**HbA1c for DIAGNOSIS of Diabetes Mellitus**

Since 2006, HbA1c has been included in the diagnostic criteria for diabetes by WHO.

This approach has also been endorsed by Diabetes UK.

However, HbA1c is not suitable for diagnosing diabetes in a number of conditions or situations.

**When NOT to use HbA1c to diagnose diabetes** *(hover over the* ***blue text*** *for more information).*

Some of the most common situations where HbA1c is NOT suitable for diagnosis of diabetes are given below. Fasting glucose should be used to diagnose diabetes in these situations.

**Rapid onset of diabetes:**

* Suspected type 1 diabetes (any age) – rapid symptom onset, weight loss, ketosis.
* Children – because most will have type 1 diabetes.
* Symptoms for <2 months
* Recent use of drugs that cause hyperglycaemia e.g. Steroids, antipsychotics and immunosuppressants.
* Within 3 months, after pancreatitis or pancreatic surgery.

**2. Conditions that significantly affect the average age of circulating red cells:**

|  |  |
| --- | --- |
| **Conditions with increased red cell survival may increase HbA1c:** | **Conditions with reduced red survival may lower HbA1c:** |
| Splenectomy | Haemolytic anaemia |
| Haemoglobin variantshave variable effects on HbA1c results.Many haemoglobinopathies are detected by the lab, but should also be suspected in racial groups where there is a high prevalence of sickle trait, sickle disease or thalassaemia.Most common variants do not directly affect the measurement of HbA1c itself but some rare variants may directly interfere in HbA1c measurement, usually giving falsely low results. It is more common that a variant shortens red cell survival time. Disorders which cause high levels of fetal Hb (HbF), such as thalassaemias, give falsely low HbA1c results. | Recent blood donation, severe blood loss, transfusion, venesection |
| Chronic kidney disease (CKD4 or 5) & renal dialysis patients |
| Antiretroviral drugs, dapsone, ribavarin (RBC destruction) |
| Liver disease / alcohol excess |
| Splenomegaly / hereditary spherocytosis |
| Chronic malaria |
| Aplastic anaemia |

**3. Pregnancy**

**4. Iron and B12 deficiency and their treatment** may raise or lower HbA1c, but the effect is usually small.

**Interpreting results**

Since most confounding factors tend to lower HbA1c, and those that raise it do so by a relatively small amount, a high HbA1c is a good indicator of diabetes (i.e. it has high specificity). The higher the HbA1c the more likely diabetes is present.

HbA1c below 48 mmol/mol does not exclude diabetes, even if all of the above conditions are excluded, due to the possibility of undiagnosed confounders.

Unexplained discrepancies between HbA1c and other glucose measurements should always be investigated. Seek advice from Clinical Biochemistry or the Diabetes and Endocrinology Department.

Where there is any doubt about the reliability of HbA1c it should not be used, and glucose testing following existing WHO criteria should be performed instead.

**Methodology:** York and Scarborough Blood Sciences Laboratories use an ion-exchange HPLC method to measure HbA1c. This allows the lab to identify the presence of many haemoglobins variants, which are often clinically silent. For these patients we do not report HbA1c but we will add a comment recommending fasting glucose measurements for diagnosis of diabetes.

The ion-exchange HPLC method does not identify all cases of abnormal haemoglobin, and cannot detect the other situations listed above which can affect HbA1c levels.

**Further advice**

Please send an Advice and Guidance request to Clinical Biochemistry, or contact the Duty Biochemist on 01904 726366 (Mon-Fri, 9-5) for further information.