510(k) Summary

MAR 2 2 2013

5.1 Description

Dimension® EXL™ with LM system

This summary of 510(k) safety and effectiveness information is submitted in accordance with the requirements of SMDA 1990 and 21 CFR §807.92.

5.2. Assigned 510(k) number

The assigned 510(k) number is: k130276

5.3 Applicant and Date

Applicant: Pamela A. Jurga
Siemens Healthcare Diagnostics Inc.
P.O. Box 6101
Newark, DE 19714-6101

Date: March 20, 2013

5.4 Proprietary and Established Names

Dimension® EXL™ with LM system
Dimension® FT4L Flex® reagent cartridge

5.5 Regulatory Information

Dimension® EXL™ with LM system (instrument)
The Dimension® EXL™ with LM system is an in vitro diagnostic device that is intended to measure a variety of analytes in human body fluids. The system utilizes photometric, turbidimetric, chemiluminescence and integrated ion selective multisensor technology for chemical and immunochemical applications for clinical use. This 510(k) is being submitted because of a change in the photomultiplier tube (from a new vendor) that will be used to count the signal for the chemiluminescent methods (LOCI).

Regulation section: 21CFR 862.2160 Analyzer, chemistry (photometric, discrete), For Clinical Use
Classification: Class I
Product Code: JJE
Panel: Clinical Chemistry

The FT4L method is an in vitro diagnostic test for the quantitative measurement of Free Thyroxine in human serum and plasma on the Dimension® EXL™ with LM system. Measurements of free thyroxine are used in the diagnosis and monitoring of thyroid disease.

Regulation section: 21CFR 862.1695, free thyroxine
Classification: Class II
Product Code: CEC
Panel: Clinical Chemistry

5.6 Predicate Device

The predicate device used to demonstrate substantial equivalence to the Dimension® EXL™ with LM system with the new photomultiplier tube (PMT) is the Dimension® EXL™ with LM system cleared under k073604 including the FT4L assay.

The predicate device used to demonstrate substantial equivalence to the Dimension® FT4L Flex® reagent cartridge is the Dimension® FT4L Flex® reagent cartridge cleared under k073604 with the Dimension® EXL™ with LM system.

5.7 Device Description / Test Principle

The Dimension EXL with LM system is a floor model, fully automated, microprocessor-controlled, integrated instrument which uses prepackaged Siemens Dimension Flex® reagent cartridges to measure a variety of analytes in human body fluids. The system can process samples in random access, batch or STAT modes. The instrument has a heterogeneous module (HM) for processing chromium-based heterogeneous immunoassays and a LOCI® module for chemiluminescent immunoassays. The instrument can also perform photometric, turbidimetric and ACMIA tests. This 510(k) is being submitted because a new photomultiplier (from a different vendor) will be used to count the signal for the chemiluminescent methods (LOCI).

The Dimension® FT4L Flex® regent cartridge consists of prepackaged liquid reagents containing two synthetic beads, and a biotinylated anti-T4 mouse monoclonal antibody in a plastic eight-well cartridge.

The FT4L method is a homogeneous, sequential, chemiluminescent immunoassay based on LOCI® technology. The LOCI® reagents include two synthetic bead reagents and a biotinylated anti-T4 mouse monoclonal antibody. The first bead reagent (Chemibeads) is coated with triiodothyronine (T3), a naturally occurring, weaker binding analog of T4, and contains chemiluminescent dye. The second bead reagent (Sensibeads) is coated with streptavidin and contains a photosensitizer dye. In a first step, sample is incubated with biotinylated antibody which allows T4 from the sample to saturate a fraction of the biotinylated antibody that is directly related to the free thyroxine (FT4) concentration. In a second step, T3 Chemibeads are added and form bead/biotinylated antibody immunocomplexes with the non-saturated fraction of the biotinylated antibody. Sensibeads are then added and bind to the biotin to form bead pair immunocomplexes. Illumination of the complex at 680 nm generates singlet oxygen from Sensibeads which diffuses into the Chemibeads, triggering a chemiluminescent

reaction. The resulting signal is measured at 612 nm and is an inverse function of the FT4 concentration in the sample.

Reagents

Wells[a,b]	Form	Ingredient	Concentration[c]	Source
1 – 2	Liquid	Streptavidin Sensibeads	225 µg/mL	Recombinant *E. coli*
3 – 4	Liquid	T3 Chemibeads	200 µg/mL	
5 – 6	Liquid	FT4 Biotinylated antibody	50 ng/mL	Mouse monoclonal
7 – 8	Empty			

5.8 Intended Use

The Dimension® EXL™ with LM system is an *in vitro* diagnostic device that is intended to measure a variety of analytes in human body fluids. The system utilizes photometric, turbidimetric, chemiluminescence and integrated ion selective multisensor technology for chemical and immunochemical applications for clinical use.

The FT4L method is an *in vitro* diagnostic test for the quantitative measurement of Free Thyroxine in human serum and plasma on the Dimension® EXL™ with LM system. Measurements of free thyroxine are used in the diagnosis and monitoring of thyroid disease.

5.9 Indication(s) for Use

The Dimension® EXL™ with LM system is an *in vitro* diagnostic device that is intended to measure a variety of analytes in human body fluids. The system utilizes photometric, turbidimetric, chemiluminescence and integrated ion selective multisensor technology for chemical and immunochemical applications for clinical use.

The FT4L method is an *in vitro* diagnostic test for the quantitative measurement of Free Thyroxine in human serum and plasma on the Dimension® EXL™ with LM system. Measurements of free thyroxine are used in the diagnosis and monitoring of thyroid disease.

5.10 Substantial Equivalence Information

The Dimension® EXL™ with LM system with new PMT and the Dimension® EXL™ with LM system cleared under k073604 are *in vitro* diagnostic devices that are intended to measure a variety of analytes in human body fluids. The systems utilize photometric, turbidimetric, chemiluminescence and integrated ion selective multisensor technology for chemical and immunochemical applications for clinical use. To ensure substantial equivalence with the new photomultiplier tube (PMT) from a different vendor, a representative method impacted by this change was tested with instruments with both the new and the current PMT. Data from a representative chemiluminescent method, LOCI Free thyroxine Flex® reagent cartridge, is included in this submission. Comparative data for Method Comparison, and Precision (with in run, within lab) demonstrate equivalent performance.

A comparison of the similarities and differences between the devices is provided in the following tables:

Similarities for Dimension® EXL™ with LM with new PMT and Dimension® EXL™ with LM:

Feature	Device: Dimension® EXL™ with LM with new PMT	Predicate: Dimension® EXL™ with LM (k073604)
Intended Use	The Dimension® EXL™ with LM system is an *in vitro* diagnostic device that is intended to measure a variety of analytes in human body fluids. The system utilizes photometric, turbidimetric, chemiluminescence and integrated ion selective multisensor technology for chemical and immunochemical applications for clinical use.	Same
Indications for Use	The Dimension® EXL™ with LM system is an *in vitro* diagnostic device that is intended to measure a variety of analytes in human body fluids. The system utilizes photometric, turbidimetric, chemiluminescence and integrated ion selective multisensor technology for chemical and immunochemical applications for clinical use.	Same
System Control	Fully automated and controlled by microprocessors	Same
User Interface	Contains graphical user interface screens	Same
Detection Technologies	Contains a photometer, a heterogenous module and a multisensor electrode for	Same

	performing photometric tests, and electrolyte tests. It also has a LOCI® module for high-sensitivity homogenous immunoassay tests.	
Reagents	Uses pre-packaged Flex® reagent cartridges. Reagents are hydrated and stored on-board the instrument	Same
Temperature	Reagents are stored at 2 - 8°C. Reactions are controlled at 37°C.	Same
Operating System	LINUX Operating System	Same
Photomultiplier tube used to count the signal in the chemiluminescent methods	❖ Contains a faceplate ❖ Contains a photocathode ❖ Contains an anode at end	Same

Differences for Dimension® EXL™ with LM with new PMT and Dimension® EXL™ with LM:

Feature	**Device: Dimension® EXL™ with LM with new PMT**	**Predicate: Dimension® EXL™ with LM (k073604)**
Photomultiplier tube used to count the signal in the chemiluminescent methods	Vendor: Hamamatsu Multiplier channel: multiple dynodes	Vendor: Excelitas Multiplier channel: Enhanced Glass Single Surface Tube

Similarities and Differences for Dimension® FT4L Flex® reagent cartridge:

Feature	Device: Dimension® FT4L Flex® reagent cartridge	Predicate: Dimension® FT4L Flex® reagent cartridge (k073604)
Intended Use	The FT4L method is an *in vitro* diagnostic test for the quantitative measurement of Free Thyroxine in human serum and plasma on the Dimension® EXL™ with LM system. Measurements of free thyroxine are used in the diagnosis and monitoring of thyroid disease.	Same
Assay Range	0.1-8.0 ng/dL	Same
Sample Type	Human serum and plasma	Same
Technology	LOCI® technology	Same
Sample size	10 µL	Same
Reagents and antibody	There are three (3) reagents- Streptavidin sensibeads, T3 Chemibeads and FT4 biotinylated antibody (containing mouse monoclonal antibody)	Same

5.11 Standard/Guidance Document Reference

- Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline (EP09-A2)
- Evaluation of Precision Performance of Quantitative Measurement Methods: Approved Guideline (EP5-A2)
- In Vitro Diagnostic Devices: Guidance for the Preparation of 510(k) Submissions – Jan. 1997
- Format for Traditional and Abbreviated 510(k)'s – Guidance for Industry and Staff – Nov. 17, 2005 Guidance for Industry and FDA Staff: Administrative Procedures for CLIA Categorization – May 7, 2008

5.12 Performance Characteristics

5.12.1 Method Comparison

The FT4L method was evaluated on the Dimension® EXL™ with LM system with new PMT and the Dimension® EXL™ with LM system with the current photomultiplier tube (CPM). Remnant de-identified human serum samples were tested. No patient history information was obtained on these samples. Inclusion/exclusion data criteria are not applicable. None of the samples were spiked.

These studies were conducted internally by Siemens Healthcare Diagnostic Inc. R & D organization personnel. The personnel conducting the study were laboratory technicians with training similar to personnel who would conduct the tests in a hospital laboratory setting. They were trained on the operation of both the device and the predicate device. A split sample method comparison, following EP09-A2, demonstrated good agreement between the Dimension EXL FT4L method with the Dimension® EXL™ with LM system with new PMT and the predicate Dimension® EXL™ with LM system with the current photomultiplier tube. Only those patient results that were within the assay range were included in this analysis.

Forty five patient samples across the FT4L assay range were tested on both platforms. The results were analyzed by Passing Bablok and linear regression statistics. The correlation coefficient was obtained by linear regression. Although the samples were tested in duplicate, only the first result was used for the analysis.

Method	Range (ng/mL)	Slope (95% CI)	Intercept ng/dL (95% CI)	Correlation Coefficient (std linear regression)	n
FT4L (Passing Bablok)	0.23 – 7.78	0.99 (0.96 – 1.01)	-0.03 (-0.07 – 0.00)	Not applicable	45
FT4L (linear regression)	0.23 – 7.78	0.97	0.00	0.998	45

The model equation for the regression statistics is: [results for Dimension® EXL™ with LM system with new PMT] = slope x [Dimension® EXL™ with LM system with current PMT] + intercept.

5.12.2 Precision

Precision testing was performed in accordance with CLSI EP5-A2 Evaluation of Precision Performance of Quantitative Measurement Methods: Approved Guideline – Second Edition. Samples consisted of three (3) commercial quality controls (BioRad Liquichek Immunoassay

QC) and two (2) patient serum pools. Testing was performed over twenty (20) days, one (1) run per day for each test material on the Dimension EXL with LM systems with both the new and the current PMT. Analysis of variance (ANOVA) was used to evaluate the data consistent with the recommendations of EP5-A2. The acceptance criteria are as follows or must be determined to be substantially equivalent to the predicate device.

FT4L target concentration (ng/dL)	BioRad QC EXL LOCI Module Concentration (ng/dL)	Repeatability (CV %)	With-in Lab (CV %)
0.6 ± 0.2 (0.4-0.8)*	0.859-1.29	≤ 5.0	≤ 7.0
1.5 ± 0.4 (1.1-1.9)	1.68-2.52	≤ 3.0	≤ 5.0
4.0 ± 2.0 (2.0-6.0)	3.86-5.78	≤ 3.0	≤ 5.0

*Note: The values obtained for BioRad Liquicheck Immunoassay QC Level 1 (mean of 0.89 and 0.91) are slightly higher than the target concentration of 0.4-0.8 ng/mL, but are consistent with the QC concentration for the EXL LOCI module of 1.0 ng/mL.

The precision observed is within the acceptance criteria for all 3 target concentrations.

The data are summarized in the following tables:

Current PMT FT4L assay

		Repeatability		With-in Lab	
Sample	**Mean (ng/dL)**	**SD (pg/mL)**	**%CV**	**SD (pg/mL)**	**%CV**
Quality Control - BioRad Liquichek Immunoassay lot number 40780					
Level 1	0.91	0.02	2.5	0.03	3.0
Level 2	2.39	0.06	2.4	0.08	3.0
Level 3	7.01	0.10	2.5	0.03	3.0
Patient Pools (serum)					
Pool 1	1.18	0.03	2.5	0.03	3.0
Pool 2	3.86	0.07	1.7	0.08	2.0

New PMT FT4L assay

		Repeatability		With-in Lab	
Sample	**Mean (ng/dL)**	**SD (pg/mL)**	**%CV**	**SD (pg/mL)**	**%CV**
Quality Control - BioRad Liquichek Immunoassay lot number 40780					
Level 1	0.89	0.02	2.0	0.03	3.4
Level 2	2.44	0.05	1.9	0.07	2.8
Level 3	6.85	0.10	1.5	0.17	2.4
Patient Pools (serum)					
Pool 1	1.17	0.02	1.7	0.03	2.7
Pool 2	3.93	0.06	1.6	0.07	1.7

5.13 Traceability

Calibrator Traceability:

USP-grade thyroxine is spiked into stripped human serum at different concentrations. This becomes the "Anchor Pool". The "Anchor Pool" values are validated in-house.

A Master Pool is developed from stripped bovine albumin to which different concentrations of thyroxine have been added. Values for the Master Pool are derived by multiple analyses against the Anchor Pool calibration curve. LOCI® Thyroid Calibrator value assignment is established by measurement against the Master Pool calibration.

5.14 Conclusion

Regression analysis of a split sample comparison of the FT4L assay with Dimension ® EXL™ with LM with both the new and the current PMT gave a correlation coefficient of 0.998, a slope of 0.99 and an intercept of -0.03 ng/dL when tested with 45 patient sample ranging from 0.23-7.78 ng/dL. This demonstrates that the Dimension® EXL™ with LM system with new PMT and the FT4L assay are substantially equivalent in principle and performance to the Dimension® EXL™ with LM system and the FT4L assay cleared under k073604.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
Document Control Center – WO66-G609
Silver Spring, MD 20993-0002

March 22, 2013

Siemens Healthcare Diagnostics, Inc.
c/o Pamela A. Jurga
500 GBC Drive, M/S 514
P. O. Box 6101
Newark, DE 19714-6101

Re: k130276
Trade/Device Name: Dimension® FT4L Flex reagent cartridge,
Dimension® EXL™ with LM System
Regulation Number: 21 CFR 862.1695
Regulation Name: Free thyroxine test system
Regulatory Class: II
Product Code: CEC, JJE
Dated: February 4, 2013
Received: February 5, 2013

Dear Ms. Jurga:

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); 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.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please go to http://www.fda.gov/AboutFDA/CentersOffices/CDRH/CDRHOffices/ucm115809.htm for the Center for Devices and Radiological Health's (CDRH's) Office of Compliance. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR 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.

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) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours,

Carol C. Benson -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

Indications for Use

510(k) Number (if known): k130276

Device Name: Dimension® EXL™ with LM system
Dimension® FT4 Flex® reagent cartridge

Indications for Use:

The Dimension® EXL™ with LM system is an *in vitro* diagnostic device that is intended to measure a variety of analytes in human body fluids. The system utilizes photometric, turbidimetric, chemiluminescence and integrated ion selective multisensor technology for chemical and immunochemical applications for clinical use.

The FT4L method is an *in vitro* diagnostic test for the quantitative measurement of Free Thyroxine in human serum and plasma on the Dimension® EXL™ with LM system. Measurements of free thyroxine are used in the diagnosis and monitoring of thyroid disease.

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

(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE OF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostics and Radiological Health (OIR)

Ruth A. Chesler -S

Division Sign-Off
Office of In Vitro Diagnostics and Radiological Health

510(k) k130276