

## Consensus Statement

# 2013 Update on the worldwide standardization of the hemoglobin A<sub>1c</sub> measurement

Hanas R, John WG on behalf of the International HbA<sub>1c</sub> Consensus Committee. 2013 Update on the worldwide standardization of the hemoglobin A<sub>1c</sub> measurement. Pediatric Diabetes 2013.

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Conflict of interest: Authors have no conflicts of interest to declare.

Hemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) reflects a time averaged blood glucose during the previous 2–3 months, and is used as the gold standard for long-term follow-up of glycemic control. The same HbA<sub>1c</sub> method was used both in the DCCT study published in 1993 (1) and the UKPDS study published in 1998 (2). Following the development of a true reference method by IFCC (3), it was stated in an international consensus that this reference method should be used by all manufacturers for the calibration methods used in the clinical laboratory (4). A second consensus meeting was held in 2009, where the main issue was how the results should be presented to clinicians and patients, and how they should be reported in scientific journals (5). In short, three conclusions were reached at this meeting:

1. HbA<sub>1c</sub> results are to be reported by clinical laboratories worldwide in SI (Système Internationale) units (mmol/mol – no decimals) and derived NGSP units (% – one decimal), using the IFCC-NGSP master equation (DCCT units).
2. HbA<sub>1c</sub> conversion tables including both SI (IFCC) and NGSP units should be easily accessible for the diabetes community.
3. Journals are strongly recommended to require that submitted manuscripts report HbA<sub>1c</sub> in both SI (IFCC) and NGSP/DCCT units.

A third consensus meeting was held in Dubai in December 2011. At this meeting, point numbers 2 and 3 above were reiterated without any disagreement, and many journals are now considering how to implement dual reporting. A web calculator is available to facilitate this and the web address is <http://www.hba1c.nu/eng> The participants stated that since 2009, different countries have moved in different directions regarding the double reporting of HbA<sub>1c</sub>. Laboratories in the USA continue to report HbA<sub>1c</sub> results in percentage only (NGSP values), and clinicians are mostly unaware of SI (IFCC) units. Japanese manufactured lab instruments in use outside of Japan are IFCC calibrated with options to display IFCC or NGSP numbers, but Japan reports both JDS and NGSP numbers within the country. Across Europe most countries have adopted dual reporting, whereas some European countries following different time periods of dual reporting are now reporting SI units (mmol/mol) only. No new consensus was reached, but the participants agreed to the following:

The original consensus, that results are reported in both SI units (mmol/mol) and in derived NGSP/DCCT percent units, remains the ideal to achieve global standardization. Some countries which reported both units have now moved on to single reporting of SI units. It is particularly important to dual report for an agreed

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period of time if countries intend to move from percent to SI units. Some countries have decided to continue to report only NGSP/DCCT percent units as this better reflects clinical practice in that country. It is important that the whole country adopts a single approach to the reporting units so as not to cause confusion, and put patients at risk. Journals are recommended to use either Hemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) or Hemoglobin A<sub>1c</sub> (A1C) as abbreviations.

Editors of journals and other printed material are strongly recommended that submitted manuscripts are required to report HbA<sub>1c</sub> in both SI (IFCC) and NGSP/DCCT units.

The 2010 statement was simultaneously published in eight journals: *Annals of Clinical Biochemistry*, *Clinical Chemistry*, *Clinical Chemistry and Laboratory Medicine*, *Diabetes Care*, *Diabetes Research and Clinical Practice*, *Diabetic Medicine*, *Diabetologia*, and *Pediatric Diabetes*. These journals either require papers to be submitted in both units or are discussing how best to implement this. We urge other journals within the diabetes field to adapt the same policy.

The consensus group will meet again in 2013 at the IDF meeting in Melbourne.

## Appendix: Consensus Committee

For ADA: Sue Kirkman, Matt Petersen; for EASD: Viktor Joergens, Andrew Boulton; for IDF: Jean-Claude Mbanya, Stephen Colagiuri; for IFCC: Garry John, Graham Beall; for ISPAD: Ragnar Hanas, Lynda Fisher; for JDS: Izumi Takei; for NGSP: David Sacks. Participants in the consensus committee:

The American Diabetes Association (ADA), the European Association for the Study of Diabetes (EASD), the International Diabetes Federation (IDF), the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC), the International Society for Pediatric and Adolescent Diabetes (ISPAD), the Japanese Diabetes Society (JDS), and the National Glycohemoglobin Standardization Program (NGSP).

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