



HbA_{1c} standardisation for clinical healthcare professionals

Change to reporting of HbA_{1c}

From 1 June 2009, the way in which HbA_{1c} results are reported in the UK is changing. This leaflet explains why and how this will happen.

What is HbA_{1c}?

Glucose in the blood binds irreversibly to a specific part of haemoglobin in red blood cells, forming HbA_{1c}. The higher the glucose, the higher the formation of HbA_{1c}. HbA_{1c} circulates for the lifespan of the red blood cell, so reflects the prevailing blood glucose levels over the preceding 2–3 months.

What does it tell us?

The Diabetes Control and Complications Trial (DCCT) in Type 1 diabetes and the UK Prospective Diabetes Study (UKPDS) in Type 2 diabetes both showed that the risk of microvascular and macrovascular complications of diabetes increases as HbA_{1c} increases. HbA_{1c} thus gives a measure of an individual's risk of the long-term complications of diabetes.

Why measure it?

Serial measurements of HbA_{1c} show how an individual's glucose control, and thus risk of complications, changes in response to alterations in management. HbA_{1c} should be measured every 2–6 months. Target HbA_{1c} levels can be set for individual patients and therapy adjusted accordingly.

Why change?

After the DCCT, a new standard specific for HbA_{1c} was prepared by the IFCC. In future, manufacturers will supply IFCC standardised values for their calibrators as well as DCCT-aligned values. The units for reporting HbA_{1c} will also be changed so that HbA_{1c} reported by laboratories is traceable to the IFCC reference method. Global comparison of HbA_{1c} results will therefore be possible. DCCT aligned values for HbA_{1c} will also be provided for the first two years of the change.

What are the new units?

HbA_{1c} results traceable to the IFCC reference method will be expressed as *mmol per mol* haemoglobin.

How is HbA_{1c} reported currently?

Current HbA_{1c} assays in the UK and other parts of the world are aligned to the assay used in the DCCT, so that an individual's risk of complications can be inferred from the result.

What are the current targets?

General targets for HbA_{1c} of 6.5–7.5% should be set for an individual, taking into consideration their risk of severe hypoglycaemia, cardiovascular status and co-morbidities.

How do old and new relate?

A guide to the new values expressed as mmol/mol is:

Current HbA _{1c} (%)	New HbA _{1c} (mmol/mol)
6.0	42
6.5	48
7.0	53
7.5	59
8.0	64
9.0	75

What are the targets in new units?

The equivalent of the current DCCT HbA_{1c} targets of 6.5% and 7.5% are 48 mmol/mol and 59 mmol/mol in the new units, with the non-diabetic reference range of 4.0–6.0% being 20 mmol/mol to 42 mmol/mol.

When is the changeover to new units?

HbA_{1c} results expressed in the new units are obviously very different to those currently in use. From **1 June 2009**, results will be provided in the UK as both IFCC-standardised units (mmol/mol) and DCCT-aligned units (%). This will give everyone time to become familiar with the new units and how they relate to DCCT numbers, and thus to the risk of complications. From **1 October 2011**, results will be reported in the new IFCC units only.

What are the limitations of HbA_{1c} measurement?

HbA_{1c} results (DCCT or IFCC) will be misleading in certain situations, eg a variety of haematological conditions where there is abnormal red cell turnover, where there is an abnormal haemoglobin, and in some patients with renal or liver disease.

In pregnancy, HbA_{1c} falls by around 0.5% due to a variety of factors. In the presence of abnormal haemoglobin, HbA_{1c} results can vary depending on the method used to measure HbA_{1c} and the particular haemoglobinopathy involved. For these reasons, such HbA_{1c} results should be used to detect trends in a patient's glycaemic control rather than for target setting.

If any condition leads to a change in red cell survival, then HbA_{1c} measurement by any means can, at best, be used to track changes in glycaemia. Other measures of glycaemia may then be required, such as more reliance on self monitored blood glucose values or the use of a serum fructosamine assay, if available.

Why not report estimated average glucose (eAG)?

Conceptually, converting the HbA_{1c} result to an equivalent 'average glucose' level might help our understanding and interpretation of HbA_{1c}. A recent large study reported on how to calculate an eAG from an HbA_{1c} result. However, the study was carried out in a restricted population, issues have been raised about the study design, and an eAG will have limited applicability to the majority of patients who do not measure their own blood glucose levels. In some patients, the estimate may also prove inaccurate enough to be misleading. Even in the DCCT study, there was a great variation in mean plasma glucose results for each value of HbA_{1c}. It has been agreed that in the UK, eAG results will not be reported at the moment. Further research into the applicability and utility of eAG to the wide range of people with diabetes is ongoing and eagerly awaited.



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