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

A. 510(k) Number:

k061775

B. Purpose for Submission:

New device

C. Measurand:

Creatinine

D. Type of Test:

Enzymatic colorimetric

E. Applicant:

Wako Chemicals USA, inc.

F. Proprietary and Established Names:

Wako L-Type Creatinine-M Test

Wako Creatinine Calibrator

G. Regulatory Information:

1. Regulation section:

    Creatinine Test: section 862.1225

    Calibrator: section 862.1150

2. Classification:

    Class II

3. Product code:

    Enzymatic Method, Creatinine (JFY)

Calibrator, secondary (JIT)

4. Panel:

Clinical Chemistry (75)

H. Intended Use:

1. Intended use(s):

See indication(s) for use.

2. Indication(s) for use:

The L-Type Creatinine-M is an in-vitro assay for the quantitative determination of creatinine in serum, plasma, and urine. Creatinine measurements are used in the diagnosis and treatment of renal diseases, in monitoring renal dialysis, and as a calculation basis for measuring other urine analytes.

3. Special conditions for use statement(s):

For professional use only

4. Special instrument requirements:

Hitachi 917

I. Device Description:

The Wako L-Type Creatinine-M Test is a two reagent system for use on an automated analyzer such as the Hitachi 917. Both reagents contain enzymes with stabilizers and/or buffers. The test is calibrated by using a calibrator with values determined by using enzymatic reagents and SRM914a (NIST) creatinine standard material as the primary standard. The calibrator matrix is an aqueous solution containing pH, viscosity, and specific gravity adjustors.

J. Substantial Equivalence Information:

1. Predicate device name(s):

Wako Creatinine HA and Creatinine Standard Solution

Roche Diagnostics Creatinine Plus

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

    k842847, k003261

3. Comparison with predicate:

Similarities and Differences		
Item	Wako L-Type Creatinine-M	Wako Creatinine HA k842847
Method	HMMPS-method, end point assay	Jaff'e Method, rate assay
Storage	Store at 2-10°C	Store at 2-25°C
Linearity	0.2-100 mg/dL in serum/plasma 1.0-200 mg/dL in urine	0-24 mg/dL
LLD	0.06 mg/dL in urine and 0.03 mg/dL in serum/plasma	0.0 mg/dL
Calibrator	Creatinine Calibrator	Creatinine Standard Solution
Sample type	Serum, plasma, urine	Serum

The device is similar to the Roche Creatinine Plus assay in intended use and matrices measured.

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

CLSI EP5-A: Evaluation of Precision Performance of Clinical Chemistry Devices; Approved Guideline

CLSI EP17-A: Protocols for Determination of Limits of Detection and Limits of Quantitation; Approved Guideline

L. Test Principle:

Creatinine present in samples is acted upon by creatininase, creatinase, sarcosine oxidase, and HMMPS to form a blue pigment. The creatinine concentration is obtained by measuring the absorbance of the blue pigment.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

    a. *Precision/Reproducibility:*
        Within run precision was evaluated by testing 3 serum and 3 urine samples in one run 21 times. The results are summarized below.

Sample#	Replicates	Mean(mg/dL)	CV(%)
Serum1	21	0.84	2.38
Serum2	21	7.16	0.42
Serum3	21	96.58	0.43
Urine1	21	23.74	0.51
Urine2	21	102.49	0.42
Urine3	21	180.67	0.68

Total Precision was evaluated following CLSI EP-5A by performing two runs per day, with each run testing 3 serum and 3 urine samples in duplicate for 21 days. The results are summarized below.

Sample#	Replicates	Mean(mg/dL)	CV(%)
Serum4	21	1.26	1.59
Serum5	21	7.22	0.88
Serum6	21	95.14	0.40
Urine4	21	24.13	0.50
Urine5	21	104.36	0.37
Urine6	21	184.45	0.42

b. *Linearity/assay reportable range:*
High level creatinine samples were created by spiking creatinine into pooled serum and urine samples at concentrations 10% to 20% above the upper end of the measuring ranges. These samples were then sequentially diluted with low level serum and urine samples, respectively. Both the serum and urine samples had measured results within ±10% of the expected values. A slope close to 1 and correlation coefficient of 0.99 was calculated for both the serum and urine linearity samples. These results demonstrated that with this assay the measurement of creatinine is linear in the range of 0.2 mg/dL to 100 mg/dL in serum or plasma and 1.0 mg/dL to 200 mg/dL in urine.

c. *Traceability, Stability, Expected values (controls, calibrators, or methods):*
The creatinine calibrator value is traceable to NIST SRM914a. The assigned value of the calibrator is determined by enzymatic methods.

The calibrators are stable until the expiration date when stored at 2 – 10°C. Once opened the calibrator is stable for 3 months when tightly recapped and stored in the original container at 2 – 10°C.

d. *Detection limit:*
The limit of detection was determined at outlined in CLSI EP-17A. The limit of detection was determined to be 0.06 mg/dL in urine and 0.03 mg/dL in serum/plasma.

e. *Analytical specificity:*
   Interfering compounds were evaluated by spiking various concentrations of the interferants into a creatinine sample and comparing the results of the interferent spiked samples with an unspiked creatinine reference sample. Non-interference was defined as a recovery of 90% - 110% of the unspiked reference sample. The highest concentration of each compound that did not interfere is shown below.

Interfering compound	Maximum concentration tested
Hemoglobin	500 mg/dL
Bilirubin	50 mg/dL
Conjugated Bilirubin	40 mg/dL
Intralipid	5%
Ascorbic Acid	50 mg/dL
Creatine	50 mg/dL
EDTA	0.5%
Sodium Citrate	2.0%
Ammonium Oxalate	0.8%
Sodium Fluoride	2.0%
Heparin Sodium	0.5%

f. *Assay cut-off:*
   Not Applicable

2. Comparison studies:

a. *Method comparison with predicate device:*
   The sponsor compared 60 serum samples ranging from 0.60 to 99.32 mg/dL creatinine to the predicate device. Linear regression produced a slope of 1.05, a y-intercept of -0.35 , and a correlation coefficient of 0.999.

   The sponsor also compared 60 urine samples ranging from 30.44 to 197.01 mg/dL creatinine to the predicate device. Linear regression produced a slope of 0.99, a y-intercept of 1.24, and a correlation coefficient of 0.999.

b. *Matrix comparison:*
   A method comparison was performed using the L-Type creatinine method with 60 matched serum-plasma samples ranging in concentration from 0.48 to 98.51 mg/dL creatinine (in serum). Linear regression produced a slope of 1.00, a y-intercept of -0.04, and a correlation coefficient of 0.999.

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. <u>Clinical cut-off</u>**:**
   Not Applicable

5. <u>Expected values/Reference range:</u>
   The sponsor cites the following reference ranges for serum from DG Klinische Chemie (1995) Volume 29, 205-224:

   Adult Male: 0.62 - 1.09 mg/dL

   Adult Female: 0.45 – 0.75 mg/dL

   The sponsor cites the following reference ranges for urine from Ann Clin Biochem 1992, Volume 29, 525-528:

   Adult Male: 1070 – 2150 mg/day

   Adult Female: 764 -1200 mg/day

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.