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

A. 510(k) Number:

k051650

B. Purpose for Submission:

Modification to Indications for Use and Intended Use of Dade Behring Stratus® CS CKMB, troponin I and myoglobin assays to add: This method is for use by trained health care professionals in the clinical laboratory and point of care (POC) settings. CKMB and myoglobin assays renamed to Acute Care™ CKMB and Acute Care™ MYO.

C. Measurand:

MB isozyme of Creatine Kinase (CKMB)

Troponin I

Myoglobin

D. Type of Test:

Two-site sandwich immunoassay

E. Applicant:

Dade Behring Inc.

F. Proprietary and Established Names:

Stratus® CS Acute Care™ MB isoenzyme of creatine kinase (CKMB) TestPak

Stratus® CS Acute Care™ CKMB CalPak

Stratus® CS Acute Care™ CKMB DilPak

Stratus® CS Acute Care™ Troponin I (cTnI) TestPak

Stratus® CS Acute Care™ cTnI CalPak

Stratus® CS Acute Care™ cTnI DilPak

Stratus® CS Acute Care™ Myoglobin (MYO) TestPak

Stratus® CS Acute Care™ MYO CalPak

Stratus® CS Acute Care™ MYO DilPak

G. Regulatory Information:

1. Regulation section:

   21 CFR 862.1215, Creatine phosphokinase/creatine kinase or isoenzymes test system

   21 CFR 866.5680, Myoglobin immunological test system

   21 CFR 862.1150, Calibrator

2. Classification:

   Class II

3. Product code:

   JHX, Fluorometric method, CPK or isoenzymes

   MMI, Immunoassay Method, Troponin Subunit

   DDR, Myoglobin, antigen, antiserum, control

   JIT, Calibrator, Secondary

4. Panel:

   Chemistry (75)

   Immunology (82)

H. Intended Use:

1. Intended use(s):

   See Indications for Use

2. Indication(s) for use:

   CKMB

The Stratus® CS Acute Care™ CKMB method is an *in vitro* diagnostic test for the measurement of the MB isoenzyme of creatine kinase (ATP:Creatine N-Phosphostransferase, E.C. No. 2.7.3.2) in heparinized plasma. Measurements of CKMB are used in the diagnosis and treatment of myocardial infarction and muscle diseases such as progressive, Duchenne-type muscular dystrophy. This method is for use by trained health care professionals in the clinical laboratory and point of care (POC) settings.

The Stratus® CS Acute Care™ CKMB Calibrator (CKMB CalPak) is an *in vitro* diagnostic product intended to be used for calibration of the Stratus® CS Acute Care™ CKMB method.

The Stratus® CS Acute Care™ CKMB Dilution Pak (CKMB DilPak) is an *in vitro* diagnostic product intended to be used in conjunction with the Acute Care™ CKMB TestPak for the measurement of samples with elevated levels of CKMB.

Troponin I

The Stratus® CS Acute Care™ Troponin I method (cTnI) is an *in vitro* diagnostic assay for the measurement of cardiac troponin I in heparinized plasma. Cardiac troponin I measurements can be used as an aid in the diagnosis of acute myocardial infarction (AMI). Cardiac troponin I can also be used as an aid in the risk stratification of patients with acute coronary syndromes (ACS) with respect to their relative risk of mortality. This method is for use by trained health care professionals in the clinical laboratory and point of care (POC) settings.

The Stratus® CS Acute Care™ Troponin I Calibrator (cTnI CalPak) is an *in vitro* diagnostic product intended to be used for calibration of the Stratus® CS Acute Care™ Troponin I method.

The Stratus® CS Acute Care™ Troponin I Dilution Pak (cTnI DilPak) is an *in vitro* diagnostic product intended to be used in conjunction with the Acute Care™ cTnI TestPak for the measurement of samples with elevated levels of cardiac troponin I.

Myoglobin

The Stratus® CS Acute Care™ Myoglobin method (MYO) is an *in vitro* diagnostic assay for the measurement of myoglobin in heparinized plasma. Measurements of myoglobin aid in the rapid diagnosis of renal or heart disease, e.g. myocardial infarction. This method is for use by trained health care professionals in the clinical laboratory and point of care (POC) settings.

The Stratus® CS Acute Care™ Myoglobin Calibrator (MYO CalPak) is an *in vitro* diagnostic product intended to be used for calibration of the Stratus® CS Acute Care™ myoglobin method.

The Stratus® CS Acute Care™ Myoglobin Dilution Pak (MYO DilPak) is an *in vitro* diagnostic product intended to be used in conjunction with the Acute Care™ MYO TestPak for the measurement of samples with elevated Myoglobin levels.

3. Special conditions for use statement(s):

   Professional use only

4. Special instrument requirements:

   Stratus® CS STAT Fluorometric Analyzer

I. Device Description:

Stratus® CS Acute Care™ MB isoenzyme of creatine kinase (CKMB) TestPak kit contains 100 TestPaks composed of the following reagents: Alkaline phosphatase (calf intestine enzyme) conjugated to anti-CKBB Fab (mouse monoclonal antibody), ACES buffer, sodium azide < 0.1 %, dendrimer linked CKMB antibody (mouse IgG monoclonal), 4-methylumbelliferyl phosphate, diethanolamine buffer.

Stratus® CS Acute Care™ CKMB CalPak is a refrigerated liquid product containing human heart CKMB in a buffered bovine protein matrix with stabilizers and preservative. The kit consists of five CalPaks at a single calibrator level. Each CalPak contains calibrator reagent in three wells.

Stratus® CS Acute Care™ CKMB DilPak is a refrigerated liquid product containing buffered human protein matrix with stabilizers and 0.2 % sodium azide. The kit consists of 5 DilPaks with diluent in one well.

Stratus® CS Acute Care™ Troponin I (cTnI) TestPak kit contains 100 TestPaks composed of the following reagents: Alkaline phosphatase conjugated (calf intestine enzyme) conjugated to anti-cardiac troponin I Fab (mouse monoclonal antibody), buffer, sodium azide < 0.1 %, dendrimer linked cardiac troponin I antibody (mouse IgG monoclonal), 4-methylumbelliferyl phosphate, diethanolamine buffer.

Stratus® CS Acute Care™ cTnI CalPak is a frozen liquid product containing native human troponin complex in a human serum base with < 0.1 % sodium azide. The kit consists of five CalPaks at a single calibrator level. Each CalPak contains calibrator reagent in three wells.

Stratus® CS Acute Care™ cTnI DilPak is a refrigerated liquid product containing phosphate buffer with preservatives including < 0.1 % sodium azide. The kit consists of 5 DilPaks with diluent in one well.

Stratus® CS Acute Care™ Myoglobin (MYO) TestPak kit contains 100 TestPaks composed of the following reagents: Alkaline phosphatase (calf intestine enzyme)

conjugated to anti-MYO Fab (mouse monoclonal antibody), ACES buffer, sodium azide < 0.1 %, dendrimer linked (mouse IgG monoclonal) MYO antibody, 4-methylumbelliferyl phosphate, diethanolamine buffer.

Stratus® CS Acute Care™ MYO CalPak is a refrigerated liquid product containing human heart myoglobin in a bovine albumin matrix with stabilizers and < 0.1 % sodium azide. The kit consists of five CalPaks at a single calibrator level. Each CalPak contains calibrator reagent in three wells.

Stratus® CS Acute Care™ MYO DilPak is a refrigerated liquid product containing buffered bovine protein matrix with stabilizers and 0.2 % sodium azide. The kit consists of 5 DilPaks with diluent in one well.

Human source material was tested and found to be negative/non-reactive for antibodies to HIV-1/2, HBsAg, and HCV.

J. Substantial Equivalence Information:

1. Predicate device name(s):

   Stratus® CS CKMB TestPak and DilPak

   Stratus® CS CKMB CalPak

   Stratus® CS cTnI Acute Care™ TestPak and DilPak

   Stratus® CS cTnI CalPak

   Stratus® CS MYO TestPak and DilPak

   Stratus® CS MYO CalPak

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

Stratus® CS CKMB TestPak and DilPak	k984067
	k981099
Stratus® CS CKMB CalPak	k981097
Stratus® CS cTnI Acute Care™ TestPak and DilPak	k033487
	k984093
	k981098

Stratus® CS cTnI CalPak	k012233
	k983722
	k012233
Stratus® CS MYO TestPak and DilPak	k981102
	k984056
Stratus® CS MYO CalPak	k981101

3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Test principle for CKMB, cTnI and MYO assays	Same	Same
Performance characteristics for CKMB, cTnI and MYO assays	Same	Same
Composition and traceability of CKMB, cTnI and MYO calibrators	Same	Same

Differences		
Item	Device	Predicate
CKMB, cTnI and MYO calibrators	Addition of *Stratus® CS Acute Care* to name	Not applicable
CKMB and MYO assays.	Addition of *Stratus® CS Acute Care* to name (*Acute Care* was added to cTnI assay name in k033487)	Not applicable
Indications for Use for CKMB, cTnI and MYO assays	Addition of: This method is for use by trained health care professionals in the clinical laboratory and point of care (POC) settings.	Not applicable
Reproducibility	Addition of reproducibility data from ED, CCU and Central Laboratory to labeling	Not applicable

Differences		
Item	Device	Predicate
Correlation	Addition of POC data subset regression statistics to labeling	Not applicable

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

CLSI EP5-T2

L. Test Principle:

CKMB

The Stratus® CS Acute Care™ CKMB method is a two-site sandwich assay based upon solid phase Radial Partition Immunoassay (RPIA) technology. Dendrimer linked monoclonal CKMB antibody is added to the center portion of a square piece of glass fiber paper in the CKMB TestPak. Sample is then added onto the paper where it reacts with the immobilized anti-CKMB antibody. After a short incubation, a conjugate consisting of enzyme labeled monoclonal antibody directed against a distinct antigenic site on the B subunit of the CKMB molecule is pipetted onto the reaction zone of the paper. During the second incubation period, enzyme-labeled antibody reacts with the bound CKMB, forming an antibody-antigen-labeled antibody sandwich. The unbound labeled antibody is later eluted from the field of view of the Stratus® CS analyzer by applying a substrate wash solution to the center of the reaction zone. By including substrate for the enzyme within the wash solution, initiation of enzyme activity occurs simultaneously with the wash. The enzymatic rate of the bound fraction increases directly with the concentration of CKMB in the sample. The reaction rate is measured by an optical system that monitors the reaction rate via front surface fluorescence. All data analysis functions are performed by the microprocessor within the analyzer.

Troponin I (cTnI)

The Stratus® CS Acute Care™ Troponin I method is a two-site sandwich assay based upon solid phase Radial Partition Immunoassay (RPIA) technology. Dendrimer linked monoclonal antibody is added to the center portion of a square piece of glass fiber paper in the cTnI TestPak. This antibody recognizes a distinct antigenic site on the cardiac troponin I molecule. Sample is then added onto the paper where it reacts with the immobilized antibody. After a short incubation, a conjugate consisting of enzyme labeled monoclonal antibody directed against a second distinct antigenic site on the cardiac troponin I molecule is pipetted onto the reaction zone of the paper. During the second incubation period, enzyme-labeled antibody reacts with the bound cardiac troponin I, forming an antibody-antigen-labeled antibody sandwich. The unbound labeled antibody is later eluted from the field of view of the Stratus® CS analyzer by applying a substrate wash solution to the center of the reaction zone. By

including substrate for the enzyme within the wash solution, initiation of enzyme activity occurs simultaneously with the wash. The enzymatic rate of the bound fraction increases directly with the concentration of cardiac troponin I in the sample. The reaction rate is measured by an optical system that monitors the reaction rate via front surface fluorescence. All data analysis functions are performed by the microprocessor within the analyzer.

Myoglobin (MYO)

The Stratus® CS Acute Care™ MYO method is a two-site sandwich assay based upon solid phase Radial Partition Immunoassay (RPIA) technology. Dendrimer linked monoclonal antibody is added to the center portion of a square piece of glass fiber paper in the MYO TestPak. This antibody recognizes a distinct antigenic site on the myoglobin molecule. Sample is then added onto the paper where it reacts with the immobilized anti-myoglobin antibody. After a short incubation, a conjugate consisting of enzyme labeled monoclonal antibody directed against a second distinct antigenic site on the myoglobin molecule is pipetted onto the reaction zone of the paper. During the second incubation period, enzyme-labeled antibody reacts with the bound myoglobin, forming an antibody-antigen-labeled antibody sandwich. The unbound labeled antibody is later eluted from the field of view of the Stratus® CS analyzer by applying a substrate wash solution to the center of the reaction zone. By including substrate for the enzyme within the wash solution, initiation of enzyme activity occurs simultaneously with the wash. The enzymatic rate of the bound fraction increases directly with the concentration of myoglobin in the sample. The reaction rate is measured by an optical system that monitors the reaction rate via front surface fluorescence. All data analysis functions are performed by the microprocessor within the analyzer.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

   a. *Precision/Reproducibility:*

      Previously established for predicate devices

   b. *Linearity/assay reportable range:*

      Previously established for predicate devices

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

      Previously established for predicate calibrators. The calibrators (Stratus® CS Acute Care™ CKMB CalPak, Stratus® CS Acute Care™ cTnI CalPak, and Stratus® CS Acute Care™ MYO CalPak) are identical to the predicate calibrators. Labeling changes reflect the name change in addition to minor

format changes.

d. Detection limit:

Previously established for predicate devices

e. Analytical specificity:

Previously established for predicate devices

f. Assay cut-off:

Previously established for predicate devices

2. Comparison studies:

a. Method comparison with predicate device:

Previously established for predicate devices

b. Matrix comparison:

Previously established for predicate devices

3. Clinical studies:

a. Clinical Sensitivity:

Previously established for predicate devices

*b. Clinical specificity**:***

Previously established for predicate devices

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

POC Studies

Method comparison and precision analyses were performed at two external evaluation sites: York Hospital in York, Pennsylvania and Western Pennsylvania Hospital in Pittsburgh, Pennsylvania. At each of the two sites, three Stratus® CS analyzers were installed, one in each of these three different locations: clinical laboratory (LAB), Emergency Department (ED) and Cardiac Care (CCU). The data supports use of these products by trained health professionals in the clinical laboratory and point of care (POC) settings. The following table represents the comparison between the POC sites vs. the

LAB site.

	n	Slope	Intercept	r	Range of samples
CKMB	147	0.95	0.56	0.990	0.3–123.9 ng/mL
cTnI	149	0.99	-0.04	0.990	0.0-43.3 ng/mL
MYO	146	1.01	4.0	0.987	15-829 ng/mL

The following table represents the % CV for total imprecision for the POC sites vs. the LAB site for CKMB. Specimens at each level were analyzed in quadruplicate for 5 runs.

	LAB % CV	CCU	ED
Control Level 1	3.4	6.0	3.5
Control Level 2	4.1	4.8	3.5

The following table represents the % CV for total imprecision for the POC sites vs. the LAB site for cTnI. Specimens at each level were analyzed in quadruplicate for 5 runs.

	LAB % CV	CCU	ED
Control Level 1	4.1	4.5	3.6
Control Level 2	3.7	4.2	3.4

The following table represents the % CV for total imprecision for the POC sites vs. the LAB site for MYO. Specimens at each level were analyzed in quadruplicate for 5 runs.

	LAB % CV	CCU	ED
Control Level 1	4.2	6.9	5.6
Control Level 2	4.6	5.2	4.8

4. Clinical cut-off**:**

   Previously established for predicate devices

5. Expected values/Reference range:

   Previously established for predicate devices

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.