

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION MEMORANDUM
ASSAY AND INSTRUMENT **COMBINATION** TEMPLATE**

A. 510(k) Number:

k143720

B. Purpose for Submission:

Modification of a previously cleared device – Change in the photomultiplier tube (PMT) for the Dimension Vista 1500 System.

C. Measurand:

Mass creatine kinase MB isoenzyme (MMB)

D. Type of Test:

Quantitative

E. Applicant:

Siemens Healthcare Diagnostics, Inc.

F. Proprietary and Established Names:

Dimension Vista MMB Assay (Mass creatine kinase MB isoenzyme)

Dimension Vista 1500 System

G. Regulatory Information:

1. Regulation section:

21 CFR 862.1215, Creatine phosphokinase/creatinase or isoenzymes test system

21 CFR 862.2160, Discrete photometric chemistry analyzer for clinical use

2. Classification:

Class II

Class I

3. Product code:

JHY

JJE

4. Panel:

Chemistry (75)

H. Intended Use:

1. Intended use(s):

See Indication(s) for use below.

2. Indication(s) for use:

Dimension Vista MMB Assay:

The MMB method is an *in vitro* diagnostic test for the quantitative measurement of mass creatine kinase MB isoenzyme (EC 2.7.3.2) in human serum and plasma on the Dimension Vista System for confirmation of acute myocardial infarction.

Dimension Vista 1500 System:

The Siemens Healthcare Diagnostics Dimension Vista 1500 System is an *in vitro* diagnostic device intended to duplicate manual analytical procedures such as pipetting, mixing, heating, and measuring spectral intensities to determine a variety of analytes in human body fluids. Dimension Vista chemical and immunochemical applications use photometric, turbidimetric, chemiluminescence, nephelometric and integrated ion-selective multisensory technology for clinical use.

3. Special conditions for use statement(s):

For prescription use only

4. Special instrument requirements:

Performance data was obtained using the Dimension Vista 1500 System.

I. Device Description:

The Dimension Vista MMB Assay is available as a prepackaged Flex cartridge for use on the Dimension Vista 1500 System. Each cartridge contains biotinylated monoclonal antibody, mass creatine kinase MB isoenzyme Chemibeads, Streptavidin Sensibeads, and

assay buffer.

The Dimension Vista 1500 System is a floor model, fully automated, microprocessor-controlled, integrated instrument system that uses prepackaged Flex reagent test cartridges to measure a variety of analytes in human body fluids. The system is a multi-functional analytical tool that processes chemical and immunochemical methodologies, utilizing photometric, turbidimetric, chemiluminescence, nephelometric, and integrated ion selective multisensory detection technologies for clinical use. The Dimension Vista 1500 System can analyze up to 1500 tests/hour (typical, depending on the method mix) using a variety of analytical detection capabilities.

J. Substantial Equivalence Information:

1. Predicate device name(s):

Dimension Vista MMB Assay

Dimension Vista 1500 Integrated System

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

k970343

k051087

3. Comparison with predicate:

Similarities and Differences		
Item	Candidate Device Dimension Vista MMB Flex Assay on the Dimension Vista 1500 System	Predicate Dimension Vista MMB Flex Assay (k970343, k051087)
Intended Use	The MMB method is an <i>in vitro</i> diagnostic test for the quantitative measurement of mass creatine kinase MB isoenzyme (EC 2.7.3.2) in human serum and plasma on the Dimension Vista System for confirmation of acute myocardial infarction.	Same
Assay Range	1 – 300 ng/mL	0.5 – 300 ng/mL
Sample Type	Human serum and plasma	Same
Technology	LOCI technology	Same
Sample Size	5 µL	Same
Reagents and antibody	Biotinylated monoclonal	Same

Similarities and Differences		
Item	Candidate Device Dimension Vista MMB Flex Assay on the Dimension Vista 1500 System	Predicate Dimension Vista MMB Flex Assay (k970343, k051087)
	antibody, mass creatine kinase MB isoenzyme Chemibeads, Streptavidin Sensibeads, assay buffer	
Instrument	Dimension Vista 1500 System Photomultiplier tube - multiplier channel: multiple dynodes Updated component area network	Dimension Vista 1500 Integrated System Photomultiplier tube - multiplier channel: enhanced glass single surface tube

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

CLSI EP09-A2 “Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline”

CLSI EP05-A2 “Evaluation of Precision Performance of Quantitative Measurement Methods: Approved Guideline”

CLSI EP-6A “Evaluation of Linearity of Quantitative Measurement Procedures: a Statistical approach”

CLSI EP17-A2 “Evaluation of Detection Capability for Clinical Laboratory Measurement Procedures; Approved Guideline – Second Edition”

L. Test Principle:

The MMB method is a homogeneous sandwich chemiluminescent immunoassay based on LOCI technology. LOCI reagents include two synthetic bead reagents and a biotinylated anti-mass creatine kinase MB isoenzyme monoclonal antibody fragment. The first bead reagent (Sensibeads) is coated with streptavidin and contains photosensitive dye. The second bead reagent (Chemibeads) is coated with a second anti-mass creatine kinase MB isoenzyme monoclonal antibody and contains chemiluminescent dye. The samples are incubated with Chemibeads and biotinylated antibody to form a bead-mass creatine kinase MB isoenzyme-biotinylated antibody sandwich. The Sensibeads are added and bind to the biotin to form bead-pair immunocomplexes. Illumination of the complex by light 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 a direct function of the mass creatine kinase MB isoenzyme concentration in the sample.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. *Precision/Reproducibility:*

Reproducibility testing was conducted in accordance with the CLSI Guideline EP5-A2. Testing included three levels of commercially available quality control material at normal, cut-off, and abnormal CK-MB concentrations and two patient plasma pools spiked with method calibrator to normal and abnormal CK-MB concentrations. For each test level, a single test from two independent cups was analyzed twice per day for 20 days with 1 reagent lot and 3 instruments.

Material	Mean ng/mL	Repeatability (within-run)		Within-Lab Precision	
		SD	%CV	SD	%CV
QC1	8.66	0.15	1.72	0.22	2.59
QC2	24.13	0.36	1.50	0.56	2.30
QC3	70.73	0.91	1.28	1.27	1.80
Plasma Pool 1	3.26	0.15	4.71	0.19	5.99
Plasma Pool 2	6.15	0.15	2.45	0.21	3.40

b. *Linearity/assay reportable range:*

Linearity across the assay range (1 to 300 ng/mL) was confirmed according to CLSI Guideline EP6-A. A sample containing a high concentration of MMB was serially diluted with the zero level calibrator to produce 10 test samples ranging from 0 to 313.5 ng/mL. Each dilution was assayed in replicates of 5. Data were analyzed using linear regression analysis. A summary of the linearity data is presented below.

Range of Samples	Slope	Intercept	Correlation Coefficient.	n
0–313.5ng/mL	1.004	0.170	0.999	10

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

Dimension Vista MMB Calibrators (liquid, bovine serum albumin based products containing human heart CK-MB isoenzyme) were previously cleared in k970336.

d. Detection limit:

Detection limit studies were carried out according to CLSI EP17-A2.

For the limit of blank (LOB), 4 zero level calibrator samples were tested over 3 days on 2 reagent lots at 5 replicates per day for a total of 60 measurements per lot.

The limit of detection (LOD) and limit of quantitation (LOQ) were determined using a patient serum sample pool diluted to 5 levels targeted to fall between 0.5 and 3.6 ng/mL. 8 replicates per day were run over 5 days with 2 lots for a total of 40 measurements per lot. The LOD and the LOQ were calculated based on within-laboratory precision profiles according to CLSI EP17-A2. The LOQ corresponds to a within-laboratory imprecision coefficient of variation of $\leq 20\%$ at a MMB concentration of ≤ 1.0 ng/mL.

Results are shown below:

LOB = 0.4 ng/mL

LOD = 0.8 ng/mL

LOQ = 1.0 ng/mL

These studies support a low end for the assay measuring range of 1.0 ng/mL - .

e. Analytical specificity:

Specificity studies were performed as described in k970343. None of the substances tested showed significant interference with the MMB assay. Since there were no changes to the MMB assay antibody or concentration of the antibody conjugates, specificity testing was not repeated.

f. Assay cut-off:

Not applicable.

2. Comparison studies:

a. Method comparison with predicate device:

The Dimension MMB assay was evaluated on the proposed Dimension Vista 1500 System with new PMT and compared to the Dimension MMB assay on the predicate Dimension Vista 1500 Integrated System with the current photomultiplier tube. One hundred eleven (111) de-identified, natural human serum and plasma samples were assayed in duplicate across the assay range; however, only the first result was used in each analysis.

Method	Predicate Sample Range Analyzed (ng/mL)	Slope (95% CI)	Intercept ng/mL (95% CI)	Correlation Coefficient (standard linear regression)	n
MMB (Passing Bablok)	1.0 – 274.0	0.99 (0.98 – 0.99)	-0.16 (-0.20 – -0.10)	Not applicable	111
MMB (linear regression)	1.0 – 274.0	0.97	0.64	0.999	111

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:

A literature-based clinical cut-off can be found in the labeling.

5. Expected values/Reference range:

A reference range of 0.5 – 3.6 ng/mL in serum was determined in k970343 as the central 95% in a population of 257 healthy adults ages 19-75. The labeling includes the

following statement: Each laboratory should establish its own expected values for mass creatine MB isoenzyme as performed on the Dimension Vista System.

N. Instrument Name:

Dimension Vista 1500 System

O. System Descriptions:

1. Modes of Operation:

Does the applicant's device contain the ability to transmit data to a computer, webserver, or mobile device?

Yes or No

Does the applicant's device transmit data to a computer, webserver, or mobile device using wireless transmission?

Yes or No

2. Software:

FDA has reviewed applicant's Hazard Analysis and software development processes for this line of product types:

Yes or No

3. Specimen Identification:

Previously described in k051087.

4. Specimen Sampling and Handling:

Previously described in k051087.

5. Calibration:

Previously described in k051087.

6. Quality Control:

Previously described in k051087.

P. Other Supportive Instrument Performance Characteristics Data Not Covered In The “Performance Characteristics” Section above:

Not applicable.

Q. Proposed Labeling:

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

R. Conclusion:

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