



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

I Background Information:

A 510(k) Number

K191296

B Applicant

MedTest Dx

C Proprietary and Established Names

Pointe Scientific Creatine Kinase (CK) Reagent Set

D Regulatory Information

Product Code(s)	Classification	Regulation Section	Panel
CGS	Class II	21 CFR 862.1215 - Creatine Phosphokinase/ Creatine Kinase Or Isoenzymes Test System	CH - Clinical Chemistry

II Submission/Device Overview:

A Purpose for Submission:

New Device

B Measurand:

Creatine Kinase

C Type of Test:

Quantitative enzymatic colorimetric assay

III Intended Use/Indications for Use:

A Intended Use(s):

See Indications for Use below.

B Indication(s) for Use:

For the quantitative determination of creatine kinase activity in serum and plasma. Rx Only. Measurements of Creatine Kinase are used in the diagnosis and treatment of myocardial infarction and muscle disease, such as progressive Duchenne-type muscular dystrophy.

C Special Conditions for Use Statement(s):

For Prescription Use Only
For In Vitro Diagnostic Use Only

D Special Instrument Requirements:

Mindray BA-800M chemistry analyzer

IV Device/System Characteristics:

A Device Description:

The Pointe Creatine Kinase (CK) Reagent Set consists of ready-to-use liquid reagents:

- CK R1 (buffer) contains: Imidazole buffer (pH 6.7) 100.0 mmol/L; NADP 2.0 mmol/L; HK (Baker's yeast) 2.5 KU/L; Glucose 20.0 mmol/L; Magnesium Acetate 10.0 mmol/L; EDTA 2.0 mmol/L and N-acetylcysteine (NAC) 20.0 mmol/L.
- CK R2 (enzyme reagent) contains: Imidazole buffer (pH 6.7) 100.0 mmol/L; ADP 2.0 mmol/L; AMP 5.0 mmol/L; Diadensosine pentaphosphate 10.0 mmol/L; Creatine phosphate 30.0 mmol/L; G6PDH (Baker's yeast) 1.5 KU/L and EDTA 2.0 mmol/L.

B Principle of Operation:

CK specifically catalyzes the transphosphorylation of ADP to ATP. Through a series of coupled enzymatic reactions, NADPH is produced at a rate directly proportional to the CK activity. The method determines the NADPH absorbance increase per min at 340 nm.

V Substantial Equivalence Information:

A Predicate Device Name(s):

Olympus Creatine Kinase Reagent

B Predicate 510(k) Number(s):

K043202

C Comparison with Predicate(s):

Device & Predicate Device(s):	<u>K191296</u>	<u>K043202</u>
Device Trade Name	Pointe Scientific Creatine Kinase (CK) Reagent Set	Olympus Creatine Kinase Reagent
General Device Characteristic Similarities		
Intended Use/Indications For Use	For the quantitative determination of creatine kinase activity in serum and plasma.	Same
Assay Principle	Quantitative enzymatic colorimetric	Same
Sample type	Serum and lithium heparinized plasma	Same
General Device Characteristic Differences		
Measuring Range	9-1200 U/L	10-2000 U/L

VI Standards/Guidance Documents Referenced:

- 1) CLSI EP05-A3, Evaluation of Precision of Quantitative Measurement Procedures; Approved Guideline—Third Edition
- 2) CLSI EP06-A, Evaluation of the Linearity of Quantitative Measurement Procedures: A Statistical Approach; Approved Guideline
- 3) CLSI EP07-A3, Interference Testing in Clinical Chemistry—Third Edition
CLSI EP17-A2, Protocols for Determination of Limits of Detection and Limits of Quantitation
- 4) CLSI EP34, Establishing and Verifying an Extended Measuring Interval Through Specimen Dilution and Spiking—First Edition

VII Performance Characteristics (if/when applicable):**A Analytical Performance:**1. Precision/Reproducibility:

The precision study was conducted following the recommendations in the CLSI EP05-A3 guideline using one lot of reagents on one Mindray BA-800M analyzer. Two levels of quality controls, three levels of pooled serum samples, and three levels of pooled lithium heparin

plasma samples were tested in duplicate twice per day for twenty days. The precision study results are summarized below:

Sample	N	Mean CK (U/L)	Within-run		Total*	
			SD	%CV	SD	%CV
Control 1	80	134.4	1.2	0.9	2.0	1.5
Control 2	80	265.2	1.4	0.5	4.4	1.7
Serum Level 1	80	88.2	1.5	1.7	3.2	3.6
Serum Level 2	80	288.0	1.8	0.8	8.7	3.8
Serum Level 3	80	691.6	3.2	0.5	10.4	1.5
Plasma Level 1	80	109.2	1.1	1.0	3.8	3.5
Plasma Level 2	80	219.3	1.4	0.6	5.1	2.3
Plasma Level 3	80	686.1	5.8	0.8	13.9	2.0

*Total: a composite of within-run, between-run and between-day imprecision

2. Linearity:

Linearity studies were performed following the recommendations in the CLSI EP06-A guideline. Linearity testing was conducted using a set of 12 serum samples ranging from 9 to 1700 U/L and 12 lithium heparin plasma samples ranging from 8 to 1595 U/L. The samples were prepared by admixture of high-level and low-level sample pools. The dilutions were analyzed in duplicate using two lots of reagent on one Mindray BA-800M. The maximum deviation from linearity observed was 8 %. The linearity study data supports the claimed measuring range of 9 to 1200 U/L.

Dilution Recovery Studies:

The sponsor provided data supporting the claim that values of highly concentrated samples can be accurately determined through dilution. The instructions for use recommend a 1:10 dilution in saline if results fall beyond the linear range of the assay.

3. Analytical Specificity/Interference:

Interference studies were conducted following recommendations in the CLSI EP07-A3 guideline to assess several common endogenous substances that could interfere with the assay. Each interferent was tested with one lot of reagent on one Mindray BA-800M. All interferents were evaluated with serum and lithium heparin plasma samples with CK concentrations ranging from 43.0 to 268.0 U/L. Significant interference was defined as a percent difference greater than 10% from the control. Results are summarized below:

Interferent	Highest Concentration at which no significant interference was observed
Bilirubin (Conjugated and Unconjugated)	60 mg/dL
Ascorbic Acid	500 mg/dL
Hemoglobin	500 mg/dL
Intralipid	1382 mg/dL

4. Assay Reportable Range:

The claimed measuring range is from 9 to 1200 U/L.

5. Traceability, Stability, Expected Values (Controls, Calibrators, or Methods):

Traceability: The Pointe Creatine Kinase Assay is traceable to the IFCC reference method.

6. Detection Limit:

Limits of detection studies were performed following the recommendations in the CLSI EP17-A2 guideline. Each study was performed on one Mindray BA-800M.

The limit of blank (LoB) study analyzed 60 saline samples and was determined as the 95th percentile of the measurements of the blank samples. The LoB was determined to be 2 U/L.

The limit of detection (LoD) was determined using low-level depleted serum and lithium heparin plasma samples per the classical approach described in the CLSI guideline. The LoD was determined to be 4 U/L.

The limit of quantitation (LoQ) describes the lowest amount of creatine kinase that can be determined quantitatively within a defined precision (<20% CV). A series of 5 low activity samples were each run in 8 replicates over a range of 5 days using a single lot of reagent. The LoQ was determined to be 9 U/L.

7. Assay Cut-Off:

Not applicable

B Comparison Studies:

1. Method Comparison with Predicate Device:

Two studies, one comparing serum specimens and one comparing lithium heparin plasma specimens, were performed. For the study using serum samples, a total of 120 deidentified serum samples were tested in duplicate using the candidate device and the predicate device across the assay range of 9–1188 U/L. Of these samples, 4 were altered by mixing two samples together to obtain an analyte level within the measurement range. The first replicate obtained with the candidate and predicate devices for each sample was used in the analysis. Deming regression analysis gave the following equation:

$$Y = 1.041 X - 5.2 \text{ U/L}, r = 0.9991$$

For the study using plasma samples, a total of 123 deidentified lithium heparin plasma samples were tested in duplicate using the candidate device and the predicate device across the assay range of 9–1119 U/L. Of these samples, 2 were altered by mixing two samples together to obtain an analyte level within the measurement range. The first replicate obtained with the candidate and predicate devices for each sample was used in the analysis. Deming regression analysis gave the following equation:

$$Y = 1.032 X - 0.4 \text{ U/L}, r = 0.9946$$

2. Matrix Comparison:

Not applicable. The results from the performance studies described above support the sponsor's claim that human serum and lithium heparin plasma specimens are acceptable sample types to be used with this assay.

C Clinical Studies:

1. Clinical Sensitivity:

Not applicable

2. Clinical Specificity:

Not applicable

3. Other Clinical Supportive Data (When 1. and 2. Are Not Applicable):

Not applicable

D Clinical Cut-Off:

Not applicable

E Expected Values/Reference Range:

This information is the same as for the predicate device. The expected values in an adult population are 30-223 U/L creatine kinase. The labeling also states that the reference range should serve only as a guideline. It is recommended that each laboratory establish its own range of expected values, since differences exist between instruments, laboratories and local populations.

VIII Proposed Labeling:

The labeling supports the finding of substantial equivalence for this device.

IX Conclusion:

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