MAR 3 0 2012 K 111664

510(k) SUMMARY

Summary of 510(k) safety and effectiveness information is being submitted in accordance with the requirements of SMDA 1990 and 21 CFR 807.92

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Name of the Device	Cystatin C POC Test; Cystatin POC Test Control Kit
Trade Name	Cystatin C POC Test; Cystatin POC Test Control Kit
Common Usual Name	SMART Cystatin C Assay
Device Classification Name	Cystatin C POC Assay
Product Code	NDY; Test, Cystatin C JJX; Quality Control Material
Panel	Clinical Chemistry (75)
Submission Type	510K
Regulation Number	21CFR 862.1225, Creatinine Test System 21CFR 862.1660, Quality Control Material
Device Class	Class II (Assay) Class I (Control)
Predicate Device	Diazyme Cystatin C Assay k093680, k092911
Establishment Registration	2032900

Executive Summary

Detailed performance characteristics and comparison analysis are given in this filing that demonstrates substantial equivalence of the Cystatin C POC Test Kit to predicate device that is currently being marketed. The performance characteristics of the Cystatin C POC Test Kit are substantially similar to that of the approved predicate device (k093680). Performance data and risk analysis indicates that differences should not affect the safety and effectiveness of the Cystatin C POC Test and offers POL users an *in vitro* diagnostic device system to measure Cystatin C in human blood samples.

Device Description:

Diazyme Cystatin C POC Test Kit contains reagents intended for use with the SMART analyzer for the quantitative determination of Cystatin C (Cys C) in human venous whole blood samples. Measurement of Cystatin C can assist in the assessment of renal transplantation status, monitoring GFR in nephrotoxic drug therapy, and monitoring GFR in acute and chronic kidney diseases including diabetic nephropathy. Cystatin C POC Test reagents are similar to the predicate Diazyme Cystatin C assay reagents (k093680). The similarities and differences in composition and format are noted in Table 1 below. The Cystatin C POC Test is based on a latex enhanced immunoturbidimetric assay. Cystatin C in the venous whole blood sample binds to the specific anti-Cystatin C antibody, which is coated on latex particles, and causes agglutination. The degree of the turbidity caused by agglutination can be measured optically and is proportional to the amount of Cystatin C in the venous whole blood sample. The Cystatin C concentration is expressed as mg/L Cystatin C by use of a lot specific calibration curve that is stored in an RFID card provided with each SMART test kit.

Diazyme Cystatin C POC Test Control Kit is intended for use as quality controls for the Diazyme Cystatin C POC Test and is packaged separately. The controls are made from human venous whole blood and are in a lyophilized (freeze-dried) state. The quality controls assist laboratory users in verification steps ensuring that the assay reagents are functioning correctly. QC materials are run exactly as samples. Users are instructed to verify the calibration curve with the controls and run controls each time a new lot of reagents are received. If QC materials fall outside laboratory acceptable range, users are instructed to re-test and call manufacturer customer service if problem persists.

SMART Analyzer (k092911) is a compact cuvette based spectrophotometer (10 inches x 5.5 inches x 5.5 inches) machine for point-of-care testing designed to analyze readings from single use reagent cuvette. The instrument only uses the Diazyme Reagent System (DRS) cuvette and caps and performs assay with a preprogrammed Radio Frequency ID (RFID) card. The DRS cuvette is supplied prefilled with Reagent 1 (R1) and the DRS cap is supplied prefilled with Reagent 2 (R2). The DRS cuvette and caps are kept separate until use. Users are instructed (see proposed labeling) to add 20µl of sample to the DRS cuvette prefilled with R1 containing proper amount of detergent for venous whole blood lysis. Users are then instructed to snap in place DRS cap and insert into analyzer. The instrument warms the cuvette to 37°C and after a predefined period adds the reagent R2 found in the DRS cap. The reagents and samples are mixed magnetically and absorbance readings are taken at 700nm. The lot specific RFID card contains reagent addition time, mixing time, reading time and calibration curve.

The Diazyme Cystatin C POC Test system thus consists of the following:

- Cystatin C POC Test Kit. Reagents are provided in prefilled tubes, cuvettes and cuvette caps. The DRS cuvette and cuvette caps can only work with the SMART analyzer.
- Cystatin C POC Test Control Kit. Controls are provided for quality control of the Cystatin C POC Test.

Equipment needed for Diazyme Cystatin C POC Test:

- SMART Analyzer (K092911).

Indication (s) for Use:

Diazyme Cystatin C Point-of Care (POC) test reagents are intended for use with the SMART analyzer for the quantitative determination of Cystatin C in venous whole blood by latex enhanced immunoturbidimetric method. The measurement of Cystatin C is used as an aid in the diagnosis and treatment of renal disease. For *in vitro* Diagnostic Use Only.

The Diazyme Cystatin C POC Test Control Kit is intended for use as quality controls for the Cystatin C POC Test. For *in vitro* Diagnostic Use Only.

Summary of Assay Kit Components (Candidate device)
Reagent 1 20 DRS cuvette (prefilled) • 100 mM TrisCl buffer, 0.125% triton
Reagent 2 20 DRS caps (prefilled) • Suspension of anti-human Cystatin C polyclonal antibody coated latex particles (< 0.5%).
Calibrator
1 x preprogrammed lot specific RFID card in each kit
Control Set
1 x 1.0 mL Control 1 (human whole blood based lyophilized, need to reconstitute before use)
1 x 1.0 mL Control 2 (human whole blood based lyophilized, need to reconstitute before use)

PERFORMANCE TESTING SUMMARIES

Precision Study

The precision of the Diazyme Cystatin C POC Test was evaluated according to Clinical and Laboratory Standards Institute (CLSI) EP5-A guideline with the following modifications: In the study, three whole blood specimens containing 1.00 mg/L, 2.70 mg/L, and 6.20 mg/L Cystatin C

were tested in 2 runs per day with duplicates over 10 working days on three different SMART Analyzers.

The mean value (Mean), standard deviation, within run imprecision and total imprecision CV mg/L are calculated and summarized in the following tables:

Within Run precision CV%

	Whole blood 1 Cystatin C	Whole blood 2 Cystatin C	Whole blood 3 Cystatin C	Whole blood 4 Cystatin C	Whole blood 5 Cystatin C	Whole blood 6 Cystatin C
Total data points	40	40	40	40	40	40
Mean (mg/L)	0.988	2.720	6.1305	0.696	1.217	4.717
SD (mg/L)	0.0553	0.0694	0.1353	0.0444	0.0563	0.1148
CV mg/L	5.6%	2.6%	2.2%	6.4%	4.6%	2.4%

Total Precision CV%

	Whole blood 1 Cystatin C	Whole blood 2 Cystatin C	Whole blood 3 Cystatin C	Whole blood 4 Cystatin C	Whole blood 5 Cystatin C	Whole blood 6 Cystatin C
Total data points	40	40	40	40	40	40
Mean (mg/L)	0.988	2.720	6.1305	0.696	1.217	4.717
SD (mg/L)	0.0577	0.0780	0.2145	0.0478	0.0590	0.1467
CV mg/L	5.9%	2.9%	3.5%	6.9%	4.9%	3.1%

Linearity/Reportable Range

Eleven levels of the Cystatin C linearity set were prepared by diluting a whole blood containing about 8 mg/L Cystatin C with saline according to CLSI EP6-A and then were run with Diazyme Cystatin C POC Test Kit in triplicates. After linear regression, the correlation coefficient is R2 = 0.9977, slope is 0.9643, and y intercept is -0.0456. Diazyme Cystatin C POC Test Kit is linear up to 7.65 mg/L. Analytical measuring range (AMR) is 0.30-7.65mg/L.

LoB, LoD, LoQ

The LOB, LOD and LOQ of Diazyme Cystatin C POC Test Kit were determined according to CLSI EP17-A. LOB = 0.045 mg/L; LOD = 0.11 mg/L; LOQ = 0.30 mg/L Cystatin C.

Analytical specificity

Interference Study

To determine the level of interference from the substances normally present in whole blood, the Diazyme Cystatin C POC Test was used to test two whole blood samples with "low" and "high" Cystatin C concentration spiked with various concentrations of substances following CLSI EP7-A "Interference Testing in Clinical Chemistry": dose-response guidelines.

The common interfering substances had no significant interference up to the concentrations summarized below:

Interference	Concentration
Triglyceride	1000 mg/dL
Ascorbic Acid	10 mg/dL
Bilirubin	40 mg/dL
Bilirubin Conjugated	40 mg/dL
Rheumatoid Factor	1000 IU/mL
Hemoglobin	10.0 g/dL

Comparison studies

Method comparison with predicate device
To demonstrate accuracy, the candidate device was tested with individual samples and the results compared to predicate device (k093680) using CLSI EP9-A2: *Method Comparison and Bias Estimation Using patient samples* as a guideline. The method comparison study was performed internally at Diazyme laboratories and externally at three POL sites.

Internal method comparison
Paired human whole blood-serum samples (venous whole blood and plasma from the same individual) were tested for comparison. The whole blood samples were tested with the Diazyme Cystatin C POC Test on SMART analyzer and the correspondent plasma samples were tested with predicate Assay (k093680) on Hitachi 917. A total of fifty five (55) EDTA whole blood specimens were tested with Diazyme Cystatin C POC Test. The correspondent plasma samples were tested with Diazyme Cystatin C on Hitachi 917 analyzer.

Regression results are summarized in the following table:

N	55
Slope	0.9535
Intercept	0.0958
R^2	0.9867

External method comparison

120 whole blood samples were tested at three POL sites by intended users. Each site ran 40 whole blood samples using SMART analyzers. The corresponding one hundred and twenty (120) plasma specimens were tested on Hitachi 917 with predicate device.

Regression analysis of the results obtained from the three POL sites is summarized as follows:

	Site 1	Site 2	Site 3	All 3 sites
N	40	40	40	120
Slope	0.9967	0.9049	0.9617	0.955
Intercept	0.1058	0.0731	0.0352	0.0723
R^2	0.9902	0.9902	0.9937	0.9872

Expected values/ Reference range:

To verify the transferability of the reference interval from the predicate device, whole blood samples from 126 apparently healthy adults with age of 19-63 were tested using the Diazyme Cystatin C SMART assay according to CLSI C28-A3 guideline. The expected normal range is 0.46 to 1.06 mg/L in 95% of the population tested.

Substantial Equivalence Table

Indications for Use

Predicate k093680	Candidate device	Equivalency
The Diazyme Cystatin C Assay is an in-vitro diagnostic test for the quantitative determination of Cystatin C in serum or plasma by latex enhanced immunoturbidimetric method. The measurement of Cystatin C is used as an aid in the diagnosis and treatment of renal disease.	Diazyme Cystatin C Point-of Care (POC) test reagents are intended for use with the SMART analyzer for the quantitative determination of Cystatin C in venous whole blood by latex enhanced immunoturbidimetric method. The measurement of Cystatin C is used as an aid in the diagnosis and treatment of renal disease. For *in vitro* Diagnostic Use Only.	Similar

Principle

Predicate k093680	Candidate device	Equivalency
Diazyme Cystatin C assay is based on a latex enhanced immunoturbidimetric assay. Cystatin C in the sample binds to the specific anti-Cystatin C antibody, which is coated on latex particles, and causes agglutination. The degree of the turbidity caused by agglutination can be measured optically and is proportional to the amount of Cystatin C in the sample.	Diazyme Cystatin C assay is based on a latex enhanced immunoturbidimetric assay. Cystatin C in the sample binds to the specific anti-Cystatin C antibody, which is coated on latex particles, and causes agglutination. The degree of the turbidity caused by agglutination can be measured optically and is proportional to the amount of Cystatin C in the sample.	Same

Test Objective

Predicate k093680	Candidate device	Equivalency
For the *in vitro* quantitative determination of human Cystatin C.	For the *in vitro* quantitative determination of human Cystatin C.	Same

Type of Test

Predicate k093680	Candidate device	Equivalency
Quantitative	Quantitative	Same

Methodology

Predicate k093680	Candidate device	Equivalency

Latex enhanced immunoturbidimetric method	Latex enhanced immunoturbidimetric method	Same

Antibodies

Predicate k093680	Candidate device	Equivalency
Latex particles coated with anti-human Cystatin C chicken polyclonal antibodies	Latex particles coated with anti-human Cystatin C chicken polyclonal antibodies	Same

Specimen

Predicate k093680	Candidate device	Equivalency
3μL Human serum or plasma.	20 μL Human venous whole blood.	Different

Product Type

Predicate k093680	Candidate device	Equivalency
Assay reagent kit, calibrator kit, quality control kit	Assay reagent kit, kit specific RFID calibration card, quality control kit	Similar

Performance

Predicate k093680	Candidate device
Measuring Range: 0.27 to 7.8 mg/L Precision: Within: < 5.0 % CV Total: < 5.0 % CV Accuracy: Correlation Coefficient: 0.99 Slope/Intercept: 0.99/0.0877	Measuring Range: 0.30 to 7.65 mg/L Precision at Diazyme: The CV for samples above 1.0 mg/L ranged from 2.2% to 4.9%. Samples with concentrations of 0.70 mg/L, and 0.99 mg/L were also tested and the CV ranged from 6.9% to 5.6%. Precision at 3 POL sites: The CV for samples above 1.0 mg/L ranged from 2.6% to 8.0%. Samples with concentrations of 0.55mg/L, and 0.93 mg/L were also tested and the CV ranged from 9.1% to 5.3%. Accuracy at Diazyme: N =55 Correlation Coefficient: 0.9867 Slope/Intercept: y = 0.9535/0.0985

	Accuracy at 3 POL sites: N = 120 Correlation Coefficient: 0.9872 Slope/Intercept: y = 0.955/0.0732

Calibrator Comparison

Predicate k093680	Candidate device	Equivalency
Separately packaged calibrator kit. User steps needed to use calibrators. The instrument calculates the Cystatin C concentration of a patient specimen by interpolation of the obtained signal on a 6-point calibration curve	Each kit has individual lot specific RFID preprogrammed calibration card. User steps limited to insertion in SMART analyzer. The instrument calculates the Cystatin C concentration of a patient specimen by use of a lot specific calibration curve that is stored in an RFID card provided with each Cystatin C SMART test kit.	Different

Control Comparison

Predicate k093680	Candidate device	Equivalency
Separately packaged quality control kit designed for specific assay	Separately packaged quality control kit designed for specific assay	Same
Liquid stable ready to use	Lyophilized powder, need to reconstitute with distilled water	Different

Rationale for Considering the Device Substantially Equivalent to Devices Approved for Inter-state Commerce

Diazyme Cystatin C Assay (k093680) was selected for method comparison. The reagents used for the POC Test are similar to the predicate and were used to develop the application (parameter) for the SMART Analyzer. The only difference is the addition of detergent Triton-100 (0.125%) is to Reagent R1. The similarity and differences for the predicate reagent versus the POC Test reagents are given in the table below.

Summary of Assay Kit Components

Predicate k093680	Candidate device
Kit can be used on automated chemistry analyzers using validated parameters	Kit can ONLY be used with SMART analyzers
Reagent 1 1 bottle • 100 mM TrisCl buffer	Reagent 1 20 DRS cuvette (prefilled) with reagent R1 • 100 mM TrisCl buffer • 0.125% Triton-100
Reagent 2 1 bottle • Suspension of anti-human Cystatin C polyclonal antibody coated latex particles (< 0.5%)	Reagent 2 20 DRS caps (prefilled) • Suspension of anti-human Cystatin C polyclonal antibody coated latex particles (< 0.5%).
Calibrator set	Calibrator
5 x 1.0 mL Calibrator 1-5	1 x preprogrammed lot specific RFID card in each kit
Control Set	Control Set
1 x 1.0 mL Control 1(buffer based liquid, read to use)	1 x 1.0 mL Control 1(human blood based matrix, lyophilized, need to reconstitute before use)
1 x 1.0 mL Control 2(buffer based liquid, read to use)	1 x 1.0 mL Control 2(human blood based matrix lyophilized, need to reconstitute before use)

DEPARTMENT OF HEALTH & HUMAN SERVICES

Food and Drug Administration

10903 New Hampshire Avenue
Silver Spring, MD 20993

Diazyme Laboratories, Inc.
c/o Abhijit Datta, PhD.
12889 Gregg Court
Poway, CA 92064

MAR 30 2012

Re: k111664
Trade Name: Diazyme Cystatin C POC Test Kit; Diazyme Cystatin C POC Test Control Kit
Regulation Number: 21 CFR 862.1225
Regulation Name: Creatinine Test System
Regulatory Class: Class II
Product Code: NDY, JJX
Dated: March 15, 2012
Received: March 19, 2012

Dear Dr. Datta:

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.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in Title 21, Code of Federal Regulations (CFR), Parts 800 to 895. 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 Parts 801 and 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); and good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820).

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Office of In Vitro Diagnostic Device Evaluation and Safety at (301) 796-5450. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding postmarket surveillance, please contact CDRH's Office of Surveillance and Biometric's (OSB's) Division of Postmarket Surveillance at (301) 796-5760. For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/Medical Devices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance...

You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 796-5680 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm

Sincerely yours,

Courtney H. Lias, Ph.D.
Director
Division of Chemistry and Toxicology Devices
Office of *In Vitro* Diagnostic Device
Evaluation and Safety
Center for Devices and Radiological Health

Enclosure

Indications for Use

510(k) Number (If Known): k111664

Device Name: Diazyme Cystatin C POC Test Kit; Diazyme Cystatin C POC Test Control Kit

Indications for Use:

Diazyme Cystatin C Point-of Care (POC) test reagents are intended for use with the SMART analyzer for the quantitative determination of Cystatin C in venous whole blood by latex enhanced immunoturbidimetric method. The measurement of Cystatin C is used as an aid in the diagnosis and treatment of renal disease. For *in vitro* Diagnostic Use Only.

The Diazyme Cystatin C POC Test Control Kit is intended for use as quality controls for the Cystatin C POC Test. For *in vitro* Diagnostic Use Only.

Prescription Use X AND/Or Over-The-Counter Use _____
(Part 21 CFR 801 Subpart D) (21 CFR 801 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE; CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostic Device Evaluation and Safety (OIVD)

Division Sign-Off
Office of In Vitro Diagnostic Device
Evaluation and Safety

510(k) k111664