**Recent update and futuristic trends in diagnosis and treatment of “*Celiac Disease”.***

**Abstract**

Foods containing gluten can cause celiac disease, which is a long-term immunological and digestive illness that harms and affects the small intestine. Our body is unable to receive all the nutrients it needs because of this disease, which also causes serious digestive issues. Gluten is a protein found in grains such as wheat, barley, rye, and others. Gluten makes dough stretchy and gives bread its chewy texture. The dough is made more elastic by gluten, which also gives bread its chewy texture. The small intestine and villi, tiny finger-like projections seen on the small intestine wall, are damaged when the patient with celiac disease consumes food containing gluten because their body overreacts to the gluten protein. The small intestine cannot absorb enough nutrients from food when these villi are destroyed. In the end, this causes starvation, miscarriage, infertility, bone density loss, and neurological disorders. Researchers still don't have a firm understanding of the cause of celiac disease. Due to its inherited nature, celiac disease may pass on to certain genes. Any traumatic emotional experience or a severe medical incident can set it off. To help identify celiac disease, a tissue test for transglutaminase IgA (tTg-IgA) is employed. In this autoimmune illness, the immune system misinterprets the protein gluten as an outside invader.

**Key words**: Celiac disease, Gluten, tissue transglutaminase IgA (tTg-IgA), Gluten free diet.

**Introduction**

Foods containing gluten triggers celiac disease which is considered as a chronic digestive and immune disorder in this it affects and damages the small intestine. Gluten containing food triggers the celiac disease. It causes long lasting digestive problems and insufficient amount of nutrients are absorbed from the food. Other names for celiac disease include celiac sprue, gluten-sensitive enteropathy, and non-tropical sprue. A protein named gluten is present in barely, wheat, rye and other grains. Gluten gives elasticity to the dough and gives bread its chewy texture.

When a person with celiac disease consumes food containing gluten, their body overreacts to the gluten protein, causing damage to the small intestine and villi, microscopic projections that resemble fingers and are visible on the small intestine wall. When these villi are lost, the small intestine is unable to absorb enough nutrients from food. In the end, this results in neurological diseases, infertility, bone density loss, miscarriage, and famine. When the patient is on gluten free diet for a year and isn’t getting better then it is called refractory or non responsive celiac disease. Most of the times the patient never know they have celiac disease due to slow damage of small intestine and varied symptoms leads to several years to diagnose the disease.

Even though the patient is on a gluten-free diet and exhibits the same symptoms, the body does not display intestinal damage. [1-2]



Fig.1-Figure showing the difference in shape of villi in celiac disease.

Fig.2-Figure showing the complications related to celiac disease in other organs of body.

**Celiac Disease Symptoms**

Food allergy can’t be concluded as celiac disease as the symptoms are varied. If the patient is allergic to wheat and consumes wheat then they may have symptoms like itchy or watery eyes or hard time breathing.

**Symptoms of celiac disease in adults**:

If a celiac disease patient accidentally consumes gluten-containing food, they may have symptoms such as:

•iAnaemiai

•iAbdominalidiscomfort

i•iBoneiorijointipain

i•iBloatingiorifeelingifullnessi

•iConstipationi

•iDiarrhea

i•iGas

i•iHeartburn

•iItchy,iblisteryirashi(dermatitisiherpetiformis,iaccordingitoidoctors)

•iHeadachesioriexhaustion

i•iMouthiulcers

•iNausea

i•iNervousisystemiinjury,isuchiasinumbioritinglingihandsiorifeet,ibalanceiissues,iorichangesiiniconsciousness

i•iPoopithatiisipale,istinks,iorifloatsi(steatorrhea)

•iWeighti reduction

Celiac disease can also result in decreased spleen function (hyposplenism) and a loss of bone density.

Children's celiac disease symptoms: Intestinal problems are more likely in children with celiac disease, including:

* Bellyiswellingioribloating
* Diarrhea
* Pale,ifoul-smellingipoop
* Weightiloss
* Constipation
* Upsetistomachiorivomiting

If celiac disease prevents a child's body from absorbing the nutrients they require, they may experience the following symptoms: • Anaemia

• Damaged tooth enamel

• Infant failure to thrive

• Slow growth and short stature

• Delayed puberty

• Crankiness or mood changes

• Neurological issues such as learning impairments and attention deficit hyperactivity disorder (ADHD)

These symptoms are not experienced by everyone who has celiac disease. Some people do not notice any abnormalities, making diagnosis difficult.

Dermatitis herpetiformis (celiac rash)

Out of 4 people 1 with celiac disease gets blisters and itchy rashes. Adults and women are more prone to celiac rashes and it mostly happens in these body parts.

* Knees
* Scalp
* Elbows
* Buttocks
* Loweriback[1-3]

**Celiac Disease Causes and Risk Factors**

There is no definite cause of celiac disease known yet. Celiac disease is inheriting in nature and may continue to certain genes. Any emotional trauma or stressful medical events can trigger it. A transglutaminase IgA (tTg-IgA) tissue test is used to help diagnose celiac disease.

If the family member is diagnose to celiac disease, and then there is 1 in 10 chance of getting celiac disease.

Caucasians are more prone to celiac disease and people with other diseases, including:

* Addison’sidisease
* [Downisyndrome](https://www.webmd.com/children/understanding-down-syndrome-basics)
* [Hashimoto](https://www.webmd.com/women/hashimotos-thyroiditis-symptoms-causes-treatments)’sithyroiditis
* [Typei1idiabetes](https://www.webmd.com/diabetes/type-1-diabetes)
* Chronici[pancreatitis](https://www.webmd.com/digestive-disorders/digestive-diseases-pancreatitis)
* IgAinephropathy
* Idiopathicidilatedicardiomyopathy
* [Lupus](https://www.webmd.com/lupus/arthritis-lupus)
* Rheumatoidiarthritis
* iTurnerisyndromei(iniwhichiaifemaleilacksianiXichromosome)i
* iMultipleisclerosisi(MS)i
* iAutoimmuneihepatitisiSjogren’sisyndrome
* [Psoriasis](https://www.webmd.com/skin-problems-and-treatments/psoriasis/understanding-psoriasis-basics)
* Williamsisyndrome
* Primaryibiliaryi[cirrhosis](https://www.webmd.com/digestive-disorders/cirrhosis-liver)
* Intestinali[lymphoma](https://www.webmd.com/cancer/lymphoma/lymphoma-cancer)
* Intestinali[cancer](https://www.webmd.com/cancer/default.htm)
* [Lactoseiintolerance](https://www.webmd.com/digestive-disorders/digestive-diseases-lactose-intolerance)
* [Irritableibowelisyndrome](https://www.webmd.com/ibs/default.htm)i(IBS)
* [Scleroderma](https://www.webmd.com/skin-problems-and-treatments/scleroderma)

**Celiac Disease Complications**

If not treated the celiac disease can be threatening to life. Complications may include:

* Malnutrition
* Lactoseiintolerance
* Infertilityiandimiscarriage
* iToothienamelidamage
* iPancreaticidisease
* iCancer,iespeciallyiintestinalilymphomaiandismalliintestineicanceri
* iNervousisystemiissuesisuchiasiseizuresioripainiandinumbnessiiniyourihandsiandifeeti(peripheralineuropathy)
* Boneiweakness[3-5]

**Celiac Disease Tests and Diagnosis**

To diagnose celiac disease, blood tests and other procedures are performed:

• Metabolic panels assess the function of the liver and kidneys.

• Iron and ferritin tests are used to detect iron deficiency.

• Swallowing a tiny camera can reveal digestive system issues.

• Serology tests search for specific antibodies.

• Blood tests examine different aspects of your immune system.

• Intestinal fatty acid binding protein assays detect intestinal damage.

• A complete blood count detects anemia (low red blood cell count).

• C-reactive protein testing reveal whether or not there is inflammation.

• Vitamin D, B12, and folate tests are used to detect vitamin deficits.

• Imaging scans detect changes in the intestine, such as wall thickening or blood vessel alterations.

• To rule out celiac disease, genetic testing searches for human leukocyte antigens.

If blood testing and other tests reveal that you have celiac disease, an endoscopy is required for confirmation. Endoscopy is a procedure in which a small piece of tissue is removed to confirm intestinal injury. [6]

 **Causes**

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### Celiac Disease Diagnosis

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**Diagnosis - Tissue Transglutaminase Iga (Ttg-Iga)**

### The tissue transglutaminase (tTg-IgA) test is used to diagnose celiac disease. Celiac disease is an autoimmune condition in which the body's immune system views gluten as a foreign invader.

### In the intestine, antibodies assault an enzyme called tissue transglutaminase (tTG). Antibodies (immunoglobulins) bind to pathogens and kill them.

### tTG-IgA Tests

### If a patient has celiac disease and exhibits symptoms such as vomiting, diarrhea, constipation, gut pain, poor growth, or rashes, a tTG-IgA test may be ordered. The test is also performed on patients who have type 1 diabetes, thyroid disease, or a family member who has celiac disease.

### Prepare for a tTG-IgA Test

For the accurate results of the blood test, the patient should be on normal diet or the gluten containing diet until the test is completely performed.

### Immunoglobulin Test

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The types of antibodies are:

* **ImmunoglobuliniAi(IgA):iThisiproteiniisifoundiinitheiliningsiofitheirespiratoryiandidigestiveitracts,iasiwelliasisalivai(spit),itears,iandibreastimilk.**
* **ImmunoglobuliniGi(IgG):iThisiisitheimosticommonlyiencounterediantibody.iItiisifoundiinibloodiandiotheribodilyifluidsiandiprovidesiprotectioniagainstibacterialiandiviralidiseases.iAfterianiinfectionioriimmunization,iIgGicanitakeisomeitimeitoidevelop.**
* **ImmunoglobuliniMi(IgiM):iFoundiprimarilyiinibloodiandilymphifluid,ithisiisitheifirstiantibodyiproducedibyitheibodyiwheniitiencountersiainewiinfection.**
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* ImmunoglobuliniDi(IgiD):iThisiantibodyiisitheileastiunderstood,iwithijustitraceilevelsiseeniinitheiblood.[14-18]

**Commonly Used Diagnostic Tests for Celiac Disease**

|  |  |  |
| --- | --- | --- |
| **TEST** | **ADVANTAGES** | **DISADVANTAGES** |
| Tissue transglutaminase tTG IgA antibodies | Most reliable noninvasive test first level screening testHigh sensitivity and specificity | Falsely negative with IgA deficiency (3% of patients with celiac disease)May be negative if on low – gluten diet |
| Tissue transglutaminase tTG IgG antibodies | Useful in patients with IgA deficiency | Widely variable sensitivity and specificity |
| IgA antiendomysial antibodies | May be useful in patients with borderline results for tTG antibodies | Sensitivity for celiac disease less than IgA anti- transglutaminase antibody test |
| IgG deamidated gliadin peptide antibodies | Useful in patients with IgA deficiency and in young children | Not as sensitive or specific as tTG IgA antibodies |
| HLA-DQ2 or HLA-DQ8 | High negative predictive value for celiac disease | Test is complex and expensive |
| Small bowel biopsy | Reliable test considered gold standardReflects response to treatment | Requires endoscopy and biopsy very expensive |

### Why Are Immunoglobulin Tests Done?

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### How Is Celiac Disease Treated?

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#### Dietary Changes

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Gluten-free foods include

1. Fruits
2. Vegetables
3. Meat and poultry
4. [Fish](https://www.webmd.com/food-recipes/ss/slideshow-foolproof-fish) and other seafood
5. Dairy
6. Beans and nuts

 Some Gluten-free starches and grains include:

* Rice
* [Corn](https://www.webmd.com/food-recipes/corn-health-benefits) or maize
* Soy
* Potato
* Tapioca
* Beans
* Sorghum
* Quinoa
* Millet
* Amaranth
* Flax
* Chia
* Nut flours
* Common things such as pharmaceuticals and toothpaste might contain gluten, so read the label carefully.[23-27]

**Conclusion**

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Theitissueitransglutaminasei(tTg-IgA)itestiisiuseditoidiagnoseiceliacidisease.iCeliacidiseaseiisiani autoimmuneiconditioniiniwhichitheibody'siimmuneisystemiviewsigluteniasiaiforeigniinvader.iInitheiintestine,iantibodiesiassaultianienzymeicalleditissueitransglutaminasei(tTG).iAntibodiesi(immunoglobulins)ibinditoipathogensiandikillithem.iThereiisicurrentlyinoicureioritreatmentiforiceliacidisease.iManyistudiesiareibeingiconductedioninewitreatments.iForitheitimeibeing,iaigluten-freeidieticanihelpito mend the intestinaliliningiorivilliiandialleviateisymptoms.

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