

Living Well with Diabetes

Hemoglobin A1c Test

What is the hemoglobin A1c test?

The hemoglobin A1c test is a simple lab test that shows the average amount of sugar in your blood over the last two to three months. It's the best way to find out if your blood sugar is under control. All people with type 2 diabetes should have a hemoglobin A1c test at least twice a year. If your treatment changes or if your blood sugar level stays too high, you should get a hemoglobin A1c test at least every three months until your blood sugar level improves. Regular testing will help you and your doctor to track your blood sugar levels over time and plan long-term treatment options to reach your target level of control.

What does this test measure?

Sugar in the bloodstream can become attached to the hemoglobin (the part of the cell that carries oxygen) in red blood cells. This process is called glycosylation. Once the sugar is attached, it stays there for the life of the red blood cell, which is about 120 days. The higher the level of blood sugar, the more sugar attaches to red blood cells. The hemoglobin A1c test measures the amount of sugar sticking to the hemoglobin in the red blood cells. A1c levels do not change quickly but will shift as older red blood cells die and younger ones take their place. Results are given in percentages.

How is the test done?

This test is usually done in a health care provider's office. To do the test, a small sample of blood is taken. The blood sample is sent to a laboratory for testing, and the laboratory sends the results to the patient's health care provider.



How is it used?

The A1c test is used primarily to monitor the glucose control of diabetics over time. The goal of those with diabetes is to keep their blood glucose levels as close to normal as possible. This helps to minimize the complications caused by chronically elevated glucose levels, such as progressive damage to body organs like the kidneys, eyes, cardiovascular system, and nerves. The A1c test gives a picture of the average amount of glucose in the blood over the last few months. It can help a patient and his doctor know if the measures they are taking to control the patient's diabetes are successful or need to be adjusted.

The A1c test is frequently ordered on newly diagnosed diabetics to help determine how elevated their uncontrolled blood glucose levels have been. It may be ordered several times while control is being achieved, and then several times a year to verify that good control is being maintained.

What does the test result mean?

A 1 percent change in an A1c result reflects a change of about 30 mg/dL (1.67 mmol/L) in average blood glucose. For instance, an A1c of 6 percent corresponds to an average glucose of 135 mg/dL (7.5 mmol/L), while an A1c of 9 percent corresponds to an average glucose of 240 mg/dL (13.5 mmol/L). The closer a diabetic can keep their A1c to 6 percent, the better their diabetes is in control. As the A1c increases, so does the risk of complications.

Bear in mind that the correlation between mean plasma glucose (MPG) levels and A1c levels is an estimation only, dependent on methodology used for the calculation as well as other factors, such as the red blood cells' life span. The exact MPG value reported on your laboratory report may not coincide exactly with the formula given above.

Is there anything else I should know?

The A1c test will not reflect temporary, acute blood glucose increases or decreases. The glucose swings of someone who has "brittle" diabetes will not be reflected in the A1c.

If you have an abnormal type of hemoglobin, such as sickle-cell hemoglobin, you may have a decreased amount of hemoglobin A. This will affect the amount of glucose that can bind to your hemoglobin and may limit the usefulness of the A1c test in monitoring your diabetes. If you have hemolysis or heavy bleeding, your test results may be falsely low. If you are iron-deficient, you may have an increased A1c measurement.

How often should I have the test done?

Depending on the type of diabetes that you have, how well your diabetes is controlled, and your doctor, your A1c may be measured 2 to 4 times each year. The American Diabetes Association (ADA) recommends testing your A1c: four times each year if you have type 1 or type 2 diabetes and use insulin; or two times each year if you have type 2 diabetes and do not use insulin.

When someone is first diagnosed with diabetes or if control is not good, A1c may be ordered more frequently.

Adapted from the National Diabetes Information Clearinghouse: <http://diabetes.niddk.nih.gov/>

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