

Level 2

## **Blood Tests in Celiac Disease**

KEY POINTS:

- Blood tests can be useful to help diagnose celiac disease as well as to get a general idea of how patients with celiac disease are healing once diagnosed.

## **Blood Tests for Diagnosis**

### **What blood tests are used to diagnose celiac disease?**

There are two modern blood tests for celiac disease:

- 1) Tissue transglutaminase IgA antibody level (commonly referred to as "tTG")
- 2) Deamidated Gliadin Peptide IgA/IgG antibody level (commonly referred to as DGP)

The most frequently used test is the tTG. It is accurate at detecting most people with celiac disease on a gluten-containing diet.<sup>1</sup> However, a minority of patients with celiac disease (~2%) do not produce any IgA antibodies. This is a condition called IgA deficiency and is generally asymptomatic but may be associated with increased risk of some infections. A person with celiac disease who has this condition will generally test negative with the tTG test regardless of celiac status.<sup>2,3</sup>

This is why doctors often also test for serum total IgA. It's also one of the reasons why the DGP test was invented. DGP can detect people with celiac people with IgA deficiency because it can test for two types of antibodies (IgA and IgG) in only one test. The person must be on a gluten-containing diet, however, just as the tTG test requires. There is also an IgG tTG test but it is less accurate than the IgG DGP test. Conversely IgA tTG is more accurate than IgA DGP.

The Endomysial Antibody test (EMA) is an earlier version of the tTG test. It is not as widely available as tTG and is more expensive than tTG. For these reasons, it is seldom used these days.

The anti-gliadin antibodies (anti-gliadin IgA or IgG) are older tests with the lowest accuracy among all the celiac blood tests. Considering the wide availability of newer/better tests, their use for diagnosis of celiac disease is highly discouraged<sup>4</sup>.

## **Is there a blood test that can detect celiac disease in a person on a gluten-free diet?**

Unfortunately, we currently do not have any accurate tests for this situation. Genetic testing may be able to rule out celiac disease in this situation but it cannot confirm it. The only way to test for celiac disease in this context is to undergo a gluten challenge.<sup>1</sup>

- Gluten challenge: A patient suspected to have celiac disease but eating a gluten-free diet is asked to eat a fixed daily amount of gluten (3 grams/day, about 2 slices of bread). If the patient develops symptoms that are not tolerable, the challenge is stopped at 2 weeks. At that moment, the patient has a small bowel biopsy taken and blood is drawn for tTG and DGP levels. If the patient tolerates the challenge during two weeks then he/she continues eating the same amount of gluten for an additional 6 weeks. A small bowel biopsy is then taken and blood is drawn again for tTG and DGP levels. We know that it is an uncomfortable situation for the patients and is not 100% reliable as some people take months of gluten exposure to develop diagnostic changes in blood tests or biopsy. We are working hard to develop new tests to shorten or avoid gluten challenges.<sup>5</sup>

## **Blood Tests for Health Maintenance**

Once a patient has been diagnosed with celiac disease, he/she is advised to follow a strict gluten-free diet for life.<sup>6</sup> During and after the diagnosis, doctors may order follow-up blood tests that can be important for:

1. Checking if the patient's small intestine is recovering from the injury; if the patient is still exposed to gluten.
2. Screening for and following up on diseases and nutritional deficiencies associated with celiac disease.<sup>1</sup>

## **Can blood tests indicate if someone with celiac disease is correctly following a gluten free diet?**

Once a person with celiac disease is on a gluten-free diet for at least 3 months, a doctor commonly checks the antibody tests that were abnormal at diagnosis, namely tTG and/or DGP. A significant drop in these antibody levels along with an improvement in the patient's symptoms is usually expected after at least 3 months on a strict gluten-free diet.<sup>7</sup>

Nevertheless, to this day no blood test has been shown to be as good as an expert dietitian assessment to check if someone is correctly following the gluten-free diet.<sup>8</sup> Tests to detect gluten in the stool of people with celiac disease are under development

in order to assess for dietary adherence or cross-contamination of foods claiming to be gluten-free.<sup>9</sup>

**What tests are commonly used to check for diseases that are more common in people with celiac disease?**

There are other autoimmune diseases that are commonly associated with celiac disease. Physicians may consider it appropriate to test for these at diagnosis or follow-up.

Examples:

Disease	Blood Tests
Thyroid disease <sup>10,11</sup>	<ul style="list-style-type: none"><li>• Thyroid Stimulating Hormone (TSH)</li><li>• Thyroid Hormones (T3, T4)</li><li>• Thyroid antibodies (anti-TPO, anti-TSHR, anti-microsomal)</li></ul>
Liver Disease <sup>12</sup>	<ul style="list-style-type: none"><li>• ALT</li><li>• AST</li><li>• Alkaline Phosphatase</li><li>• Bilirubin</li></ul>

**What tests are commonly used to help better understand the nutritional status of a person with celiac disease?**

When celiac disease is active, many nutrients are not well absorbed from the gut. Doctors and dietitians run blood tests to monitor the blood levels of key nutrients. If these levels are found to be abnormal, they are monitored and treated until they normalize.<sup>13, 14</sup>

Examples:

System involved / Common Symptoms	Tests
Blood cells (Red) <ul style="list-style-type: none"> <li>- Fatigue</li> <li>- Shortness of Breath</li> </ul>	<ul style="list-style-type: none"> <li>• Iron stores               <ul style="list-style-type: none"> <li>○ Ferritin</li> <li>○ Iron Binding Capacity</li> <li>○ Serum iron</li> </ul> </li> <li>• Complete blood count (CBC)               <ul style="list-style-type: none"> <li>○ Red cell morphology</li> </ul> </li> <li>• Folic acid</li> <li>• Vitamin B12</li> </ul>
Bones <ul style="list-style-type: none"> <li>- Higher risk of fractures</li> </ul>	<ul style="list-style-type: none"> <li>• Vitamin D</li> <li>• Calcium</li> <li>• Parathyroid Hormone (PTH)</li> </ul>
Brain and nerves <ul style="list-style-type: none"> <li>- Fatigue</li> <li>- "Brain fog"</li> <li>- Limb tingling</li> <li>- Abnormal gait</li> </ul>	<ul style="list-style-type: none"> <li>• Vitamin B6</li> <li>• Vitamin B12</li> <li>• Carnitine</li> </ul>
General health <ul style="list-style-type: none"> <li>- Frequent respiratory infections</li> <li>- Frequent digestive infections</li> </ul>	<ul style="list-style-type: none"> <li>• Copper</li> <li>• Zinc</li> </ul>

**TAKE HOME MESSAGES:**

1. The tTG and DGP antibody tests are the main blood tests to diagnose and monitor celiac disease.
2. Anti-gliadin antibodies are no longer used to diagnose celiac disease.
3. A number of other tests are useful for detection of disorders related to celiac disease and monitoring of nutritional deficiencies. These should be considered on a case by case basis with your clinician.

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