

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

**A. 510(k) Number:**

k072548

**B. Purpose for Submission:**

Modification of the reagent from powder form to liquid form

**C. Measurand:**

Creatine Kinase

**D. Type of Test:**

Quantitative, enzymatic

**E. Applicant:**

Teco Diagnostics

**F. Proprietary and Established Names:**

Creatine Kinase Liquid Reagent (Kinetic Method)

**G. Regulatory Information:**

1. Regulation section:

21CFR 862.1215

2. Classification:

Class II

3. Product code:

CGS

4. Panel:

75 (Chemistry)

## **H. Intended Use:**

1. Intended use(s):

See Indication for use below.

2. Indication(s) for use:

The Teco Diagnostics Creatine Kinase liquid reagent is intended for *in vitro* diagnostic test for the quantitative determination of Creatine Kinase activity in human serum.

Measurements of Creatine kinase are used in the diagnosis and treatment of myocardial infarction and muscle diseases such as progressive, Duchenne-type muscular dystrophy.

3. Special conditions for use statement(s):

For prescription use

4. Special instrument requirements:

Beckman Synchron CX analyzer

## **I. Device Description:**

The Teco Diagnostics Creatine Kinase liquid reagent consists of two ready-to-use liquid reagents to be used on the Beckman Synchron CX systems. The reagents contain buffers, preservatives, stabilizers, and the reactive compounds and enzymes listed in Test Principle section below.

## **J. Substantial Equivalence Information:**

1. Predicate device names(s):

Teco Diagnostics Creatine Kinase (CK-NAC) reagent

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

k864744

3. Comparison with predicate:

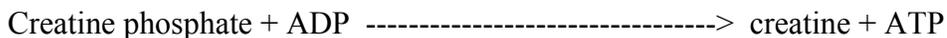
Similarities and Differences		
Item	Teco CK-NAC powder reagent (predicate device)	Teco CK Liquid reagent (candidate device)
Intended Use	Quantitative determination of Creatine Kinase in human serum as an aid in diagnosing muscular dystrophy and other diseases of skeletal muscles, myocardial infarction, hypothyroidism, renal diseases, and/or dysfunction.	Quantitative <i>in vitro</i> diagnostic determination of Creatine Kinase activity in human serum. Measurements of Creatine Kinase are used in the diagnosis and treatment of myocardial infarction and muscle diseases such as progressive, Duchenne-type muscular dystrophy
Methodology	Enzymatic	Same
Instruments	Auto chemistry analyzer/manual	Auto chemistry analyzer
Reagents	Lyophilized	Liquid, ready to use
Sample types	Serum	Serum
Reportable range	Up to 1,200 U/L	7-1100 U/L
Normal range	25-192 IU/L (37°C) 10-109 IU/L (30°C)	23-207 IU/L on the Beckman Synchron CX 7 Delta analyzer

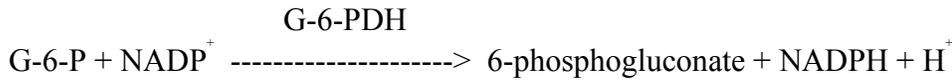
**K. Standard/Guidance Document Referenced (if applicable):**

1. CLSI EP5-A, *Evaluation of Precision Performance of Clinical Chemistry Devices; Approved Guideline.*
2. CLSI EP7-A, *Interference Testing in Clinical Chemistry; Proposed Guideline*
4. CLSI EP9-A2, *Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline Second edition*
5. CLSI EP17-A, *Protocols for Demonstration, Verification, and Evaluation of Limits of Detection and Quantitation: Approved Guideline-2004*

**L. Test Principle:**

The Teco Diagnostics Creatine Kinase Liquid reagent measures Creatine Kinase activity in the sample via the following mechanism:





The rate of formation of NADPH, measured at 340 nm, is directly proportional to serum Creatine Kinase activity.

**M. Performance Characteristics (if/when applicable):**

1. Analytical performance:

a. *Precision/Reproducibility:*

A precision study was performed using three levels of commercial controls following a modification of the CLSI EP5-A. Samples were run 21 times per day for within-run precision and five times per day for 5 days for run-to-run precision on the Beckman Synchron CX7 delta analyzer. Mean, SD, and %CVs were calculated for within-run and run-to-run precision and are shown in the tables below:

Within-run precision on the Beckman Synchron CX 7 delta analyzer:

	Mean (IU/L)	SD (IU/L)	CV% (Within run)
Control Level 1	51	1.1	2.1
Control Level 2	226	1.6	0.7
Control Level 3	539	2.7	0.5

Run-to-run precision on the Beckman Synchron CX 7 delta analyzer:

	Mean (IU/L)	SD (IU/L)	CV% (Between run)
Control Level 1	50	1.2	2.4
Control Level 2	229	5.6	2.5
Control Level 3	539	5.1	1.0

b. *Linearity/assay reportable range:*

A linearity study was performed using a commercially available linearity set and mixing a high level (1406 U/L) and a lower level (955 U/L) to achieve a pool sample of CK concentrations of 1255 U/L. This pool sample was then serially diluted with water to obtain 10 different concentrations (1046, 837, 628, 418, 209, 105, 52, 26, 13.1, 6.54U/L) of CK. Each concentration was tested in duplicate to determine the mean concentration on the Synchron CX 7 delta analyzer. Values were plotted for the expected concentrations (X) versus the observed concentrations (Y) and an

appropriate line fitted by standard linear regressions was calculated as follows:

$$Y = 0.9997X + 6.3353, r^2 = 0.9996.$$

The data provided supports the sponsor's claim that the assay has a linearity/reportable range of 7-1100 IU/L.

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

There is no calibration required for this assay. The sponsor stated that this assay is traceable to the IFCC reference method.

A real-time stability study is still on-going to evaluate the shelf-life of the reagent. An accelerated stability study was performed to support the shelf-life claim of the reagent for 18 months. On-board stability (open vial) of the reagents was evaluated and the studies support an on-board stability claim of 7 days when stored at 2-8°C.

*d. Detection limit:*

A detection limit study was performed to assess the detection limit of the Creatine Kinase liquid reagent. The study was performed based on the CLSI EP17-A guideline. One blank sample and three low level samples were assayed 6 times a day for four days on the Synchron CX7 Delta analyzer. The limit of detection (LoD) is defined as the concentration that can be distinguished from zero with 95% confidence. The sponsor claims that the calculated limit of detection (LoD) for this assay is 5.5 IU/L.

*e. Analytical specificity:*

An interference study was conducted to determine the effect of common interferents based on the CLSI EP7-A guidelines. Two levels of serum controls with different CK activity (100, 300 IU/L) were tested on the Synchron CX7 Delta analyzer. The following interferents were tested: bilirubin, hemoglobin, and cholesterol. Stock solutions of the above chemicals were prepared and spiked into the tested samples with different concentrations. The % bias was calculated based on the differences between the spiked sample and the control sample. Non-interference was defined as <10% bias. Results of the interference studies of various potential interferents are shown as follows:

Bilirubin: Interference  $\leq$  6% for up to 15mg/dL bilirubin

Hemoglobin: Interference  $\leq$  8% for up to 500 mg/dL hemoglobin

Cholesterol: Interference  $\leq$  2% for up to 1000 mg/dL cholesterol

The sponsor stated the following limitation in the package insert:

“Certain drugs and medications may affect the activity of CK, see Young, et al.”

f. *Assay cut-off:*

Not applicable

2. Comparison studies:

a. *Method comparison with predicate device:*

A method comparison study was performed using 97 patient serum samples. In order to cover the entire analytical range, 11 samples were either diluted or spiked. All testing were performed using the Synchron CX 7 Delta analyzer. Results from the Creatine Kinase Liquid reagent (candidate device) were compared with the Creatine Kinase powder reagent (predicate device). The results obtained yielded a correlation coefficient and a regression equation as follows:

$Y = 1.001X + 1.417, r = 0.9995$ , samples ranged tested from 7- 1015 IU/L.

X= Creatine Kinase powder reagent (predicate device)

Y= Creatine Kinase Liquid reagent (candidate device)

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:

Not applicable

5. Expected values/Reference range:

A reference range study was conducted using 138 normal adults in California according to the CLSI C28-A guideline. The patient samples include 36 females and 102 males

between the ages of 21 and 72 years old. Serum samples were assayed by the Creatine Kinase liquid reagent on the Synchron CX 7 Delta analyzer. The reference range, determined as the range of all observed values in this population, was determined to be 23-207 IU/L.

**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.