

Diagnosis of Diabetes

This is not always straightforward, and is not an 'exact science'.

1) Using plasma glucose readings:

If symptomatic (e.g. polyuria, polydipsia and unexplained weight loss), one abnormal value is needed from the following list (these values are only for those who are not pregnant):

- fasting plasma glucose $>7\text{mmol/l}$, or
- random plasma glucose $\geq 11.1\text{mmol/l}$, or
- OGTT fasting glucose $>7\text{mmol}$, or
- OGTT 2 hr glucose $\geq 11.1\text{mmo/l}$

If asymptomatic, two abnormal values are needed, which can be any combination or repeat from the list above.

2) Using HbA1c:

Since 2011, HbA1c is also an acceptable method of diagnosing diabetes. An HbA1c of 48mmol/mol (6.5%) is recommended as the cut-off point. No one test is perfect, however HbA1c values have some advantages over glucose measurements as a blood test can be done opportunistically, and does not require the individual to fast. It is a more robust assay i.e. it is less likely to vary on repeat sampling in the same patient, and HbA1c correlates more closely with an acceleration in the risk of developing retinopathy which determines the threshold for a diabetes diagnosis. However, diabetes is a condition of abnormal glucose metabolism and there are inherent interethnic variations and situations when HbA1c can be misleading (see below).

As with plasma glucose measurements, a single raised HbA1c value is not diagnostic and needs to be repeated.

Borderline or discrepant results:

You will often find discrepant results on plasma glucose and A1c testing so this means that a non-diagnostic HbA1c value does not exclude a diabetes diagnosis with plasma glucose readings. This can be confusing, so if in doubt there are a few options:

1. Repeat the HbA1c test after an interval (e.g. 3 months)
2. Repeat fasting glucose, with HbA1c to be repeated in 6 months
3. Perform an OGTT.



Plasma glucose tests should be used if there is reason to think that an HbA1c might be unreliable – see below.

Examples of tricky diagnostic situations:

1. FPG 7.2mmol/l but HbA1c 46mmol/mol:

Repeat the A1c after an interval – If second sample < 48mmol/mol then code as ‘high risk of diabetes’ and/or pre-diabetes and repeat the HbA1c test in 6 months. If > 48mmol/mol then code as diabetes.

2. First HbA1c = 48mmol/mol but second Hba1c 46mmol/mol:

Code as ‘high risk of diabetes’ and/or pre-diabetes and repeat the HbA1c test in 6 months.

It is important to be aware of situations in which HbA1c testing might be misleading, in which case a plasma glucose or OGTT tests should be used for diagnosis. These are:

- All children and young people (<25yrs)
- Patients of any age suspected of having Type 1 diabetes
- Patients with symptoms of diabetes for less than 2 months
- Patients at high risk who are acutely ill
- Patients taking medication that may cause rapid rise in glucose levels e.g. steroids, antipsychotics
- Patients with acute pancreatic damage, including pancreatic surgery
- In pregnancy
- Genetic, haematological and illness-related factors that influence HbA1c and its measurement – see below.

HbA1c Falsely Elevated	HbA1C Falsely Reduced
Chronic iron def. anaemia	Haemolysis and acute blood loss
Vit B12 deficiency	Chronic alcohol excess
Thalassaemias	Hypertriglyceridaemia
Chronic blood loss	CKD & haemodialysis
Gestational diabetes	Recent blood transfusion
	Haemaglobinopathies e.g HbS, HbF
	Gestational diabetes

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