

## HbA1c in diagnosis of Type 2 Diabetes Mellitus

### Introduction

HbA1c can be used as an alternative test to glucose for diagnosing type 2 diabetes or identifying people at high risk of developing the disease. In 2011 WHO recommended the use of HbA1c for the diagnosis of type 2 diabetes at a value  $\geq 48$ mmol/mol (6.5%). When the HbA1c result is in this range it is advisable to request a second HbA1c test to confirm the diagnosis. In addition, patients with an HbA1c value of 42-47mmol/mol (6.0-6.4%) can be considered at high risk of developing diabetes. In order to avoid confusion, either glucose or HbA1c (not both) should be used to diagnose type 2 diabetes.

**There are clear advantages to using HbA1c rather than glucose concentrations for the diagnosis of type 2 diabetes:**

- There is no requirement for the patient to fast or to take a glucose drink (which can cause nausea)
- Measurement of HbA1c is less time-consuming and less costly than an oral glucose tolerance test.
- HbA1c assesses glycaemia over a period of months
- Biological variability of HbA1c is much lower than that of blood glucose

**Whilst HbA1c is a convenient diagnostic test it is important to be aware of situations in which its use is inappropriate:**

- Children and young people
- Pregnancy (current or recent i.e. within last 2 months)
- Suspected type 1 diabetes (changes in HbA1c lag behind changes in blood glucose and so HbA1c results may be misleadingly low in any situation where hyperglycaemia has developed recently or rapidly)
- Short duration of symptoms (less than 2 months)
- Patients at high risk of diabetes who are acutely ill
- Patients taking drugs which may cause a rapid rise in glucose (eg corticosteroids, antipsychotic drugs)
- Acute pancreatic damage
- Kidney failure (carbamylated Hb can interfere with analysis and anaemia can associated with kidney disease affect interpretation of HbA1c)
- Patients being treated for HIV infection (treatments can influence HbA1c independently of glycaemia)

**Clinicians should also be aware of conditions which might affect the results i.e. where caution is required in interpretation:**

- The presence of a haemoglobin variant (e.g. HbF, HbE)
- Anaemia of any cause
- Changes to erythropoiesis (e.g. iron or vitamin B12 deficiency, administration of erythropoietin, chronic liver disease)
- Recent blood transfusion
- Altered red cell lifespan (e.g. post-splenectomy)
- Altered glycation (e.g. alcoholism, CKD, aspirin, vitamin C and E)

### References:

1. Kilpatrick ES, Atkin SL. Using haemoglobin A1c to diagnose type 2 diabetes or to identify people at high risk of diabetes. *Brit Med J* 2014; 348: 37-39.
2. WHO. Use of glycated haemoglobin (HbA1c) in the diagnosis of diabetes mellitus. Abbreviated report of a WHO consultation. Geneva: WHO; 2011.