August 11, 2020

MedTest Dx
William Cripps
Director, R&D, QA/RA
5449 Research Drive
Canton, MI 48188

Re: K191296
Trade/Device Name: Pointe Scientific Creatine Kinase (CK) Reagent Set
Regulation Number: 21 CFR 862.1215
Regulation Name: Creatine phosphokinase/creatine kinase or isoenzymes test system
Regulatory Class: Class II
Product Code: CGS
Dated: July 8, 2020
Received: July 10, 2020

Dear William Cripps:

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. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database located at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. 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 and Part 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803) for devices or postmarketing safety reporting (21 CFR 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

Marianela Perez-Torres, Ph.D.
Acting Deputy Director
Division of Chemistry
and Toxicology Devices
OHT7: Office of In Vitro Diagnostics
and Radiological Health
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 06/30/2020
See PRA Statement below.

510(k) Number *(if known)*
K191296

Device Name
Pointe Scientific Creatine Kinase (CK) Reagent Set

Indications for Use *(Describe)*
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.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

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5. 510(k) SUMMARY (k191296)

This 510(k) Summary of Safety and Effectiveness is being submitted in accordance with the requirements of Safe Medical Device Act of 1990 and 21 CFR 807.92.

a. Device Information

Category	Comments
Sponsor	MedTest Dx 5449 Research Drive Canton, MI 48188 Phone: 734-487-8300 Fax: 734-483-1592
Correspondent Contact Information	William Cripps Director, R&D/RA/QA Email: wcripps@medtestdx.com Phone: 734-487-8300 ext. 120 Fax: 734-483-1592
Device Common Name	Creatine Kinase (CK)
Trade or Proprietary Name	Pointe Scientific Creatine Kinase (CK) Reagent Set
Candidate Device Product Code, Classification, Classification Name & Panel	CGS, Class II, 21 CFR 862.1215 – Nad Reduction/Nadh Oxidation, Cpk Or Isoenzymes, 75 – Clinical Chemistry

Predicate Device Information

Predicate Device	Olympus Creatine Kinase Reagent
Predicate Device Manufacturer	Beckman Coulter, Inc.
Predicate Device Premarket Notification #:	K043202

b. Date Summary Prepared

May 10, 2019
Updated on: October 4, 2019
Updated on: November 8, 2019
Updated on: July 8, 2020
Updated on: August 4, 2020

c. Description of Device

The Pointe Scientific 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.

The kinetic procedure presented is a modification of Szasz of the Rosalki technique, which optimizes the reaction by reactivation of CK activity with N-actyl-L-cysteine (NAC).

Creatine Kinase 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.

d. Intended 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.

e. Comparison to Predicate Device

The chart below illustrates the similarities between the Pointe Scientific Creatine Kinase (CK) Reagent Set and the predicate, Beckman Coulter Creatine Kinase.

Characteristics	Pointe Scientific Creatine Kinase (CK) Reagent Set (Proposed Device)	Beckman Coulter K043202 (Predicate Device)
Intended 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.	For use in the Olympus automated clinical chemistry analyzers for the quantitative determination of creatine kinase activity in human serum and plasma Measurements of Creatine Kinase are used in the diagnosis and treatment of myocardial infarction and muscle disease, such as progressive Duchenne-type muscular dystrophy.
Contents	• 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.	• Final concentration of reactive ingredients: • Imidazole (pH 6.5) 100 mmol/L • HK (Yeast) ≥ 4.0 kU/L (66.7 µkat/L) • NADP 2 mmol/L • G6P-DH (Leuconostoc mesenteroides) ≥ 2.8 kU/L (46.7 µkat/L) • ADP 2 mmol/L • Mg2+ 20 mmol/L • AMP 5 mmol/L • Diadenosine pentaphosphate 10 µmol/L • EDTA 2 mmol/L • Glucose 20 mmol/L • Creatine Phosphate 30 mmol/L • N-Acetylcysteine 0.2 mmol/L • Stabilizers • Also contains preservatives

Principle	The kinetic procedure presented is a modification of Szasz of the Rosalki technique, which optimizes the reaction by reactivation of CK activity with N-actyl-L-cysteine (NAC). 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.	This CK procedure is a modification of the IFCC method. CK reversibly catalyzes the transfer of a phosphate group from creatine phosphate to adenosine diphosphate (ADP) to give creatine and adenosine triphosphate (ATP) as products. The ATP formed is used to produce glucose-6-phosphate and ADP from glucose. This reaction is catalyzed by hexokinase (HK) which requires magnesium ions for maximum activity. The glucose6-phosphate is oxidized by the action of the enzyme glucose-6-phosphate dehydrogenase (G6P-DH) with simultaneous reduction of the coenzyme nicotinamide adenine dinucleotide (NADP) to give NADPH and 6-phosphogluconate. The rate of increase of absorbance at 340/660 nm due to the formation of NADPH is directly proportional to the activity of CK in the sample
Sample Type	Serum and lithium heparin plasma	Serum and heparinized plasma
Measurement Range	9-1200 U/L	10-2000 U/L

Performance Data
All analytical performance studies presented below were performed on the Shenzhen Mindray BA-800M Chemistry Analyzer. All studies were performed using either serum samples collected in serum separator tubes (SST) or plasma collected in lithium heparin tubes.

Method Comparison Study
Two separate split-sample method comparison studies between the Pointe Scientific Creatine Kinase (CK) Reagent Set on the Shenzhen Mindray BA-800M Chemistry Analyzer versus the predicate Beckman Coulter Creatine Kinase (CK-Nac) on the Beckman Coulter Olympus AU400 Clinical Chemistry Analyzer were performed on either serum or plasma samples following CLSI EP09-A2 guidelines using one lot of each of the manufacturer's reagents and a single BA-800M Chemistry analyzer and a single AU400 Clinical Chemistry Analyzer.

a. *Method Comparison with serum:*
A total of 120 deidentified remnant serum samples were obtained from a commercial repository and tested in duplicate across the assay range of 9–1188 U/L. Of these samples, 4 were altered by mixing of two samples together to obtain an analyte level within the measurement range. Samples were analyzed in singlicate. Results using a Deming regression were obtained with EP Evaluator Software. Results from single representative data set are summarized below:

Serum-Serum

Method	Creatine Kinase
N	120
Range (U/L)	9-1188
Standard Deviation	249.5
Regression Analysis	y = 1.041x - 5.2
Correlation Coefficient	0.9991

b. *Method Comparison with plasma:*
A total of 123 deidentified remnant Plasma samples were obtained from a commercial repository and tested in duplicate across the assay range of 9–1119 U/L. Of these samples, 2 were altered by mixing of two samples together to obtain an analyte level within the measurement range. Samples were analyzed in singlicate. Results using a Deming regression were obtained with EP Evaluator Software. Results from single representative data set are summarized below:

Plasma-Plasma

Method	Creatine Kinase
N	123
Range (U/L)	9-1119
Standard Deviation	255.4
Regression Analysis	y = 1.032x - 0.4
Correlation Coefficient	0.9946

Precision Studies

Precision studies were conducted in accordance with CLSI EP05-A3. Samples consisted of two commercial quality controls, three serum pools and three plasma pools. Analyte levels of the tested pools approximated Westgard medical decision points for normal and elevated creatine kinase levels. A third level for each matrix was included above the mid-point of the measurable range for each matrix.

Testing was performed utilizing two lots of the Pointe Scientific Creatine Kinase (CK) Reagent Set on the same Shenzhen Mindray BA-800M Chemistry Analyzer. Pools were tested in duplicate twice per day for a total of 20 days (final *n* per sample = 80). Results from a single representative lot are summarized below.

Matrix	Sample	N	Mean CK (U/L)	Repeatability		Total	
				SD	%CV	SD	%CV
Controls	Control 1	80	134.37	1.22	0.9	1.97	1.5
	Control 2	80	265.18	1.35	0.5	4.39	1.7
Serum	Level 1	80	88.19	1.50	1.7	3.16	3.6
	Level 2	80	288.02	1.79	0.8	8.71	3.8
	Level 3	80	691.63	3.20	0.5	10.40	1.5
Plasma	Level 1	80	109.18	1.12	1.0	3.83	3.5
	Level 2	80	219.33	1.36	0.6	5.05	2.3
	Level 3	80	686.11	5.79	0.8	13.86	2.0

Linearity/Assay Range Study

A linearity study was conducted according to CLSI EP06-A. A set of 12 serum samples ranging from 9 to 1700 U/L or 12 plasma samples ranging from 8 to 1595 U/L were prepared by admixture of high-level and low-level sample pools. Each admixture was analyzed in duplicate using two lots of reagent on the same Shenzhen Mindray BA-800M Chemistry Analyzer.

The results from one representative lot run are summarized below. Acceptable deviation from expected value was set at less than or equal to 10%. The linearity study data supports the claimed range of 9 to 1200 U/L.

Matrix: Serum				**Matrix: Plasma**			
Sample	**Mean Result**	**Expected Result**	**% Recovery**	**Sample**	**Mean Result**	**Expected Result**	**% Recovery**
Low	9	9	100%	Low	8	8	100%
Dil 1	96	94	102%	Dil 1	88	87	102%
Dil 2	145	145	100%	Dil 2	133	135	99%
Dil 3	222	221	100%	Dil 3	196	206	95%
Dil 4	252	263	96%	Dil 4	227	246	93%
Dil 5	423	432	98%	Dil 5	372	404	92%
Dil 6	645	643	100%	Dil 6	595	603	99%
Dil 7	855	855	100%	Dil 7	801	801	100%
Dil 8	1060	1066	99%	Dil 8	1024	999	102%
Dil 9	1254	1277	98%	Dil 9	1206	1198	101%
Dil 10	1448	1489	97%	Dil 10	1455	1396	104%
High	1637	1700	96%	High	1669	1595	105%

Detection Capability

The limit of blank (LoB), limit of detection (LoD), and limit of quantitation (LoQ) were determined for both serum and plasma in accordance to CLSI EP17-A2 suggested guidelines on two lots of Pointe Creatine Kinase (CK) Reagent Sets and a single BA-800M Chemistry Analyzer.

Saline was used as the blank sample for the determination of LoB. Sixty measurements (1 sample X 20 repetitions x 3 days each) were analyzed across two lots of reagent to determine the LoB of the system. Using a non-parametric distribution calculation of LoB, as detailed in CLSI EP17-A2, the limit of blank was determined to be 2 U/L.

For LoD determination, twenty low-level depleted serum samples and twenty depleted plasma samples were analyzed in duplicate across two lots of reagent within a single day. Results were used in conjunction with Limit of Blank results to determine LoD using the equation $LoD=LoB+1.625(SD_{\text{Low Level Samples}})$, per CLSI 17-A2 guidance. Results from one representative lot are presented below.

The LoQ is 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 duplicates over a range of 5 days. Data analysis was performed by EP Evaluator statistical software. The LoQ value was derived from the lowest sample results exhibiting a precision CV of less than 20%.

	Creatine Kinase (U/L)	
	Plasma	Serum
Limit of Blank	2	2
Limit of Detection	4	4
Limit of Quantitation	9	9

Dilution Recovery Studies

Studies were performed to provide evidence that values of highly concentrated samples of creatine kinase outside of the claimed measurement range (9–1200 U/L) can be accurately determined through a 10-fold dilution of the sample (as prescribed in the instruction for use). A dilution recovery study was undertaken utilizing suggested methods from CLSI EP34-E1. Three contrived high-level samples greater than the Pointe Creatine Kinase (CK) Reagent Set's measurement range for both serum and plasma were diluted in physiological saline at dilutions of 1:2; 1:4; 1;10 and 1:12 then subsequently analyzed using two lots of the Pointe Creatine Kinase (CK) Reagent set on the same Shenzhen Mindray BA-800M Chemistry. Results from one representative reagent lot for each matrix type are presented below.

Dilution Factor	Mean (U/L, dilute)	Theoretical Result (U/L)	Calculated Result (U/L)	% recovery
Matrix: Serum				
1:2	1664.5	3686	3329	90
1:4	903	3686	3612	98
1:10	380	3686	3800	103
1:12	322.5	3686	3870	105
Matrix: Plasma				
1:2	1608	3064	3216	105
1:4	832	3064	3328	109
1:10	328.5	3064	3285	107
1:12	266	3064	3192	104

Analytical Specificity (Endogenous Substances)

Interference studies were performed following the recommendation of CLSI EP07-A3. Interference testing was conducted using one lot of reagent and one Mindray BA-800M analyzer. All interferents were evaluated in randomly selected serum and plasma samples ranging from 43 U/L to 268 U/L. Interferents were tested across an evenly spaced range of concentrations. The range of interferent concentrations were derived through admixtures of high and low interferent concentration pools. Significant interference was defined by the sponsor as a percent difference greater than 10% from control.

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

Traceability, Stability, Expected values

Traceability: The Pointe Scientific Creatine Kinase (CK) Assay is traceable to the IFCC reference method.

Stability: The reagent shelf life stability claim is 24 months at 2-8°C. The reagent onboard (in use and refrigerated) stability claim is 29 days.

Expected Values: This information is the same as for the predicate device (k043202). The expected values in an adult population (from 200 blood donors in North Texas) are 30-223 U/L creatine kinase.

Conclusion: Based on the results of the testing conducted, the Pointe Scientific Creatine Kinase (CK) Reagent Set is substantially equivalent to the predicate device, the Olympus Creatine Kinase Reagent (K043202).