February 27, 2018

Barbara Phillips
Vice President, Reagent Technologies
Alfa Wassermann Diagnostic Technologies, LLC
4 Henderson Drive
West Caldwell, NJ 07006

Re: K170623
Trade/Device Name: ACE Hemoglobin A1c (HbA1c) Reagent
Regulation Number: 21 CFR 864.7470
Regulation Name: Glycosylated hemoglobin assay
Regulatory Class: Class II
Product Code: LCP
Dated: January 25, 2018
Received: January 29, 2018

Dear Barbara Phillips:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801 and Part 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR

Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/) and CDRH Learn (http://www.fda.gov/Training/CDRHLearn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (http://www.fda.gov/DICE) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

Kellie B. Kelm -S

for Courtney H. Lias, Ph.D.
Director
Division of Chemistry and Toxicology Devices
Office of In Vitro Diagnostics
and Radiological Health
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 06/30/2020
See PRA Statement below.

510(k) Number *(if known)*
K170623

Device Name
ACE Hemoglobin A1c (HbA1c) Reagent

Indications for Use *(Describe)*

ACE Hemoglobin A1c (HbA1c) Reagent is intended for the quantitative determination of percent hemoglobin A1c in venous whole blood collected in K2-EDTA tubes using the ACE Alera® and ACE Axcel® Clinical Chemistry Systems. This test is intended for use in clinical laboratories and physician office laboratories to monitor long term blood glucose control in individuals with diabetes mellitus. For in vitro diagnostic use only.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

This section applies only to requirements of the Paperwork Reduction Act of 1995.

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510(K) SUMMARY – K170623

I. Applicant/Submitter Contact Information

Applicant:	Alfa Wassermann Diagnostic Technologies, LLC
Address:	4 Henderson Drive West Caldwell, NJ 07006
Contact Person:	Barbara Phillips, MT (ASCP)
Alternate Contact:	Hyman Katz, Ph.D.
Phone Number:	(973) 852 - 0112
Fax Number:	(973) 852 - 0237
Date of Preparation:	02/21/2018

II. Device

Trade Name:	ACE Hemoglobin A1c (HbA1c) Reagent
Regulatory Information:	
Regulation Numbers:	21 C.F.R. § 864.7470
Regulation Names:	Assay, Glycosylated Hemoglobin
Regulatory Class:	Class 2
Product Codes:	LCP

III. Predicate Devices

K951361 DCA 2000+ System for Hemoglobin A1c

IV. Device Description

The **ACE Hemoglobin A1c (HbA1c) Reagent** assay requires a pretreatment step of denaturation of the whole blood samples, which is performed off-line. The red blood cells in the sample are lysed by the Hemoglobin Denaturant and the hemoglobin chains are hydrolyzed. For determination of HbA1c, a latex agglutination inhibition assay is used. In the absence of HbA1c in the sample, the synthetic polymer containing the immunoreactive portion of HbA1c in the HbA1c Agglutinator Reagent will agglutinate with the antibody-coated microparticles in the HbA1c Antibody Reagent. The presence of HbA1c in the blood sample competes for the antibody binding sites and inhibits agglutination. The increase in absorbance, monitored monochromatically at 692 nm, is inversely proportional to the HbA1c present in the sample. For the determination of total hemoglobin, all hemoglobin derivatives in the sample are converted to alkaline hematin. The reaction produces a green colored solution, which is measured bichromatically at 573 nm/692 nm. The intensity of color produced is directly proportional to the total hemoglobin concentration in the sample. The concentrations of both HbA1c and total hemoglobin are measured, the ratio is calculated, and the result reported as percent HbA1c.

V. Intended Use

Indication for use:
ACE Hemoglobin A1c (HbA1c) Reagent is intended for the quantitative determination of percent hemoglobin A1c in venous whole blood collected in K_2-EDTA tubes, using the ACE *Alera*® and ACE *Axcel*® Clinical Chemistry Systems. This test is intended for use in clinical laboratories and physician office laboratories to monitor long term blood glucose control in individuals with diabetes mellitus. For *in vitro* diagnostic use only.

VI. Comparison of Technological Characteristics with the predicate device

Both candidate and predicate devices are used for the measurement of the same analyte, have the same intended use, utilize whole blood samples, and are read on an automated instrument.

The candidate device utilizes a different reaction type and different reading wavelengths.

The candidate device requires an off-board pretreatment of the whole blood sample prior to analyzing the sample.

Technological Similarities and Differences

	Candidate Device	Predicate Device
510(k)#	**K170623**	**K951361**
Name	**ACE Hemoglobin A1c (HbA1c) Reagent (Off-board pretreatment)**	**Siemens Healthcare Diagnostics Hemoglobin A1c Reagent Kit**
Intended Use/Indications for Use	ACE Hemoglobin A1c (HbA1c) Reagent is intended for the quantitative determination of percent hemoglobin A1c in venous whole blood collected in K_2-EDTA tubes, using the ACE *Alera*® and ACE Axcel® Clinical Chemistry Systems. This test is intended for use in clinical laboratories and physician office laboratories to monitor long term blood glucose control in individuals with diabetes mellitus. For *in vitro* diagnostic use only.	This assay provides a convenient, quantitative method for measuring the percent concentration of hemoglobin A1c in blood. The measurement of hemoglobin A1c concentration is recommended for monitoring the long-term care of persons with diabetes. The Diabetes Control and Complications Trial (DCCT) showed the importance of improved glycemic control in reducing the risk and progression of the complications of diabetes. Glycemic control was determined by the measurement of hemoglobin A1c. The American Diabetes Association (ADA) recommends measurement of hemoglobin A1c levels two to four times per year, less frequently in patients with stable control. This assay is based on a latex immunoagglutination inhibition methodology. After loading the reagent test cartridge into the DCA™ Analyzer, the test result is displayed in six minutes. The DCA Hemoglobin A1c assay is for use in laboratories such as physician office laboratories, clinics, and hospitals.
Conditions for Use	The g/dL HbA1c and total hemoglobin values generated are intended for use in the calculation of the HbA1c/THb ratio and cannot be used individually for diagnostic purposes.	No contraindications
Instrument Platforms	ACE *Alera* and ACE Axcel Clinical Chemistry Systems	DCA 2000+ Analyzer
Analytes Measured	Same	%HbA1c (ratio of HbA1c to total hemoglobin)

	Candidate Device	Predicate Device
510(k)#	**K170623**	**K951361**
Name	**ACE Hemoglobin A1c (HbA1c) Reagent (Off-board pretreatment)**	**Siemens Healthcare Diagnostics Hemoglobin A1c Reagent Kit**
Calibration	6 point calibration for HbA1c, 1 point calibration for Total Hemoglobin	Calibrated by the manufacturer. Before reagent cartridges are released by the manufacturer, each lot of reagent cartridges undergoes a thorough analysis and characterization. Values of calibration parameters based on a DCCT reference method are determined that provide for optimal reagent performance. The DCA HbA1c test method is National Glycohemoglobin Standardization Program (NGSP) Certified and is traceable to International Federation of Clinical Chemistry (IFCC) reference materials and test methods. The values for the calibration parameters are encoded onto the calibration card provided with each lot of reagent cartridges.
Method Traceability or Standardization	Same	NGSP Standardization
Basic Principle	Same	Photometric
Methodology	Same	Antibody-coated latex agglutination inhibition
Reactive Ingredients	Porcine pepsin Sodium hydroxide HbA1c hapten polymer Bovine serum albumin HbA1c antibody (mouse) coupled particles Buffer	HbA1c-specific mouse monoclonal antibody adsorbed onto latex particles Glycine Buffer HbA1c hapten polymer Sodium Citrate Buffer Bovine serum albumin Buffer
Non-reactive Ingredients	Surfactants, preservatives	Surfactants, preservatives
Dimensions	Bottles with total volumes of 12 and 30 mL containing the reagents	Single test cartridges
Analysis Temperature	Same	37°C
Reaction Type	HbA1c: Delta Total Hb: Final Point	Endpoint
Measurement Type	Same	Quantitative ratio of HbA1c to total hemoglobin, expressed as percent

	Candidate Device	Predicate Device
510(k)#	**K170623**	**K951361**
Name	**ACE Hemoglobin A1c (HbA1c) Reagent (Off-board pretreatment)**	**Siemens Healthcare Diagnostics Hemoglobin A1c Reagent Kit**
Sample Type	K_2-EDTA Whole Blood	Capillary whole blood Venous whole blood collected in EDTA, heparin, fluoride/oxalate, citrate anticoagulants
Measuring Range	2.7% – 13.0% HbA1c	2.5% – 14.0% HbA1c
Expected Values	Glycemic recommendation for many non-pregnant adults with diabetes: A1c < 7.0%	4.2% HbA1c to 6.5% HbA1c 95% CI (4.3% to 5.7%) Risk classifications: 3% – 6% in non-diabetics 6% – 8% in controlled diabetics
Testing Environment	Clinical laboratories or physician office laboratories	Laboratories such as physician office laboratories, clinics, and hospitals.

VII. Performance Data

The following performance data were provided in support of the substantial equivalence determination.

Performance Data

Detection Limit and Limit of Quantitation:

Because HbA1c is present to some extent in all samples (without homozygous hemoglobin variants), there is no need to determine the detection limit (LoD) of this assay.

	ACE *Alera* Clinical Chemistry System	**ACE Axcel Clinical Chemistry System**
LoQ (%)	2.5	2.5

Linearity:

%HbA1c	**ACE *Alera***	**ACE Axcel**
No. of Samples	11	11
No. of Reps/Sample	4	4
Range Tested	2.7% – 13.0% HbA1c	2.4% – 13.1% HbA1c
Regression Equation	y=0.987x + 0.3	y=0.954x + 0.3
Coefficient of Determination (r^2)	0.9948	0.9936

Total Hemoglobin	**ACE *Alera***	**ACE Axcel**
No. of Samples	11	11
No. of Reps/Sample	4	4
Range Tested	1.4 – 22.2 g/dL	1.2 – 21.8 g/dL
Regression Equation	y=1.006x + 0.10	y=0.997x + 0.20
Coefficient of Determination (r^2)	0.9978	0.9964

Performance Data

Precision: <u>In-house</u>

ACE *Alera*		Within run		Total	
Sample	**Mean**	**SD**	**%CV**	**SD**	**%CV**
A	5.1	0.07	1.4	0.13	2.5
B	6.8	0.14	2.1	0.18	2.6
C	8.2	0.10	1.3	0.20	2.4
D	11.2	0.32	2.8	0.34	3.1

ACE Axcel		Within run		Total	
Sample	**Mean**	**SD**	**%CV**	**SD**	**%CV**
A	5.0	0.08	1.6	0.12	2.4
B	6.8	0.14	2.0	0.17	2.6
C	8.2	0.13	1.6	0.21	2.6
D	11.1	0.27	2.4	0.32	2.9

Performance Data

Precision: Physician office labs

ACE *Alera*			Within-Run		Total	
Lab	**Sample**	**Mean**	**SD**	**%CV**	**SD**	**%CV**
POL 1	1	5.3	0.09	1.6	0.09	1.6
POL 2		5.2	0.11	2.1	0.12	2.4
POL 3		4.6	0.08	1.8	0.13	2.9
POL 1	2	6.8	0.12	1.7	0.12	1.7
POL 2		6.7	0.08	1.2	0.14	2.1
POL 3		6.0	0.07	1.1	0.14	2.3
POL 1	3	8.8	0.24	2.7	0.27	3.1
POL 2		8.5	0.11	1.3	0.18	2.1
POL 3		7.9	0.07	0.9	0.25	3.1
POL 1	4	12.5	0.29	2.4	0.32	2.5
POL 2		12.5	0.36	2.9	0.36	2.9
POL 3		11.5	0.13	1.1	0.27	2.3

ACE Axcel			Within-Run		Total	
Lab	**Sample**	**Mean**	**SD**	**%CV**	**SD**	**%CV**
POL 1	1	5.4	0.12	2.2	0.24	4.3
POL 2		4.6	0.09	2.0	0.11	2.3
POL 3		4.8	0.10	2.1	0.10	2.2
POL 1	2	6.8	0.08	1.1	0.13	1.9
POL 2		6.1	0.13	2.2	0.16	2.7
POL 3		6.3	0.11	1.7	0.12	1.8
POL 1	3	8.8	0.12	1.3	0.20	2.2
POL 2		8.8	0.16	1.8	0.24	2.8
POL 3		9.1	0.15	1.7	0.27	2.9
POL 1	4	11.9	0.19	1.6	0.29	2.5
POL 2		11.8	0.34	2.9	0.42	3.5
POL 3		12.2	0.15	1.2	0.35	2.9

Performance Data

Comparative Analysis Regression Evaluation: In-house vs. DCA 2000+

	ACE *Alera*	ACE Axcel
n	101	102
Range (x-method)	3.2% – 12.8% HbA1c	2.5% – 12.8% HbA1c
Regression Equation	y=0.979x + 0.05	y=0.983x - 0.03
Correlation Coefficient	0.9839	0.9832
Standard Error	0.32	0.34
Confidence Interval – slope	0.944 to 1.015	0.948 to 1.019
Confidence Interval - intercept	-0.21 to 0.31	-0.29 to 0.24

Comparative Analysis Regression Evaluation: Physician office labs vs. DCA 2000+

ACE *Alera*

Lab	n	Range (x-method) % HbA1c	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept
POL 1	50	3.2 – 13.4	y=0.967x+0.34	0.9892	0.35	0.925 to 1.008	0.04 to 0.65
POL 2	50	3.1 – 12.9	y=0.984x-0.02	0.9945	0.21	0.955 to 1.014	-0.23 to 0.18
POL 3	50	3.2 – 12.4	y=0.981x-0.09	0.9939	0.21	0.950 to 1.013	-0.30 to 0.12

ACE Axcel

Lab	n	Range (x-method) % HbA1c	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept
POL 1	52	3.2 – 12.9	y=1.000x-0.28	0.9885	0.33	0.957 to 1.043	-0.59 to 0.03
POL 2	50	3.4 – 12.8	y=0.993x-0.12	0.9932	0.25	0.960 to 1.027	-0.37 to 0.13
POL 3	50	3.5 – 12.9	y=0.980x+0.02	0.9960	0.22	0.955 to 1.006	-0.16 to 0.20

Performance Data

Expected Values:

Glycemic recommendation for many non-pregnant adults with diabetes:	
A1c	< 7.0%*

*More or less stringent glycemic goals may be appropriate for individual patients. Goals should be individualized based on duration of diabetes, age/life expectancy, comorbid conditions, known CVD or advanced microvascular complications, hypoglycemia unawareness, and individual patient considerations.

Source: American Diabetes Association. Glycemic Targets: Standards of Medical Care in Diabetes - 2018. Diabetes Care 2018 Jan; 41 (Supplement 1): S55-S64.

Analytical Specificity

Interferent	No significant interference ≤
Bilirubin	53 mg/dL
Triglycerides	1100 mg/dL
Ascorbic Acid	6 mg/dL
Sodium Fluoride	1200 mg/dL
Acetaldehyde	100 mg/dL

Cross Reactivity:

Acetylated Hb showed no significant interference at 2000 mg/dL.
Carbamylated Hb showed no significant interference at 2000 mg/dL.
Labile A1c showed no significant interference at 1440 mg/dL.
Non-glycated Hb (HbA0) showed no significant interference at 1725 mg/dL.
$HbA1_{a+b}$ fraction showed no significant interference at 100 mg/dL.

HbA1c Variants

Instrument Used:	Axcel			Instrument Used:	Alera		
Variant:	HbD			Variant:	HbD		
% Variant	36.3%	34.0%	17.3%	% Variant	36.3%	34.0%	17.3%
Reference Value	5.2%	9.4%	12.0%	Reference Value	5.2%	9.4%	12.0%
Mean	5.1%	8.9%	12.0%	Mean	5.1%	9.0%	12.7%
% Recovery	98.6	94.4	99.8	% Recovery	98.1	95.2	105.6

Instrument Used:	Axcel			Instrument Used:	Alera		
Variant:	HbE			Variant:	HbE		
% Variant	22.5%	14.3%	20.7%	% Variant	22.5%	14.3%	20.7%
Reference Value	4.7%	7.8%	10.8%	Reference Value	4.7%	7.8%	10.8%
Mean	5.1%	7.7%	10.8%	Mean	5.1%	7.9%	10.9%
% Recovery	108.0	98.4	99.5	% Recovery	108.5	101.6	100.9

Instrument Used:	Axcel			Instrument Used:	Alera		
Variant:	HbF			Variant:	HbF		
% Variant	10.1%	16.8%	29.5%	% Variant	10.1%	16.8%	29.5%
Reference Value	5.1%	7.6%	9.3%	Reference Value	5.1%	7.6%	9.3%
Mean	5.2%	6.6%	6.7%	Mean	5.2%	6.4%	6.7%
% Recovery	101.0	*86.2*	*71.5*	% Recovery	101.0	*84.5*	*72.3*

Instrument Used:	Axcel				
Variant:	HbC				
% Variant	0.0%	8.8%	17.5%	26.3%	35.0%
Reference Value (Normal)	4.8%	4.8%	4.8%	4.8%	4.8%
Mean	4.8%	5.1%	5.2%	5.9%	6.6%
% Recovery	100.0	106.2	109.3	*122.4*	*138.6*

Instrument Used:	Axcel				
Variant:	HbC				
% Variant	0.0%	7.0%	14.0%	21.0%	28.0%
Reference Value (Abnormal)	7.9%	7.9%	7.9%	7.9%	7.9%
Mean	7.9%	8.0%	8.6%	9.4%	10.8%
% Recovery	100.0	101.9	109.6	*119.1*	*137.3*

Instrument Used:	Alera				
Variant:	HbC				
% Variant	0.0%	8.8%	17.5%	26.3%	35.0%
Reference Value (Normal)	4.7%	4.7%	4.7%	4.7%	4.7%
Mean	4.7%	4.7%	4.8%	5.5%	6.5%
% Recovery	100.0	100.4	103.1	*117.0*	*139.4*

Instrument Used:	Alera				
Variant:	HbC				
% Variant	0.0%	7.0%	14.0%	21.0%	28.0%
Reference Value (Abnormal)	7.4%	7.4%	7.4%	7.4%	7.4%
Mean	7.4%	7.4%	7.8%	9.0%	10.3%
% Recovery	100.0	98.9	105.0	*120.5*	*138.0*

Instrument Used:	Axcel				
Variant:	HbS				
% Variant	0.0%	9.0%	17.9%	26.9%	35.8%
Reference Value (Normal)	4.8%	4.8%	4.8%	4.8%	4.8%
Mean	4.8%	5.1%	5.3%	5.7%	5.9%
% Recovery	100.0	104.6	109.7	*118.0*	*122.7*

Instrument Used:	Axcel				
Variant:	HbS				
% Variant	0.0%	8.6%	17.1%	25.7%	34.2%
Reference Value (Abnormal)	8.0%	8.0%	8.0%	8.0%	8.0%
Mean	8.0%	8.3%	8.5%	9.5%	10.0%
% Recovery	100.0	103.8	106.9	*119.8*	*125.5*

Instrument Used:	Alera				
Variant:	HbS				
% Variant	0.0%	9.0%	17.9%	26.9%	35.8%
Reference Value (Normal)	5.0%	5.0%	5.0%	5.0%	5.0%
Mean	5.0%	5.3%	5.4%	5.8%	5.9%
% Recovery	100.0	106.1	108.6	*117.7*	*119.2*

Instrument Used:	Alera				
Variant:	HbS				
% Variant	0.0%	8.6%	17.1%	25.7%	34.2%
Reference Value (Abnormal)	7.8%	7.8%	7.8%	7.8%	7.8%
Mean	7.8%	8.1%	8.5%	9.2%	9.7%
% Recovery	100.0	103.9	109.7	*118.7*	*125.5*

High Hemoglobin F (> 10.1%), Hemoglobin C (> 14.0%) and Hemoglobin S (> 17.1%) will result in inaccurate HbA1c results. Therefore, a statement will be included in the labeling as follows:

> Hemoglobinopathies may interfere with glycated hemoglobin analysis. The results from both ACE Alera and ACE Axcel Clinical Chemistry Systems show that there is no significant interference for Hemoglobin D (≤ 36.3%) and Hemoglobin E (≤ 22.5%). High Hemoglobin F (> 10.1%) will result in lower than expected HbA1c values. High Hemoglobin C (> 14.0%) and high Hemoglobin S (> 17.1%) will result in higher than expected HbA1c values.

VIII. Conclusions

Based on the foregoing data, the device is safe and effective. These data also establish substantial equivalence to the predicate device.