

**REVIEWED***By Chris at 10:25 am, Dec 17, 2019*

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A1C test

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Overview

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The A1C test is a common blood test used to diagnose type 1 and type 2 diabetes and to monitor how well you're managing your diabetes. The A1C test goes by many other names, including glycated hemoglobin, glycosylated hemoglobin, hemoglobin A1C and HbA1c.

The A1C test result reflects your average blood sugar level for the past two to three months. Specifically, the A1C test measures what percentage of your hemoglobin — a protein in red blood cells that carries oxygen — is coated with sugar (glycated). The higher your A1C level, the poorer your blood sugar control and the higher your risk of diabetes complications.

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Why it's done

The A1C test measures your average blood sugar level for the past two to three months. The results of your A1C test can help your doctor:

- **Identify prediabetes.** If you have prediabetes, you have a higher risk of developing diabetes and cardiovascular disease.
- **Diagnose type 1 and type 2 diabetes.** To confirm a diabetes diagnosis, your doctor will likely look at the results of two blood tests administered on different days — either two A1C tests or the A1C test plus another diabetes blood test.
- **Monitor your diabetes treatment plan.** The results of your initial A1C test(s) also help establish your baseline A1C level. The A1C test is then repeated on a regular basis to monitor your diabetes treatment plan.

It measures your average blood sugar level for the past two to three months and can show how well your diabetes treatment plan is working to lower your blood sugar over time.

How often you need the A1C test depends on the type of diabetes you have, your treatment plan and how well you're managing your blood sugar. For example, the A1C test may be recommended:

- Once every year if you have prediabetes
- Twice a year if you have type 2 diabetes, you don't use insulin and your blood sugar level is consistently within your target range
- Four times a year if you have type 1 diabetes
- Four times a year if you have type 2 diabetes, you use insulin to manage your diabetes or you have trouble keeping your blood sugar level within your target range

You may need more frequent A1C tests if your doctor changes your diabetes treatment plan or you begin taking a new diabetes medication.

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How you prepare

The A1C test is a simple blood test. You don't need to fast for the A1C test, so you can eat and drink normally before the test.

What you can expect

During the A1C test, a member of your health care team takes a sample of blood by inserting a needle into a vein in your arm or pricking the tip of your finger with a small, pointed lancet. If the blood is taken from a vein, the blood sample is sent to a lab for analysis. Blood from a finger prick is usually analyzed in your doctor's office for same-day results. You can return to your usual activities immediately.

Results

A1C test results are reported as a percentage. A higher A1C percentage corresponds to higher average blood sugar levels. The higher your A1C level, the higher your risk of developing diabetes or complications of diabetes.

For someone who doesn't have diabetes, a normal A1C level is below 5.7 percent. If your A1C level is between 5.7 and 6.4 percent, you have prediabetes (also called impaired fasting glucose), which means you have a high risk of developing diabetes in the future.

An A1C level of 6.5 percent or higher on two separate occasions shows that you have diabetes. An A1C level above 8 percent means that your diabetes is not well-controlled and you have a higher risk of developing complications of diabetes.

For most adults who have diabetes, an A1C level of 7 percent or less is a common treatment target. Lower or higher targets may be appropriate for some individuals. If your A1C level is above your target, your doctor may recommend a change in your diabetes treatment plan.

Some people who have diabetes monitor their blood sugar levels at home with devices. Your devices likely report your blood sugar levels in milligrams per deciliter (mg/dL) or millimoles per liter (mmol/L). A1C levels are reported as a percentage, but they correspond with estimated average blood sugar (glucose) levels. To help you tie your A1C levels back to your home monitoring, here's how A1C corresponds to the estimated average blood sugar level:

A1C level	Estimated average blood sugar (glucose) level
6 percent	126 mg/dL (7 mmol/L)
7 percent	154 mg/dL (8.6 mmol/L)
8 percent	183 mg/dL (10.2 mmol/L)
9 percent	212 mg/dL (11.8 mmol/L)
10 percent	240 mg/dL (13.4 mmol/L)
11 percent	269 mg/dL (14.9 mmol/L)
12 percent	298 mg/dL (16.5 mmol/L)

It's important to note that the effectiveness of A1C tests may be limited in certain cases. For example:

- If you experience heavy or chronic bleeding, your hemoglobin stores may be depleted. This may make your A1C test results falsely low.
- If you have iron deficiency anemia, your A1C test results may be falsely high.
- Most people have only one type of hemoglobin, called hemoglobin A. If you have an uncommon form of hemoglobin (known as a hemoglobin variant), your A1C test result may be falsely high or falsely low. Hemoglobin variants are most often found in blacks and people of Mediterranean or Southeast Asian heritage. Hemoglobin variants can be confirmed with lab tests. If you're diagnosed with a hemoglobin variant, your A1C tests may need to be done at a specialized lab for the most accurate results.
- If you have another form of hemolytic anemia, or if you've had a recent blood transfusion, this test would not be useful, as results may be falsely low.

Also keep in mind that the normal range for A1C results may vary somewhat among labs. If you consult a new doctor or use a different lab, it's important to consider this possible variation when interpreting your A1C test results.

By Mayo Clinic Staff

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