

View this article online at: patient.info/diabetes/diabetes-mellitus-leaflet/tests-for-blood-sugar-glucose-and-hba1c

Blood glucose test (blood sugar) and HbA1c

Blood sugar (glucose) measurements are used to diagnose diabetes. They are also used to monitor glucose control for those people who are already known to have diabetes.

If your glucose level is high and remains high then you have diabetes. If the level goes too low then it is called hypoglycaemia.

The main tests for measuring the amount of glucose in the blood are:

- Random blood glucose level.
- Fasting blood glucose level.
- The HbA1c blood test.
- Oral glucose tolerance test.
- Capillary blood glucose (home monitoring).
- Urine test for sugar (glucose).

Blood glucose tests (blood sugar)

Random blood glucose level

A sample of blood taken at any time can be a useful test if diabetes is suspected. A level of 11.1 mmol/L or more in the blood sample indicates that you have diabetes. A fasting blood glucose test may be done to confirm the diagnosis.

Fasting blood glucose level

A glucose level below 11.1 mmol/L on a random blood sample does not rule out diabetes. A blood test taken in the morning before you eat anything is a more accurate test. Do not eat or drink anything except water for 8–10 hours before a fasting blood glucose test. A level of 7.0 mmol/L or more indicates that you have diabetes.

If you have no symptoms of diabetes but the blood test shows a glucose level of 7.0 mmol/L or more, the blood test should be repeated to confirm you have diabetes. If you do have symptoms and the blood test shows a glucose level of 7.0 mmol/L or more, the test does not need to be repeated. See the separate leaflets called [Type 1 Diabetes](#) and [Type 2 Diabetes](#) for more details.

Oral glucose tolerance test

This test may be done to check whether a woman has developed diabetes associated with pregnancy (gestational diabetes). It is sometimes also done if it is thought that your body doesn't control glucose levels normally but not badly enough to be called diabetes. This is referred to as pre-diabetes (also called impaired glucose tolerance or non-diabetic hyperglycaemia). The oral glucose tolerance test is not now usually used to diagnose diabetes.

For this test, you fast overnight. In the morning you are given a drink which contains 75g of glucose. A blood sample is taken two hours later. Normally, your body should be able to deal with the glucose and your blood level should not go too high. A glucose level of 11.1 mmol/L or more in the blood sample taken after two hours indicates that you have diabetes. [See the separate leaflet called Glucose Tolerance Test for more details.](#)

The HbA1c blood test

If you have diabetes, your HbA1c level may be done every 2–6 months by your doctor or nurse. This test measures your recent average blood sugar (glucose) level. Because it is an average measurement you do NOT need to fast on the day of the test. The test measures a part of the red blood cells. Glucose in the blood attaches to part of the red blood cells. This part can be measured and gives a good indication of your average blood glucose over the previous 2–3 months.

- In the UK, HbA1c results are expressed in mmol/mol. This is in line with the International Federation of Clinical Chemistry. The non-diabetic, 'normal' range is 20-42 mmol/mol.
- In the UK HbA1c results used to be expressed in percentages in line with the Diabetes Control and Complications Trial (DCCT). The non-diabetic 'normal' range is 4-6%.
- As some places still use the old-style percentages, a comparison chart is shown below.

Comparing DCCT-HbA1c and IFCC-HbA1c Results	
DCCT-HbA1c (%)	IFCC-HbA1c (mmol/mol)
6.0	42
6.5	48
7.0	53
7.5	59
8.0	64
9.0	75

For people with diabetes, treatment aims to lower the HbA1c level to below a target level which is usually agreed between you and your doctor at [regular check-ups](#). Ideally, the aim is to maintain your HbA1c to less than 48 mmol/mol (6.5%). However, this may not always be possible to achieve and the target level of HbA1c should be agreed on an individual basis between you and your doctor. (For example, by increasing the dose of medication, improving your diet, etc.)

The HbA1c test can also be used as a test to diagnose diabetes. An HbA1c value of 48 mmol/mol (6.5%) or above is the blood level for diagnosing diabetes. People with an HbA1c level of 42–47 mmol/mol (6.0–6.5%) are at increased risk of diabetes and cardiovascular disease. This is called pre-diabetes or non-diabetic hyperglycaemia or impaired glucose tolerance). [See the separate leaflet called Pre-diabetes \(Impaired Glucose Tolerance\) for more details.](#)

Home monitoring

A drop of blood from a finger prick is placed on a test strip which contains a chemical that reacts with glucose. By using a colour chart or a small glucose meter machine, the blood level of glucose can be measured quickly. Home glucose monitoring is very important for any person with diabetes who needs insulin treatment. In this situation, it is usually recommended to check the blood glucose several times a day.

New devices called flash glucose monitors or continuous glucose monitors can be worn by diabetics. These allow them to check their blood glucose very frequently without pricking their finger.

Urine test for sugar (glucose)

Urine (produced by the kidneys) does not normally contain glucose. The kidneys filter our blood, keeping substances the body needs, while getting rid of waste products. Your kidneys constantly reabsorb glucose so that it doesn't enter your urine. However, if the glucose level goes above a certain level, the kidneys can't reabsorb all of the glucose. This means that some glucose will 'spill' through the kidneys into the urine.

A simple [urine dipstick test](#) can detect glucose in a sample of urine. In a dipstick test a doctor or nurse uses a special chemical strip which he/she dips into a sample of your urine. Colour changes on the strip show whether there is glucose in the urine sample. If you have glucose in your urine, you are likely to have diabetes.

However, some people have kidneys that are more 'leaky' and glucose may leak into urine with a normal blood level. Therefore, if your urine contains any glucose, you should have a blood test to measure the blood level of glucose to confirm, or rule out, diabetes.

Further reading

- [Management of diabetes](#); Scottish Intercollegiate Guidelines Network – SIGN (March 2010 – updated November 2017)
- [Diabetes UK](#)
- [Type 1 diabetes in adults: diagnosis and management](#); NICE Guidelines (August 2015 – last updated August 2022)
- [Diabetes \(type 1 and type 2\) in children and young people: diagnosis and management](#); NICE Guidelines (Aug 2015 – updated May 2023)
- [Diabetic foot problems: prevention and management](#); NICE Guidelines (August 2015 – last updated October 2019)
- [Type 2 diabetes in adults: management](#); NICE Guidance (December 2015 – last updated June 2022)

Disclaimer: This article is for information only and should not be used for the diagnosis or treatment of medical conditions. Egton Medical Information Systems Limited has used all reasonable care in compiling the information but makes no warranty as to its accuracy. Consult a doctor or other healthcare professional for diagnosis and treatment of medical conditions. For details see our [conditions](#).

Authored by:	Peer Reviewed by: Dr Colin Tidy, MRCGP	
Originally Published: 19/11/2023	Next review date: 19/07/2023	Document ID: doc_4786

View this article online at: patient.info/diabetes/diabetes-mellitus-leaflet/tests-for-blood-sugar-glucose-and-hba1c

Discuss Blood glucose test (blood sugar) and HbA1c and find more trusted resources at [Patient](#).



To find out more visit www.patientaccess.com
or download the app



Follow us

