

# HbA1C DIRECT WITHOUT CALIBRATOR (LATEX TURBIDIMETRIC METHOD)

Code	Product Name	Pack Size
SE002A	HbA1c Direct without Calibrator	40 ml
SE002B	HbA1c Direct without Calibrator	80 ml



**BEACON**

## Intended Use

For the quantitative determination of Hemoglobin A1c (HbA1c) in human blood. The determination of HbA1c is most commonly performed for the evaluation of glycemic control in diabetes mellitus. HbA1c values provide an indication of glucose levels over the preceding 4-8 weeks. A higher HbA1c value indicates poorer glycemic control. For in vitro diagnostic use only.

## Summary and Explanation of Test

Throughout the circulatory life of the red cell, Hemoglobin A1c is formed continuously by the adduction of glucose to the N-terminal of the hemoglobin beta chain. This process, which is non-enzymatic, reflects the average exposure of hemoglobin to glucose over an extended period. In a classical study, Trivelli et al<sup>1</sup> showed Hemoglobin A1c in diabetic subjects to be elevated 2-3 fold over the levels found in normal individuals. Several investigators have recommended that Hemoglobin A1c serve as an indicator of metabolic control of the diabetic, since Hemoglobin A1c levels approach normal values for diabetics in metabolic control.<sup>2,3,4</sup>

Hemoglobin A1c has been defined operationally as the "Fast Fraction" hemoglobins (HbA1a, A1b, A1c) that elute first during column chromatography with cation-exchange resins. The non-glycosylated hemoglobin which consists of the bulk of the hemoglobin has been designated HbA0. The present procedure utilizes an antigen and antibody reaction to directly determine the concentration of the HbA1c.

## Principle

This method utilizes the interaction of antigen and antibody to directly determine the HbA1c in whole blood. Total hemoglobin and HbA1c have the same unspecific absorption rate to latex particles. When mouse antihuman HbA1c monoclonal antibody is added (R2), latex-HbA1c-mouse antihuman HbA1c antibody complex is formed. Agglutination is formed when goat anti-mouse IgG polyclonal antibody interacts with the monoclonal antibody. The amount of agglutination is proportional to the amount of HbA1c absorbed on to the surface of latex particles. The amount of agglutination is measured as absorbance. The HbA1c value is obtained from a calibration curve.

## Contents

Reagent 1 : Latex Reagent

Reagent 2 : Antibody Reagent.

Reagent 3 : Hemolysis Reagent

## Reagent Storage

Store all reagents refrigerated at 2-8°C.

## Reagents Preparation

R1, R2 and Hemolysis reagents are supplied as ready to use liquids, Mix gently before use.

## Reagent Deterioration

Alterations in the physical appearance of the reagents or values of control materials outside of the manufacture's acceptable range may be an indication of reagent instability.

## Specimen Collection and Preparation

Special preparation of the patient is unnecessary. Fasting specimens are not required. No special additives or preservatives other than anticoagulants are required. Collect venous blood with EDTA using aseptic technique. All human specimens should be regarded as potentially biohazardous. Therefore, universal precautions should be used in specimen handling (gloves, lab garments, avoid aerosol production, etc.).

## HEMOLYSIS:

To determine the level of HbA1c, a hemolysate must be prepared for each sample & calibrator:

1. Dispense 500 µl of Hemolysing Solution into a tube.
2. Add 10 µl of well mixed whole blood sample/Calibrator.
3. Mix thoroughly by gentle vortexing for 30 seconds.
4. Stand for 15 minutes at room temperature until complete lysis.

## Instruments

Refer to specific instrument application for suggested settings.

## Precautions

1. This reagent is for in vitro diagnostic use only.
2. Not for internal or external use in humans or animals.

## Storage and Stability

1. All reagents are stable to the expiration date stated on the labels. Do not use the reagents past their expiration date.
2. Hemoglobin A1c in whole blood collected with EDTA is stable for one week at 2-8°C.<sup>5</sup>

## GENERAL SYSTEM PARAMETER

Mode of reaction	End point
Slope of reaction	Increasing
Wavelength	660nm (600-660nm)
Temperature	37°C
Linearity	15%
Blank	Reagent blank
Sample volume	12 µL
Reagent 1 Volume	360 µL
Reagent 2 Volume	120 µL
Light Path	1 cm

## PROCEDURE

	Blank	Calibrator	Sample/control
Latex Reagent	360 µL	360 µL	360 µL
Calibrator	-	12 µL	-
Hemolysate (sample)	-	-	12 µL

**Mix & Incubate for 5 min at 37°C.**

Antibody Reagent	120 µL	120 µL	120 µL
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**Mix and incubate for 5 min at 37°C and read absorbance(A) at 660 nm.**

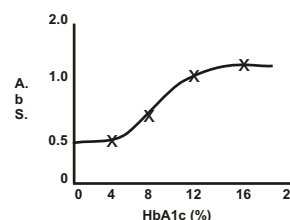
## Calculation

Calibration curve

Calculate the Abs of calibrators = Abs calibrator – Abs Blank.

Plot the Δ Abs of each calibrator versus assigned concentration (HbA1c %) on a linear graph paper. HbA1c results according to NGSP for the samples and controls are determined using the prepared calibration curve.

An example curve is illustrated below.



## Calculate

Δ Abs of sample i.e. abs sample - abs blank

HbA1c % in the sample is calculated by interpolation of Abs of sample on the calibration curve. For calculation of results according to IFCC, use IFCC calibrator values (see calibrator insert), or use following equation.

NGSP = (0.915 x IFCC) + 2.15

## Interferences & Limitations

1. Bilirubin to 50mg/dL, ascorbic acid to 50mg/dl, triglycerides to 2000 mg/dl, Carbamylated Hb to 7.5 mmol/L and acetylated Hb to 5.0 mmol/L do not interfere in this assay.
2. It has been reported that results may be inconsistent in patients who have the following conditions : opiate addiction, lead-poisoning, alcoholism, ingest large doses of aspirin.<sup>6,7,8,9</sup>
3. It has been reported that elevated levels of HbF may lead to underestimation of HbA1c.<sup>10</sup> Also, it has been reported that labile intermediates (Schiff base) are not detected and do not interfere with HbA1c determination by immunoassay.<sup>5</sup>
4. It has been determined that Hemoglobin variants HbA2, HbC and HbS do not interfere with this method.
5. Other very rare variants of hemoglobin (e.g. HbE) have not been asessed.
6. Patient specimens should always be assayed using a calibration curve.

### Expected Values<sup>11</sup>

Recommended values: 4.5-6.5 %

Each laboratory should establish its own expected values. In using hemoglobin A1c to monitor diabetic patients, results should be interpreted individually. That is, the patient should be monitored against him or herself. There is a 3-4 week time lag before Hemoglobin A1c reflects changes in blood glucose level.

### Linearity

This Procedure linear up to 15%

### Performance

1. Comparison : A study using 40 human specimens between this Hemoglobin A1c procedure and an automated HPLC procedure (Tosoh) yielded a correlation coefficient of 0.988 and a linear regression equation of  $y = 1.050x - 0.481$ . (syx = 0.332)
2. Precision :  
Within Run : The within run precision was established by assaying two blood samples following NCCLS protocol EP5 on a Hitachi 917.

Level	Mean	Std. Dev.	% C.V.
Low	5.48	0.078	1.43
High	10.28	0.176	1.72

Day to Day : The between day precision was established by assaying two blood samples following NCCLS protocol EP5 on a Hitachi 917.

Level	Mean	Std. Dev.	% C.V.
Low	5.48	0.152	2.77
High	10.28	0.275	2.68

3. Sensitivity : Sensitivity was investigated by reading the change in absorbance at 660 nm for a saline sample and a whole blood sample with a known concentration. Ten replicates of each sample were performed. The results of this investigation indicated that, on the analyzer used (Hitachi 717), the HbA1c reagent showed little or no drift on the zero sample. Under the reaction conditions described, a 0.073 absorbance change is approximately equivalent to 1.0% HbA1c.

### Reference :

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2. Gonen, B., and Rubenstein, A.H., Diabetologia 15,1(1978).
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4. Bates, H.M., Lab. Mang., Vol 16, (Jan. 1978).
5. Tietz, N.W., Textbook of Clinical Chemistry, Philadelphia, W.B. Saunders Company, p.794-795 (1999).
6. Ceriello, A., et al, Diabetologia, 22, p.379 (1982).
7. Little, R.R., et al, Clin. Chem. 32, pp. 358-360 (1986).
8. Fluckiger, R., et al, New Eng. J. Med. 304 pp. 823-827 (1981).
9. Nathan, D.M. et al, Clin Chem. 29, pp.466-469 (1983).
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11. American Diabetes Association: Clinical practice recommendations (Position statement). Diabetes care 24 (Suppl. 1):S33-S55, (2001).



### SYMBOLS USED ON LABELS

REF	Catalogue Number		Manufacturer		See Instruction for Use
LOT	Lot Number	CONT	Content		Storage Temperature
	Expiry Date		In Vitro Diagnostics		

BEA/24/HBW/SE/IFU Ver -03  
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