Diabetes-related Autoantibodies

Also known as: Islet Autoantibodies; Diabetes Mellitus Autoantibody Panel

Formal name: Islet Cell Cytoplasmic Autoantibodies; ICA; Insulin Autoantibodies; IAA; Glutamic Acid Decarboxylase Autoantibodies; GADA; GAD65 Autoantibodies; Insulinoma-Associated-2 Autoantibodies; IA-2A; ICA512 Autoantibodies; Protein Tyrosine Phosphatase-like Autoantibodies

Related tests: Glucose Tests; Insulin; C-peptide

At a Glance

Why Get Tested?

After a diagnosis of diabetes is made, to help distinguish autoimmune type 1 diabetes from type 2 diabetes

When to Get Tested?

When you are first diagnosed with diabetes to help determine whether your diabetes is autoimmune-related; when you are a diabetic who is treated with diet or drugs and have great difficulty maintaining normal or near-normal blood sugar (glucose) levels and are suspected of having type 1 instead of type 2 diabetes

Sample Required?

A blood sample drawn from a vein in your arm

Test Preparation Needed?

None

The Test Sample

What is being tested?

Diabetes-related autoantibodies are proteins produced by the immune system that have been shown to be associated with type 1 diabetes. Testing can detect the presence of one or more of these autoantibodies in the blood.

Type 1 diabetes is a condition characterized by a lack of insulin due to autoimmune processes that destroy the insulin-producing beta cells in the pancreas. Diabetes-related autoantibodies reflect the destruction of beta cells, the loss of beta cell function, and inadequate production of insulin that are features of type 1 diabetes, but they are not thought to be the cause of type 1 diabetes. In contrast, type 2 diabetes primarily results from the body's resistance to the effects of insulin (insulin resistance) and does not involve autoimmune processes.

Type 1 diabetes was previously known as juvenile or insulin-dependent diabetes but has been re-characterized to reflect beta cell destruction. When autoimmune type 1 diabetes is present, one or more of the diabetes autoantibodies will be present in about 95% of those affected at the time of initial diagnosis. With type 2 diabetes, the autoantibodies are typically absent.

Four of the most common diabetes-related autoantibody tests include:

- Islet Cell Cytoplasmic Autoantibodies (ICA)

- Glutamic Acid Decarboxylase Autoantibodies (GADA)

- Insulinoma-Associated-2 Autoantibodies (IA-2A)

- Insulin Autoantibodies (IAA)

For more on these, see The Test tab.

About 5% of all cases of diabetes are type 1 (autoimmune) and the majority of these cases are diagnosed in people younger than 20. Symptoms of diabetes, such as frequent urination, thirst, weight loss, and poor wound healing, emerge when about 80-90% of a type 1 diabetic's beta cells have been destroyed and are no longer able to produce insulin. The body requires daily insulin so that glucose can enter cells and be used for energy production. Without sufficient insulin, cells starve and high blood sugar (hyperglycemia) results. Acute hyperglycemia can cause a diabetic medical crisis and chronic hyperglycemia can damage blood vessels

and organs such as the kidneys.

How is the sample collected for testing?

A blood sample is obtained by inserting a needle into a vein in the arm.

**Is any test preparation needed to ensure the quality of the sample?**

No test preparation is needed.

The Test

How is it used?

Diabetes-related (islet) autoantibody testing is primarily used to help distinguish autoimmune type 1 diabetes from diabetes due to other causes. Type 1 diabetes is a condition characterized by a lack of insulin due to autoimmune processes that destroy the insulin-producing beta cells in the pancreas. Type 2 diabetes is primarily associated with insulin resistance.

Determining which type of diabetes is present allows for early treatment with the most appropriate therapy to avoid complications from the disease. Type 1 diabetics must self-check their glucose levels and inject themselves with insulin several times a day to control the level of glucose in their blood. Type 2 diabetics may self-check their glucose one or more times a day. However, type 2 diabetics control their blood glucose in a variety of ways. Some can control their glucose levels with diet and exercise, others take oral medications, and some need daily insulin injections.

View image
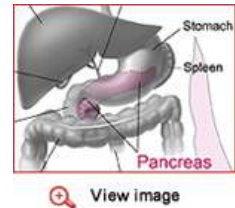
The four most common autoantibody tests used to distinguish between type 1 diabetes and diabetes due to other causes are summarized in the table below.

Test	Abbr	Description	Comments
Islet Cell Cytoplasmic Autoantibodies	ICA	Measures a group of islet cell autoantibodies targeted against a variety of islet cell proteins (Note: beta cells are one type of islet cell)	One of the most common islet cell autoantibodies detected at onset of disease; detected in about 70-80% of newly diagnosed type 1 diabetics
Glutamic Acid Decarboxylase Autoantibodies	GADA	Tests for autoantibodies directed against beta cell protein (antigen) but is not specific to beta cells	Also one of the most commonly detected autoantibodies in newly diagnosed type 1 diabetics (about 70-80%)
Insulinoma-Associated-2 Autoantibodies	IA-2A	Tests for autoantibodies directed against beta cell antigens but is non-specific	Detected in about 60% of type 1 diabetics
Insulin Autoantibodies	IAA	Autoantibody targeted to insulin; insulin is the only antigen thought to be highly specific for beta cells.	Detected in about 50% of type 1 diabetic children; not commonly detected in adults IAA test does not distinguish between autoantibodies that target the endogenous insulin and antibodies produced against exogenous insulin.

The autoantibodies seen in children are often different than those seen in adults. IAA is usually the first marker to appear in young children. As the disease evolves, this may disappear and ICA, GADA and IA-2A become more important. IA-2A is less commonly positive at the onset of type 1 diabetes than either GADA or ICA. Whereas about 50% of children with new-onset type 1 diabetes will be IAA positive, IAA positivity is not common in adults.

When is it ordered?

A combination of these autoantibodies may be ordered when a person is newly diagnosed with diabetes and the health practitioner wants to distinguish between type 1 and type 2 diabetes. In addition, these tests may be used when the diagnosis is unclear in diabetics who have been diagnosed as type 2 but who have great difficulty in controlling their glucose levels with standard treatments.

What does the test result mean?

If ICA, GADA, and/or IA-2A are present in a person with symptoms of diabetes, the diagnosis of type 1 diabetes is confirmed. Likewise, if IAA is present in a child with diabetes who is not insulin-treated, type 1 diabetes is the cause.

If no diabetes-related autoantibodies are present, then it is unlikely that the diabetes is type 1. Some people who have type 1 diabetes will never develop detectable amounts of islet autoantibodies, but this is rare. The majority of people, 95% or more, with new-onset type 1 diabetes will have at least one islet autoantibody.

Is there anything else I should know?

Because GADA and IA-2A assays are automated, these tests are generally more available than ICA testing, which is labor-intensive and requires considerable expertise in interpretation.

Islet autoantibodies may also be seen in people with other autoimmune endocrine disorders such as Hashimoto thyroiditis or autoimmune Addison disease.

Testing non-diabetic individuals for islet autoantibodies is recommended only as part of a research study. In research settings, these islet autoantibody tests may be used to help predict the development of type 1 diabetes in family members of those affected. In general, the more islet autoantibodies that a non-diabetic person has in their blood, the higher their risk for later developing type 1 diabetes. If a non-diabetic individual with one or more islet autoantibodies also has a low insulin response to the intravenous injection of glucose, their risk for type 1 diabetes can be high. More specifically, in first degree relatives of people with type 1 diabetes who have ICA and a low insulin response to intravenous injection of glucose, the risk of developing type 1 diabetes within 5 years is greater than 50%.

Because there are currently no effective therapies to prevent type 1 diabetes, general population screening for islet autoantibodies or testing of first degree relatives of those with type 1 diabetes is not generally recommended, except for research purposes.

People who are treated with insulin injections may begin to develop antibodies directed against the exogenous insulin. The IAA test does not distinguish between these types of antibodies and the autoantibodies directed against endogenous insulin. Therefore, this test is not valid for someone who has already been treated with injections of insulin. For example, someone who was thought to be a type 2 diabetic and who was treated with insulin injections cannot then have this test done to determine if he or she is a type 1 diabetic.

Common Questions

1. Can these tests be used to diagnose diabetes?

No. Type 1 diabetes as well as other types are screened for, diagnosed, and monitored using tests for blood glucose and/or A1c. The autoantibody tests can be used after diabetes is already diagnosed to help differentiate between type 1 and type 2.

2. Do the autoantibodies ICA, GADA, and IA-2A destroy the beta cells?

They are associated with beta cell destruction and reflect an ongoing autoimmune process, but they are not thought to cause the damage.

3. Does early detection of beta cell destruction allow its prevention?

Not currently. What it does do is allow for diabetes to be addressed as soon as symptoms, such as frequent urination, weight loss, and high blood glucose (hyperglycemia), appear. This can help establish diabetic glucose control and can in turn help minimize the occurrence of complications, such as the kidney and eye damage that are seen with diabetes.

Related Pages

On This Site

Conditions: Diabetes, Autoimmune Disorders, Insulin Resistance

Elsewhere On The Web

National Diabetes Information Clearinghouse: Diabetes Overview

American Diabetes Association: Type 1 Diabetes

MedlinePlus Medical Encyclopedia: Type 1 diabetes

Mayo Clinic: Type 1 Diabetes

University of California San Francisco: What is Type 1 Diabetes?

Article Sources

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