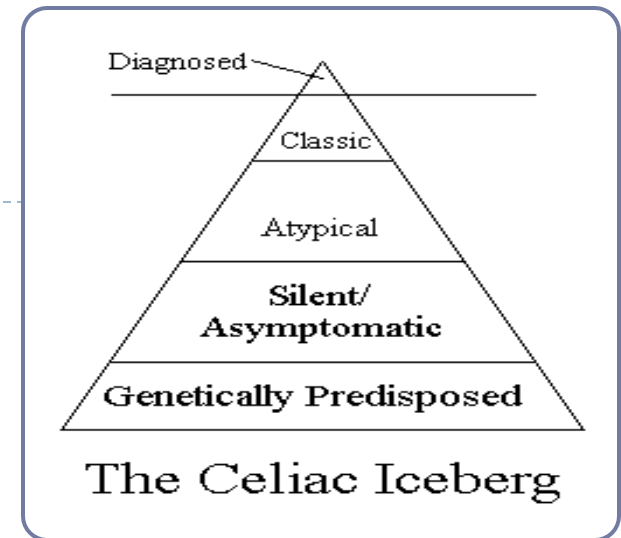
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## SILENT:

- \* Patients have no symptoms.
- \* Their serology is positive
- \* And, small intestinal biopsy abnormal, thus confirming celiac disease.

## LATENT:

- \* The individual has no symptoms but a positive serologic test for celiac disease.
- \* The intestinal biopsy is completely normal
- \* Treatment with a gluten-free diet is not recommended by most authorities.



# DERMATITIS HERPETIFORMIS

\* Dermatitis herpetiformis (DH) is “Celiac disease of the skin”.

\* It is a chronic condition that presents with a blistering skin rash associated with itching and burning sensations.

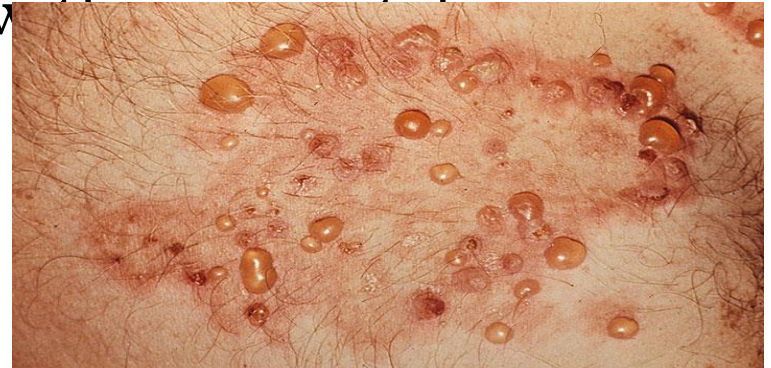
\* Genetic factors, the immune system and sensitivity to gluten seem to play a role.

\* Common affected areas include the elbows, scalp, back of the neck, knees the upper back, and the buttocks.

\* It is more common in males.

Can be diagnosed with a carefully performed skin biopsy.

\* Granular IgA antibody deposits on histology are unique to DH and confirm the diagnosis.



# DIAGNOSIS:

## TISSUE-TRANSGLUTAMINASE ANTIBODY:

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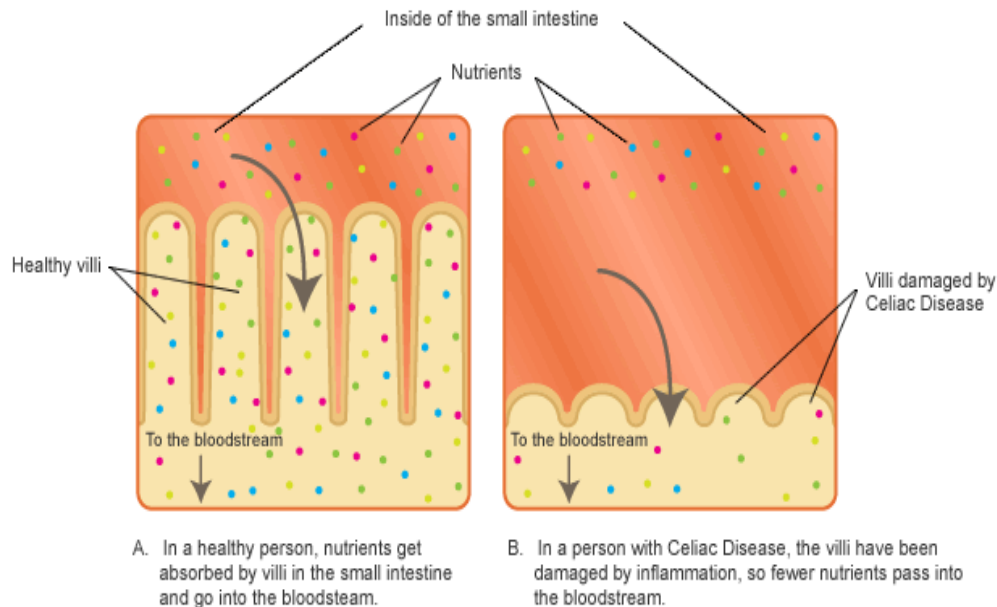
- \* The TTG is currently the recommended antibody test.
- \* Tissue transglutaminase is an enzyme (protein) found in almost all tissues of the body including the intestines.
- \* Two types of TTG antibodies are formed: IgA TTG and IgG TTG.
- \* The IgA TTG is the one that is measured by most laboratories. IgG TTG can be measured but is not commonly available.
- \* The presence of HLA-DQ2/DQ8 and two positive antibody tests in a symptomatic patient may obviate the need for small intestinal biopsy for diagnosis of celiac disease.



# SMALL INTESTINAL BIOPSY:

\* A small intestinal biopsy is the diagnostic test to confirm celiac disease.

\*The biopsy is a tiny sample taken from the mucosa (lining) of the small intestine and examined for inflammation and damage to the villi.



# ENDOSCOPY:

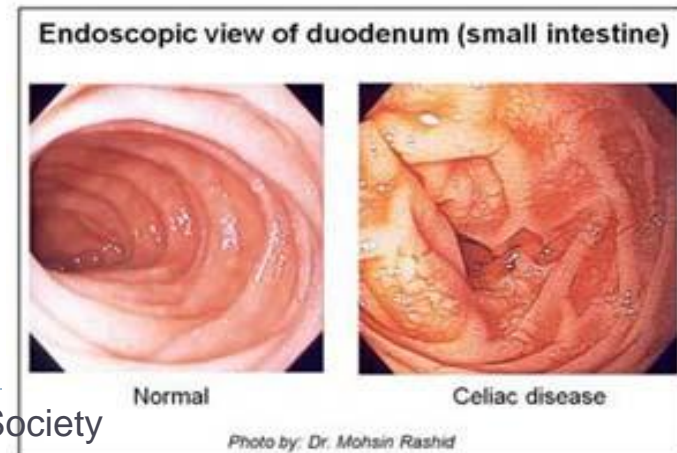
The small intestinal biopsy is taken during a procedure called an endoscopy.

Tiny pinches are taken from the mucosa with the forceps

A variety of changes can be seen affecting the mucosa in celiac disease. These changes include the following;

- \* Absence or flattening of mucosal folds
- \* Notching of mucosal folds (scallopiform)

<http://www.celiac-education.com>



# CLINICAL CASE:

There is no better way to learn than from real patients. Sir William Osler said, ***“If you listen carefully to the patient they will tell you the diagnosis”***.

## OBESITY AND CELIAC DISEASE:

A 10 year-old boy was referred to the Paediatric Gastroenterology service.

- \*One-year history of mild, intermittent abdominal pain with loose stools, four to five per day without any blood. There was no nausea or vomiting.
- \*Appetite was described as huge and he always felt hungry.
- \*He had put on a lot of weight.

\*The past history was unremarkable and his growth and development were normal.

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\*There were some individuals in the family with inflammatory bowel disease but nobody was known with celiac disease.

\*On examination, the child was massive with a weight of 79.5kg

\*The body mass index (BMI) was 34.1

\*The rest of the examination was normal.

\*Normal IgA and a tissue-transglutaminase antibody (TTG) level of >100AU (normal <9AU).

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\*Endoscopic small intestinal biopsies revealed total villous atrophy, crypt hyperplasia and an increased intraepithelial lymphocyte count confirming celiac disease.

## **DISCUSSION:**

Normally, with celiac disease one would think of malabsorption and weight loss. However, it is now becoming evident that the lesion of celiac disease can be patchy and some individuals may, in fact, be overweight.

## **KEY MESSAGE:**

Being obese does not rule out celiac disease. If there are symptoms present, serological testing for celiac disease should be obtained regardless of the weight of the patient.

<http://www.celiac-education.com>

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## TREATMENT :

Patients with celiac disease have to consume a **strict gluten-free diet** for the rest of their life.

# **GRAINS: GLUTEN-FREE AND GLUTEN-CONTAINING FLOURS AND STARCHES**

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## **Gluten-Free Grains, Flours**

- ▶ **Rice, all forms (brown, white, sweet, sticky, wild, jasmine, basmati, glutinous rice, rice polish, rice bran) bran,**
- ▶ **Corn (cornstarch, cornmeal, corn bran**
- ▶ **Nut flours and nut meals**
- ▶ **Millet**
- ▶ **Flax seed**
- ▶ **Pea flour**
- ▶ **Potato flour, potato starch**
- ▶ **Sago ,Sorghum flour**
- ▶ **Oats (uncontaminated with any other flour),Gram flour**
- ▶ **Soy (soya) flour**

## **Toxic (Gluten-Containing) Grains and starches Flours, and Starches**

- ▶ **Barley**
- ▶ **Malt (malt extract,malt syrup)**
- ▶ **Wheat (wheat starch) Rye**
- ▶ **Triticale(a cross between wheat and rye)**
- ▶ **Semolina**
- ▶ **Oats (mostly commercial brands, oat bran, oat syrup)**

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- ▶ **All lentils and pulses**

## Basic Gluten-Free Foods

- Eggs
- Dried beans and peas
- Nuts and seeds

## Possible Sources of Gluten (check ingredients carefully)

- Baked beans
- Seasoned nuts (may contain hydrolyzed wheat, protein wheat flour or wheat starch)



## Basic Gluten-Free Foods

## Possible Sources of Gluten (check ingredients carefully)

### Fruits and Vegetables

Fresh, frozen, and canned fruits  
Dried fruits (dates)  
and vegetables and their juices

- may be dusted with oat flour

### Meats and Alternatives

Fresh meat, fish, and poultry  
Meat marinades and flavorings  
Tofu

- (may contain hydrolyzed wheat protein, wheat-based soy sauce)
- Flavored tofu may contain soy sauce  
(made from wheat or seasonings with wheat derivatives)

## Basic Gluten-Free Foods

## Possible Sources of Gluten (check ingredients carefully)

### Milk Products

- ▶ Milk, buttermilk, cream Milk, buttermilk, cream
- ▶ Most yogurt (plain, fruited or flavored)
- ▶ Cheese, plain Cream cheese, cottage cheese
- ▶ Some imported foods labeled gluten from GF grains and free of other

### Grains & Grain Products

- ▶ Breads and baked goods made

### Fats and Oils

- ▶ Butter, margarine, vegetable oil, lard , shortening, cream

- ▶ Malted milk
- ▶ Cheese sauces, cheese spreads, flavored cheeses
- ▶ Pastas made from rice, beans, corn , potato, soy and other GF grains.

## Basic Gluten-Free Foods

## Possible Sources of Gluten (check ingredients carefully)

### Desserts

- ▶ Cakes, cookies, pastries made from Icing and frosting
- ▶ Many ice creams, sherbet  
Some ice creams are made with gluten-containing ingredients

### Whipped toppings

Egg custards  
Gelatin desserts  
GF licorice, most hard candies and most chocolate bars

### Miscellaneous

Beverages:  
Cocoa drinks, soft drinks, juices Most non-dairy soy, rice, potato and nut beverages

- may contain GF flours wheat flour or wheat starch
- (cookie dough, brownies, waffle cone pieces, nuts coated with flour etc

Chocolate bars and candy may contain barley malt flavoring or wheat Most common brands of licorice contain wheat flour

Flavored teas and coffees, herbal teas, and non-dairy beverages may contain barley malt flavoring or barley malt extract

## Basic Gluten-Free Foods

Teas, coffee (instant or ground regular or decaffeinated)

### **Sweets:**

Honey, jams, jellies, marmalade, molasses, corn syrup, maple syrup, sugar(white, brown, confectioner's)

## Possible Sources of Gluten (check ingredients carefully)

- Cocoa drinks may contain malt or malt flavoring (e.g., Ovaltine is NOT gluten free)
- Seasoned and flavored varieties may contain hydrolyzed wheat protein, wheat flour, or wheat starch Some brands of plain potato chips or potato crisps are made with wheat flour

## Basic Gluten-Free Foods

## Possible Sources of Gluten (check ingredients carefully)

### Condiments:

Salad dressings free of gluten-containing ingredients, plain pickles relish, olives, ketchup, mustard tomato paste, pure herbs and pure black pepper, GF soy sauce, vinegars (apple vinegar, cider vinegar, grape vinegar all but malt vinegar are GF)

Common baking ingredients:  
Pure cocoa, baking chocolate, chocolate chips, monosodium glutamate (MSG), cream of tartar

- Soy sauce is typically made from wheat
- Salad dressings may be made with soy sauce
- Malt vinegar
- Some brands of Worcestershire sauce
- contain malt vinegar

## Basic Gluten-Free Foods

- Baking soda, yeast, brewer's yeast, aspartame, vanilla
- Soups, Sauces, and Gravies  
Homemade broths, GF bouillon cubes
- Cream soups and stocks made from allowed ingredients
- Sauces and gravies made from
  - allowed ingredients

## Possible Sources of Gluten (check ingredients carefully)

- Major brands of baking powder are GF, others may contain wheat starch
- Most commercially produced soups and broths contain hydrolyzed wheat protein or wheat flour

Adapted from Case, Gluten-Free Diet: A Comprehensive Resource Guide, 2006 (29)

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\*Research has shown that in food a gluten content of less than 20 parts per million (or 20 mg/kg) is safe for most individuals with celiac disease.

\*Studies also reveal that 50 mg of gluten if taken daily for a few months can cause intestinal damage.

<http://www.celiac-education.com>

# INGREDIENTS TO WATCH FOR ON YOUR FOOD LABELS:

INGREDIENT	SAFE	UNSAFE
Caramel Color	This is made from corn. It is safe in a celiac diet.	
Citric Acid	This is made from corn. It is safe in a celiac diet.	
Dextrin	Producers in the United States claim to use corn, so domestically produced dextrin should be safe in a celiac diet.	
Flavors (artificial and natural)	Barley malt, which is sometimes used as a flavoring, and flavoring used in meat products may contain gluten. If so, it should be listed clearly on the label. In rare instances, barley malt is used as a flavoring but not identified on the label.	
Soy sauce	Use Tamari instead of soy sauce.	Many soy sauces are fermented from wheat, which is unsafe. Check with the processor for information.





INGREDIENT	SAFE	UNSAFE
Hydrolyzed vegetable protein (HVP) or Hydrolyzed plant protein (HPP)	Usually processors use “hydrolyzed soy protein”, which is safe in a celiac diet.	In rare instances, processors neglect to identify the “vegetable” in HVP. This could be wheat. Wheat is unsafe.
Malt	If made from corn it is safe in a celiac diet.	Malt is usually made from barley. Malt extract, malt flavoring, malt syrup, and malt flour are also made from barley. None of these ingredients are safe.
Maltodextrin		Wheat may sometimes be used in imported products. If so, it will be listed on the food label as “maltodextrin (wheat)” or “wheat maltodextrin.” This is unsafe.
Mono and Diglycerides	Fats are naturally gluten-free.	
Seasonings		Seasonings may contain anything. Be careful with seasonings.

INGREDIENT	SAFE	UNSAFE
Spices	Pure spices are gluten-free and should be safe in a celiac diet.	
Starch	Starch is always cornstarch. Cornstarch is safe in a celiac diet.	
Modified food starch		Modified food starch listed on a food label could be wheat starch. This is unsafe.
Sweeteners		Sweeteners can be unsafe. Read the labels for the use of gluten.
Malt Vinegar		Contains malt. This is unsafe.
Bakers and brewers yeast		Brewers yeast is not gluten-free unless found in a dietary food supplement. Brewers yeast found in dietary supplements is gluten-free.
<a href="http://www.celiac.com.pk">www.celiac.com.pk</a>	Pakistan Nutrition & Dietetic Society	

# SAMPLE MENU:

## Breakfast

- ▶ Cream of Rice cereal with fresh fruit or nuts
- ▶ Cottage cheese or Yogurt with fresh fruit
- ▶ Scrambled Eggs, with Gluten free Bread(rice)
- ▶ Egg, Cheese, and Vegetable with GF (e.g. nut flour) bread
- ▶ French Toast (made with gluten free bread)
- ▶ Corn flakes with Milk
- ▶ Boiled Egg Sandwich(gluten free bread)
- ▶ Basin ki Roti with any Plain Pickle
- ▶ Pan cakes with Jam
- ▶ Butter Milk
- ▶ Egg nog

# Main Meal Options

\*Beef and Potato curry

\*Chicken Shashlik

Fried Rice / Boiled Rice

\*Daal Saag

\*Chicken corn soup

\*All types of gravies and curries can be eaten with GF bread or chapati (e.g. Gram ,rice,soy ,potato ,millet , sorghum flour either individually or in combination)

# Snacks

\*Pop Corns

\*Roasted Chanay

\*GF Bread Rolls

\*GF biscuits

\*French fries

\*Pakorras

\*Fruit Gelatin Mould

\*Crackers and Cakes made with GF flour

# CROSS CONTAMINATION:

Whenever products containing gluten touch a bowl, utensil, or cutting board there is a risk of it getting into the gluten-free food. Other possibilities for cross-contamination are:

Toaster/toaster oven - use a separate toaster

Crumbs being left in jams, butter, condiments - use squeeze containers

Storage - make a separate space in cabinets and refrigerator

Double dipping - make sure that no one sticks utensils or food in gluten-free foods, such as butter.

[http://www.medicinenet.com/ceeliac\\_disease\\_gluten\\_free\\_diet/page\\_5.htm](http://www.medicinenet.com/ceeliac_disease_gluten_free_diet/page_5.htm)



# EAT OUT AND TRAVEL GLUTEN-FREE WITH EASE

There is a way to convert recipes that contain gluten into gluten-free recipes. You will need to experiment with the ingredient substitution, length of time, and temperature used for baking. Here are some substitutions that you can make in your recipes:

- For 1 tablespoon of wheat flour, substitute one of these:
  - 1 1/2 teaspoons cornstarch
  - 1 1/2 teaspoons potato starch
  - 1 1/2 teaspoons arrowroot starch
  - 1 1/2 teaspoons rice flour
  - 2 teaspoons quick-cooking tapioca

For 1 cup of wheat flour, substitute one of these:

- 3/4 cup plain cornmeal, coarse
- 1 cup plain cornmeal, fine
- 5/8 cup potato flour
- 3/4 cup rice flour

# HOW LONG THIS DIET SHOULD CONTINUE?

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The diet is lifelong—and cheating isn't an option: even eating a tiny amount of gluten can damage the small intestine. But the good news is that, for most people, following this diet will stop symptoms, heal existing intestinal damage and prevent further damage.

Improvements begin within days of starting the diet, and the small intestine is usually completely healed in **three to six** months for children and young adults and within **two years** for older adults.

[http://www.eatingwell.com/nutrition\\_health/gluten\\_free\\_diet/gluten\\_free\\_diet\\_guidelines](http://www.eatingwell.com/nutrition_health/gluten_free_diet/gluten_free_diet_guidelines)

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# COPING WITH THE GLUTEN-FREE DIET:

In closing, a strict gluten-free diet can be challenging, especially at the beginning. High cost, lack of availability of gluten-free products, limitations in eating out and

worries about cross contamination can all be overwhelming

Despite these challenges, Keeping a positive and a realistic attitude goes a long way in maintaining a gluten-free life style, and having a healthy, happy life..



# SUMMARY :

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Celiac disease is a genetic disorder in which lining of the small intestine is damaged by the ingestion of gluten, found in wheat , rye and barley. It is truly a global disorder seems to affect all areas of the world including Pakistan. Common symptoms are abdominal pain , malabsorption , weight loss and infertility. Dermatitis herpetiformis is the Celiac disease of skin. Common and available diagnosis includes TTG antibody test, small intestinal biopsy and endoscopy. The only treatment of Celiac disease is the consumption of strict gluten-free diet for the rest of life..

*Thank you!*