



Tosoh Automated
Glycohemoglobin Analyzer
HLC-723G8
Variant Analysis Mode

TOSOH BIOSCIENCE

The Diabetes Epidemic and the role of HbA_{1c}

Diabetes is recognised worldwide as a disease that is reaching epidemic proportions. ⁽¹⁾

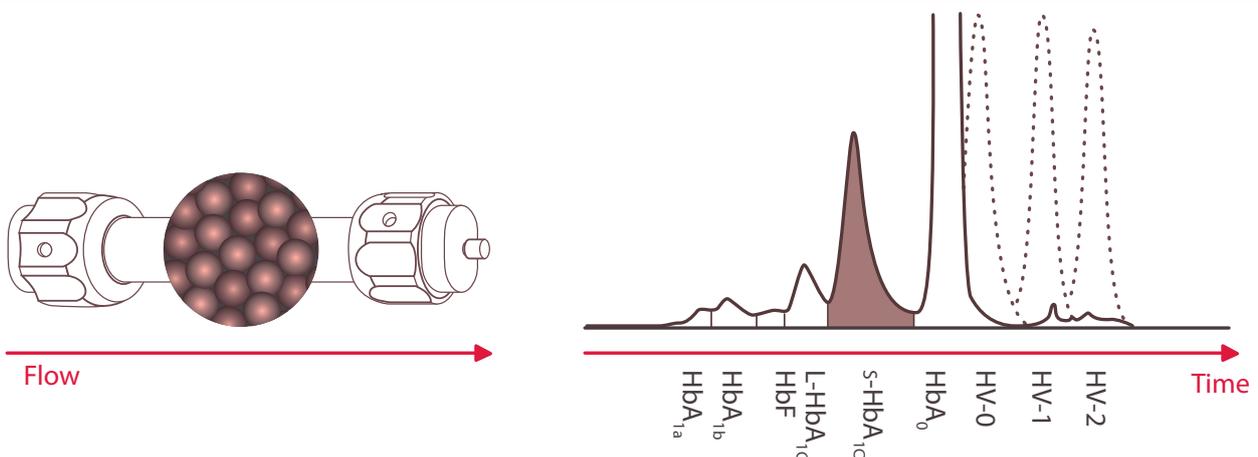
IDF region	Adult Population (20-79) in 1000s	Diabetes cases (20-79) in 1000s	Diabetes national prevalence (%)	Undiagnosed Diabetics in 1000s	Undiagnosed Diabetics %	Diabetes related deaths (20-79)	Mean diabetes-related expenditure per person with diabetes (EURO)
WORLD	4,479,259	371,329	8.29 %	187,087	4.18 %	4,802,747	1,027
EUR	655,983	54,942	8.38 %	21,204	3.23 %	622,114	2,043
MENA	366,249	34,163	9.33 %	18,114	4.95 %	356,586	285
AFR	398,113	14,920	3.75 %	12,148	3.05 %	401,276	135

The significance of HbA_{1c} for the diagnosis and follow-up of diabetes has increased with the continuing rise in the number of patients. This represents a significant workload challenge to many laboratories.

How to measure HbA_{1c}?

One of the reference methods for HbA_{1c} measurement is “High Performance Liquid Chromatography”, better known as “HPLC” (this method was also used in the DCCT and UKPDS trials). With this technique the different haemoglobin fractions are separated based on charge.

When using the **Tosoh Automated Glycohemoglobin Analyzer HLC-723G8 (G8)** separation of the haemoglobin fractions is obtained by use of a negatively charged column and positively charged buffers that compete with the different haemoglobins to bind to the column (=cation exchange). Tosoh offers you over 35 years of world leading HPLC experience.



Why use HPLC?

Besides being the method used during the DCCT and UKPDS trials different arguments are raised in literature.

"The method of choice should measure HbA_{1c} highly precisely; should be economical, automatable and simple to perform; and should yield results that are comparable between different laboratories, ...one should use a method that meets the following conditions: The Hb variant should be recognised; and HbA_{1c}, HbA₀ and Hb variants should be separated and quantified reliably." ⁽²⁾

"The advantage of HPLC lies in its ability to separate variant haemoglobins and, in doing so, allowing better interpretation of the result!" ⁽³⁾

The Importance of low CV%

HbA_{1c} can be used for three specific applications*:

1. For identifying risk: HbA_{1c} could be used as a tool, among other parameters, to identify individuals at risk for developing diabetes. The American Diabetes Association (ADA) suggested 5.7 – 6.4 % (39 – 47 mmol/mol) as the high risk range. ^(4,5)

2. For Diagnosis.

An international expert committee assembled by the American Diabetes Association (ADA), International Diabetes Federation (IDF), and European Association for the Study of Diabetes (EASD) has recommended the HbA_{1c} assay as the new test for the diagnosis of diabetes. An HbA_{1c} value greater than or equal to 6.5 %, or 48 mmol/mol, is used as cut-off for the diagnosis of diabetes. Diagnosis should be confirmed with a repeat HbA_{1c} test. ^(4,5)

3. For treatment follow-up.

Lowering HbA_{1c} to below or around 7 %, or 53 mmol/mol, has been shown to reduce micro-vascular and neuropathic complications of type 1 and type 2 diabetes. HbA_{1c} of ≥ 7 %, or 53 mmol/mol, should initiate or change therapy to reach an HbA_{1c} level of < 7 %, or 53 mmol/mol. Relevant changes in serial measurements of HbA_{1c} testing serve as the guide to changes in therapeutic regimes. ^(6,7)

The Coefficient of Variation (CV) determines the difference between two serial HbA_{1c} measurements.

At a medical decision point of 7 %, or 53 mmol/mol, a healthcare provider should be able to conclude that a significant difference of 0.5 %, or 5 mmol/mol, is caused by a change in glycaemic control of a patient and not by the analytical imprecision. For that reason the CV% of the method should be ≤ 2.4 %. ⁽⁸⁾

"...95 % of the laboratories using a method from Tosoh were able to meet the criteria of having an analytical CV% of ≤ 2.4 %!" ⁽⁸⁾

The G8 will deliver:

- **Precision**

Direct determination of stable HbA_{1c} with less than 1 % CV. 

- **Speed**

Stable HbA_{1c} result with variant detection in 1.6 minutes, Time to first result is 3.5 minutes.

- **Operational Simplicity**

With cap piercing, positive sample identification, automated maintenance, the G8 is simplicity itself.

- **Absence of Interference**

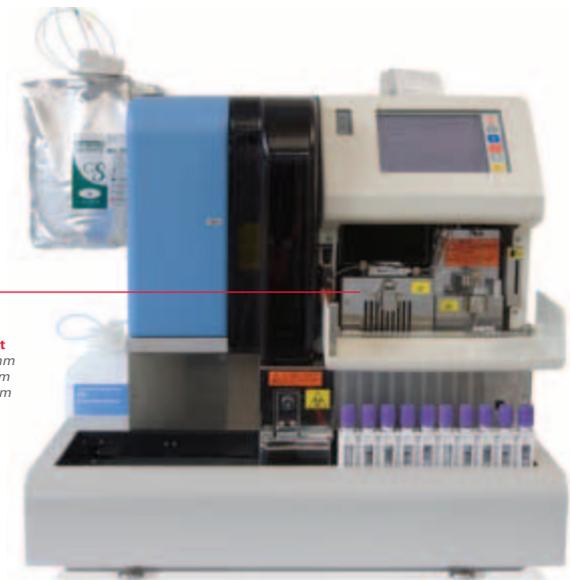
In the presence of the most common haemoglobin variants, HbF or haemoglobin derivatives such as labile and carbamylated haemoglobin, HbA_{1c} results are unaffected.

* Official guidelines on the use of HbA_{1c} may vary from country to country.

Speed A high quality and productivity HPLC solution

Simply load sample racks and press 'Start', it's that easy!

- Automated daily maintenance.
- A user friendly touch screen enables easy instrument operation.
- Simple finger tight connectors permit quick, convenient and easy replacement of columns and pre-filters.
- Constant visual monitoring of buffer consumption with customisable alarm to notify when buffers need replacing.



Compact
W 530 mm
D 515 mm
H 482 mm
34 kg

The G8 can manage an ever increasing workload and easily adapts to changing laboratory needs!

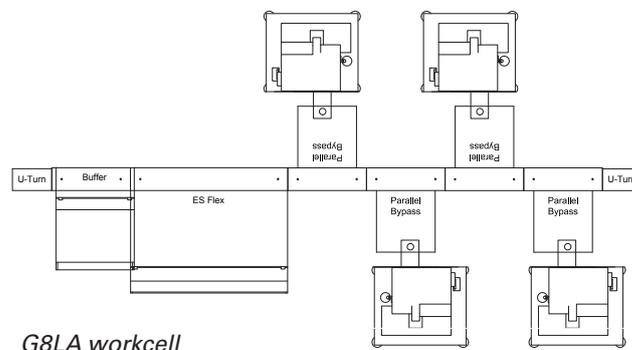
- The analyser is available with a 90 or 290 sample loader.
- A built-in STAT position allows emergency samples to be analysed without disrupting routine analysis.
- Different sample types and sizes can be loaded continuously onto the system together with secondary tubes, in any order in any rack.
- Complements with Tosoh's HLC-723GX (GX) which is ideal for low volume HbA_{1c} testing or as backup analyser.



for dealing with your laboratory's HbA_{1c} needs.

The G8LA easily integrates in any open laboratory automation system, increasing:

- Analysing capacity and throughput
- Efficiency
- Flexibility
- Connection is achievable in combination with other lab analysers or as G8LA-only work cell.



Unique software to ensure the most advanced data management capabilities!

- Bidirectional interfacing allows connection to the Laboratory Information Systems (LIS).
- Optional integration to Tosoh's data management software allows full data management capabilities including:
 - Patient linked result validation
 - Chromatogram review with overlay and library facility
 - Full QC-package including Levey-Jennings charts
 - Reagent logging and audit trail
 - Data storage and full result archiving
 - Economical multi-instrument interfacing

Customisable alarm / flag system ensures an unparalleled level of patient safety!

- A highly developed flag check function allows easy programming of user-selectable levels to ensure easy interpretation of results with increased security.
- Unique TSKgel column and peltier controlled column oven guarantee stable results.
- Customisable alarms offer a high level of security and aid in the interpretation of results.



The G8 is the ideal solution for reliable diabetic patient monitoring!

- HbA_{1c} results are directly determined with less than 1 % CV and are reportable to 2 decimal places.
- HbA_{1c} results are NGSP / DCCT and IFCC certified.

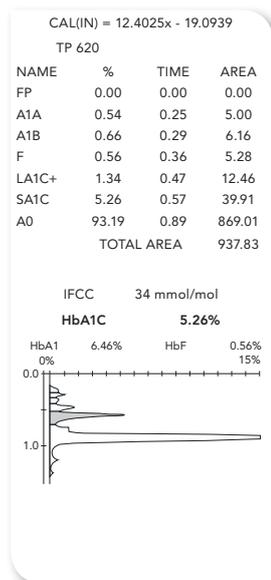
N = 20	Intra-Assay precision		Inter-Assay precision	
	Mean HbA _{1c} (%)	CV (%)	Mean HbA _{1c} (%)	CV (%)
Normal value	5.53	0.42	5.67	0.48
Intermediate value	8.25	0.44	8.54	0.25
Elevated value	10.39	0.40	12.44	0.36

Source: Evaluation of the G8 analyzer and PIANO software (Tosoh Bioscience) for glycated haemoglobin determination. Fonfrède et.al. Spectra Biologie October 2007, N° 161, page 38 - 45.

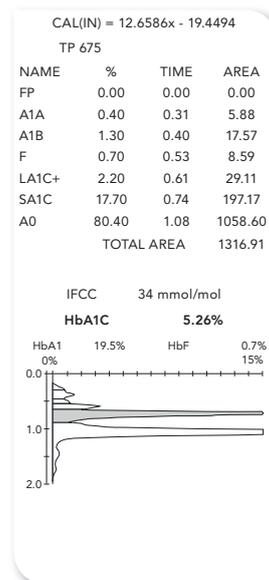
Best-in-class chromatographic separation!

- Separation of labile A_{1c} from stable A_{1c} is achieved without the loss of precision or resolution and without manipulating the sample or using mathematical artefacts (algorithms).
- Results are unaffected by the presence of the most common haemoglobin variants, HbF or haemoglobin derivatives such as labile HbA_{1c} and carbamylated - or acetylated haemoglobin.
- Suspected presence of HbE will trigger a specific flag.

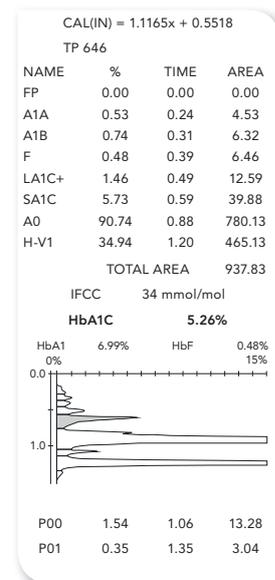
Normal patient*



Diabetic patient*



HbAS patient*



* HbA_{1c} result is reportable.

For in depth analysis of patients presenting haemoglobin variants, you can just switch to the "β-Thalassaemia" analysis mode, allowing high resolution detection of this pathology.

Traceability to International Standards

HbA_{1c} results obtained with the G8 are traceable to the “National Glycohemoglobin Standardization Program (NGSP; DCCT-aligned)” and the “International Federation of Clinical Chemistry (IFCC)”.

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