

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION  
DECISION SUMMARY  
ASSAY ONLY TEMPLATE**

**A. 510(k) Number:**

k053411

**B. Purpose for Submission:**

New product

**C. Measurand:**

HbA1c (glycosylated hemoglobin assay)

**D. Type of Test:**

Quantitative immunoturbidimetric assay and calibrators

**E. Applicant:**

Microgenics Corporation

**F. Proprietary and Established Names:**

DRI Hemoglobin A1c (HbA1c) Reagent Set

DRI HbA1c Calibrator Set

**G. Regulatory Information:**

1. Regulation section:

21 CFR §864.7470 Assay, glycosylated hemoglobin

21 CFR §864.8165 Calibrator for hemoglobin or hematocrit measurement

2. Classification:

Class II

3. Product code:

LCP

KRZ

4. Panel:

Hematology (71)

**H. Intended Use:**

1. Intended use(s):

See below.

2. Indication(s) for use:

“The DRI Hemoglobin A1c Assay is an in vitro reagent system for the quantitative determination of hemoglobin A1c in human whole blood using automated clinical chemistry analyzers. It is intended to aid in monitoring long-term blood glucose control. The DRI Hemoglobin A1c Calibrators are intended for use in the calibration of the CRI Hemoglobin A1c Assay in human whole blood.”

3. Special conditions for use statement(s):

For prescription use only.

4. Special instrument requirements:

Hitachi 900 series instruments.

**I. Device Description:**

The device consists of four reagents and five levels of calibrators. The liquid assay components are: Reagent 1 containing microparticles, Reagent 2a containing glycine buffer, Reagent 2b containing mouse anti-human HbA1c and polyclonal goat anti-mouse IgG antibodies in buffer, and a hemolysis reagent. The lyophilized calibrators are based on human blood hemolysate and are reconstituted with water before use.

**J. Substantial Equivalence Information:**

1. Predicate device name(s):

Tosoh G7 Automated High Performance Liquid Chromatography (HPLC)  
Analyzer: HbA1c Variant Analysis Mode

2. Predicate 510(k) number(s):

k011434

3. Comparison with predicate:

The two devices have the same intended use and analyte. Both use whole blood. The predicate device uses HPLC separation to detect the analyte while the DRI HbA1c Assay utilizes light scattering due to microparticle agglutination on conventional clinical chemistry systems. The predicate is calibrated with two points while the proposed assay uses a five point calibration scale.

**K. Standard/Guidance Document Referenced (if applicable):**

Area of Study	Reference Procedure	Reference Title
Precision	CLSI EP5-A	User Evaluation of Precision Performance of Clinical Chemistry Devices
Linearity Method Comparison Traceability		National Glycohemoglobin Standardization Program (NGSP) Manufacturer Certification Guidelines

**L. Test Principle:**

The DRI HbA1c Assay is a homogeneous immunoassay. Hemoglobin and HbA1c in hemolyzed blood samples bind to microparticles by adsorption. HbA1c-specific antibody is introduced, and binds to the HbA1c on the microparticles resulting in agglutination. The extent of agglutination, measured spectrophotometrically, is directly proportional to the percentage of HbA1c present in the sample.

**M. Performance Characteristics (if/when applicable):**

1. Analytical performance:

a. *Precision/Reproducibility:*

Imprecision studies were based on NCCLS Guideline EP5-A and performed on a Hitachi 917 analyzer. Two levels of control material, one normal HbA1c patient sample, and one elevated HbA1c patient sample were used in a total of two assays per day, two replicates per assay, over 20 days. Imprecision results were within the acceptance criteria set by the sponsor.

### Imprecision of the DRI HbA1c Assay

	n =	Mean (%)	Within-Run SD	Within-Run %CV	Total-Run SD	Total-Run %CV
<b>Control 1</b>	80	<b>5.12</b>	0.07	1.31	0.11	2.19
<b>Control 2</b>	80	<b>10.47</b>	0.09	0.83	0.16	1.52
<b>Normal Sample</b>	80	<b>5.49</b>	0.04	0.67	0.11	2.03
<b>High Sample</b>	80	<b>11.69</b>	0.07	0.62	0.28	2.36

*b. Linearity/assay reportable range:*

Linearity of the DRI HbA1c Assay was evaluated by mixing a high and low patient sample to create a series of dilutions. Each dilution was tested five times. The mean value was compared to the expected value.

Recovery of samples relative to the target value ranged from 97% to 100 %. Linear regression analysis demonstrated that A1c2 recovery was linear from 5.2% to 16.0% ( $y = 1.012x + 0.0027$ ,  $r = 0.9995$ ). Linearity was within the sponsor's acceptance specifications.

*c. Traceability, Stability, Expected values (controls, calibrators, or methods):*

Claimed stability of unopened assay reagents and calibrators stored at 2 – 8 °C is 24 months. Claimed stability of opened reagents is 60 days at 2 – 8 °C while the claimed stability of opened calibrators is 30 days at 2 – 8 °C. Stability claims were established by real-time and accelerated testing.

Calibrator values are assigned using reference calibrators certified by NGSP. To assign the calibrators' values, three runs were carried out on at least two instruments; the mean values were assigned to the lot. Control recovery was also tested to confirm the new assigned values of the calibrators.

*d. Detection limit:*

The lower limit of detection (LOD) was determined by taking twice the standard deviation of a zero calibrator sample read 10 times and dividing by the change in absorbance between the zero calibrator and the lowest calibrator (5.1%). The calculated LOD for the DRI HbA1c Assay is 0.2%.

*e. Analytical specificity:*

Potential interference from two levels of bilirubin, ascorbic acid, and triglycerides was evaluated in normal and elevated HbA1c samples. There was less than 1% interference in all samples. Likewise, various anticoagulants used to collect whole blood were evaluated in normal and elevated HbA1c samples for potential interference: Na<sub>2</sub>EDTA, K<sub>3</sub> EDTA, Na Heparin, Lithium Heparin, NH<sub>4</sub> Heparin, Na<sub>3</sub> Citrate, Na<sub>2</sub> Oxalate. All anticoagulants were tested at 1x, 2x, and 3x their normal concentration. There was less than 0.3% interference in all samples at all concentrations.

f. *Assay cut-off:*  
Not applicable to this device.

2. Comparison studies:

a. *Method comparison with predicate device:*

Method comparison testing was based on the NGSP guidelines for manufacturer certification. Forty frozen whole blood samples with unknown HbA1c values were obtained from a secondary reference laboratory (SRL) from the NGSP network. Each sample was analyzed in duplicate; the analysis was performed in five separate runs over five days. Samples spanned a range of 4.8-11.2% HbA1c. The results were compared to results obtained by the SRL on a Tosoh G7 Automated HPLC Analyzer. Regression analysis yielded the following equation:  $y = 0.995x + 0.210$ ,  $r = 0.9915$ . Bias was less than  $\pm 1\%$  for all points.

b. *Matrix comparison:*

Not applicable.

3. Clinical studies:

a. *Clinical Sensitivity:*

Not applicable.

b. *Clinical specificity:*

Not applicable.

c. Other clinical supportive data (when a. and b. are not applicable):

Not applicable.

4. Clinical cut-off:

Not applicable.

5. Expected values/Reference range:

The normal range for HbA1c in non-diabetic people is 4 to 6%. The American Diabetes Association recommends a goal of  $<7\%$  for effective management of diabetes and to minimize long-term diabetic complications. They suggest that a level above 7% indicates more intensive diabetes management should be considered.

**N. Proposed Labeling:**

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

**O. Conclusion:**

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.