SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY TEMPLATE

A. 510(k) Number:

k113389

B. Purpose for Submission:

New device

C. Measurand:

Urea Nitrogen (BUN)
Creatinine
Uric acid
Creatinine Kinase

D. Type of Test:

Quantitative, photometric/ colorimetric detection

E. Applicant:

Alfa Wassermann Diagnostic Technologies, LLC

F. Proprietary and Established Names:

ACE BUN/ Urea Reagent
ACE Creatinine Reagent
ACE Uric Acid Reagent
ACE CK Reagent

G. Regulatory Information:

Analyte	Regulation	Product Code	Classification	Panel
BUN	21 CFR 862.1770 Urea nitrogen test system	CDN	II	Clinical Chemistry (75)
Creatinine	21 CFR 862.1225 Creatinine test system	CGX	II	Clinical Chemistry (75)
Uric Acid	21 CFR 862.1775 Uric acid test system	KNK	I. reserved	Clinical Chemistry (75)

CK	21 CFR 862.1215 Creatine phosphokinase / creatine kinase or isoenzymes	CGS	II	Clinical Chemistry (75)

H. Intended Use:

1. Intended use(s):

   See indication for use below

2. Indication(s) for use:

   The ACE BUN/Urea Reagent is intended for the quantitative determination of blood urea nitrogen (BUN) concentration in serum using the ACE Axcel Clinical Chemistry System. BUN measurements are used in the diagnosis and treatment of certain renal and metabolic diseases. This test is intended for use in clinical laboratories or physician office laboratories. For *in vitro* diagnostic use only.

   The ACE Creatinine Reagent is intended for the quantitative determination of creatinine concentration in serum using the ACE Axcel Clinical Chemistry System. 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. This test is intended for use in clinical laboratories or physician office laboratories. For *in vitro* diagnostic use only.

   The ACE Uric Acid Reagent is intended for the quantitative determination of uric acid concentration in serum using the ACE Axcel Clinical Chemistry System. Uric acid measurements are used in the diagnosis and treatment of numerous renal and metabolic disorders, including renal failure, gout, leukemia, psoriasis, starvation or other wasting conditions and of patients receiving cytotoxic drugs. This test is intended for use in clinical laboratories or physician office laboratories. For *in vitro* diagnostic use only.

   The ACE CK Reagent is intended for the quantitative determination of creatine kinase activity in serum using the ACE Axcel Clinical Chemistry System. Measurement of creatine kinase is used in the diagnosis and treatment of myocardial infarction and muscle diseases such as progressive, Duchenne-type muscular dystrophy. This test is intended for use in clinical laboratories or physician office laboratories. For *in vitro* diagnostic use only.

3. Special conditions for use statement(s):

   For in vitro diagnostic use only

   For prescription use and Point-of-Care settings

4. Special instrument requirements:

ACE Axcel Clinical Chemistry System

I. Device Description:

The ACE BUN/Urea Reagent consists of a single reagent bottle containing α-Ketoglutarate (4.0 mmol/L), Urease (Jack Bean) >15,000 U/L, Glutamate dehydrogenase (GLDH) (Beef Liver) >1667 U/L, Adenosine diphosphate (ADP) 2.0 mmol/L, Nicotinamide adenine dinucleotide, reduced (NADH) 0.28 mmol/L, buffer, preservative and stabilizer.

The ACE Creatinine Reagent consists of two reagent bottles, the Sodium Hydroxide Reagent and Picric Acid Reagent. The Sodium Hydroxide Reagent (R1) contains Sodium Hydroxide 0.25 mol/L and surfactants. The Picric Acid Reagent (R2) contains Picric Acid 20.5 mmol/L.

The ACE Uric Acid Reagent consists of a single reagent bottle containing 4-Aminoantipyrine (AAP) 0.5 mmol/L, Dichlorohydroxybenzene sulfonic acid (DHBS) 1.8 mmol/L, Peroxidase (Horseradish) > 3500 U/L, Uricase (Bacillus) > 200 U/L and stabilizers and preservatives.

The ACE CK Reagent consists of two reagent bottles, Buffer and Substrate. The Buffer Reagent (R1) contains Imidazole Buffer (pH 6.5 at 25°C), Glucose 27 mmol/L, N-acetylcysteine 27 mmol/L, Magnesium acetate 14 mmol/L, EDTA 2 mmol/L, NADP 2.7 mmol/L, Hexokinase (recombinant yeast, modified) >5 KU/L. The Substrate Reagent (R2) contains Creatine phosphate 160 mmol/L, EDTA 2 mmol/L, ADP 11 mmol/L, AMP 28 mmol/L, Diadenosine pentaphosphate 55 µmol/L and Glucose-6-phosphate dehydrogenase (E coli) >14 KU/L.

J. Substantial Equivalence Information:

1. Predicate device name(s):
   ACE BUN/Urea Reagent
   ACE Creatinine Reagent
   ACE Uric Acid Reagent
   ACE CK Reagent

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

   k930104

3. Comparison with predicate:

	ACE BUN/Urea Reagent (Candidate device)	ACE BUN/Urea Reagent (Predicate device, k930104)
Intended Use/Indications for use	The ACE BUN Reagent is intended for the quantitative determination of blood urea nitrogen concentration in serum. BUN measurements are used in the diagnosis and treatment of certain renal and metabolic diseases.	Same
Instrument/ Platform	ACE Axcel Clinical Chemistry System	ACE Clinical Chemistry Systems
Calibration Stability	7 days	Same
On- Board Stability	30 days	Same
Basic Principle	Enzymatic method for urea nitrogen	Same
Sample Stability	2-5 days at 2-8^{o}C up to several weeks at -20°C; and at -70°C or lower for longer periods	Same
Unopened Stability	until the expiration date shown on the box and bottle labels when stored in the refrigerator at 2-8^{o}C	Same

	ACE Creatinine Reagent (Candidate device)	Ace Creatinine Reagent (Predicate, k930104)
Intended Use/Indications for use	The ACE Creatinine Reagent is intended for the quantitative determination of creatinine concentration in serum. 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.	Same
Instrument/ Platform	ACE Axcel Clinical Chemistry System	ACE' Clinical Chemistry System

Calibration Stability	2 days	Same
On- Board Stability	10 days	Same
Basic Principle	Alkaline picrate chemistry.	Same
Sample Stability	7 days at 2-8^{o}C; 3 month at -20°C	Same
Unopened Stability	until the expiration date shown on the box and bottle labels when stored in the refrigerator at 2-8^{o}C	Same

	ACE Uric Acid Reagent (Candidate device)	ACE Uric Acid Reagent (Predicate, k930104)
Intended Use/Indications for use	The ACE Uric Acid Reagent is intended for the quantitative determination of uric acid concentration in serum. Uric acid measurements are used in the diagnosis and treatment of numerous renal and metabolic disorders, including renal failure, gout, psoriasis, starvation or other wasting conditions and of patients receiving cytotoxic drugs.	Same
Instrument/ Platform	ACE Axcel Clinical Chemistry System,	ACE Clinical Chemistry System
Calibration & On- Board Stability	30 days	Same
Basic Principle	Coupled Enzymatic method	Same
Sample Stability	3-5 days at 2-8^{o}C 6 months below -20°C.	Same
Unopened Stability	Until the expiration date shown on the box and bottle labels when stored in the refrigerator at 2-8^{o}C	Same

	ACE CK Reagent (Candidate device)	ACE CK Reagent (Predicate, k930104)

Intended Use/ Indications for use	The ACE CK Reagent is intended for the quantitative determination of creatine kinase activity in serum. Measurement of creatine kinase is used in the diagnosis and treatment of myocardial and muscle diseases s such as progressive, Duchenne-type muscular dystrophy.	Same
Instrument/ Platform	ACE Axcel Clinical Chemistry System	ACE Clinical Chemistry System
Basic Principle	Conversion of creatine phosphate to creatine and ATP enzymatically coupled to the formation of NADPH	Same
Sample Stability	4 hours at room temperature 48 hours at -8 ^{0}C 20 days below -20°C.	Same
Unopened Stability	until the expiration date shown on the box and bottle labels when stored in the refrigerator at 2-8 ^{0}C	Same

K. Standard/Guidance Document Referenced :

CLSI EP6-A Evaluation of the Linearity of Quantitative Measurement Procedures: A Statistical Approach (2003)
CLSI EP5-A2 Evaluation of Precision Performance of Quantitative Measurement Methods; Second Edition (2004)
CLSI EP7-A2 Interference Testing in Clinical Chemistry; Approved Guideline; Second Edition (2005)
CLSI EP10-A3 Preliminary Evaluation of Quantitative Clinical Laboratory Measurement Procedures - Third Edition (2006)
CLSI EP9-A2-IR Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline- Second Edition (2002)
CLSI EPI 17-A Protocol for Determination of Limits of Detection; Second Edition (2004)

L. Test Principle:

The ACE BUN/Urea Reagent is a photometric assay in which urea in serum is hydrolyzed by urease to yield ammonia and carbon dioxide, the ammonia formed subsequently reacts with 2-oxoglutarate and NADH in the presence of glutamate dehydrogenase (GLDH) to yield glutamate and NAD. NADH absorbs strongly at 340 nm, whereas NAD^+ does not. The decrease in absorbance of NADH at 340 nm is proportional to the urea concentration in the sample.

The ACE Creatinine Reagent is a photometric assay based on Jaffe reaction, in which serum creatinine reacts with picric acid in an alkaline medium to form a red-orange colored complex, which absorbs strongly at 505 nm. The rate of complex formation is determined by the increase of absorbance at 505 nrn/573 nm during a fixed time interval; this rate is directly proportional to the creatinine concentration in the sample.

The ACE Uric Acid Reagent is based on a photometric assay in which serum uric acid is oxidized by uricase to allantoin and hydrogen peroxide, which subsequently reacts to coupled chromogen dichlorohydroxybenzene sulfonic acid (DHBS) and 4-aminoantipyrine (AAP) in a reaction catalyzed by peroxidase and produces a red colored quinoneimine complex; which are measured by the increase in absorbance at 505 nm/610 nm.

The ACE CK Reagent is a coupled enzymatic reaction in which serum creatine kinase (CK) first catalyzes the conversion of creatine phosphate and adenosine diphosphate (ADP) to creatine and ATP. Subsequently, hexokinase (HK) uses the ATP produced to phosphorylate D-glucose to form D-glucose-6-phosphate and ADP. In the final reaction, the enzyme glucose-6-phosphate dehydrogenase (G-6-PDH) uses D-glucose-6-phosphate to convert nicotinamide adenine dinucleotide phosphate (NADP+) into NADPH, absorbs strongly at 340 nm. The rate of conversion of NADP+ to NADPH, which is a function of the activity of CK in the sample, is determined by monitoring the increase in absorbance at 340 nm/378 nm.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

   a. Precision/Reproducibility:

   In-House: ACE BUN/Urea Reagent
   Four serum samples (three serum based pool and one normal human serum sample), were tested on one ACE Axcel Clinical Chemistry System two times per run, two runs per day, for a total of 20 or more days. The results are summarized in the table below:

Sample 1 Mean 15.9 mg/dL BUN	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.5	0.0	0.6	0.7
Coefficient of Variation	2.9%	0.0%	3.5%	4.6%

Sample 2 Mean 52.7 mg/dL BUN	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.7	0.4	1.7	1.9
Coefficient of Variation	1.3%	0.7%	3.3%	3.6%

Sample 3 Mean 87.6 mg/dL BUN	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.9	1.0	2.7	3.0
Coefficient of Variation	1.1%	1.2%	3.1%	3.5%

Sample 4 Mean 8.0 mg/dL BUN	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.3	0.0	0.2	0.3
Coefficient of Variation	3.3%	0.0%	2.7%	4.3%

Point of Care Laboratory: ACE BUN/Urea Reagent

Three serum based samples were tested on three ACE Axcel Clinical Chemistry Systems (one at each POL site) at least three times per run, one run per day, for a total of 5 days. The mean, standard deviations and % coefficients of variation (CV) were calculated for each sample.

BUN/Urea			Within-Run		Total	
Lab	Sample	Mean (mg/dL)	SD	%CV	SD	%CV
POL 1	1	14.8	0.0	0.0%	0.4	3.0%
POL 2	1	16.1	0.3	1.9%	0.5	3.4%
POL 3	1	15.1	0.4	2.6%	0.8	5.2%
POL 1	2	48.9	0.3	0.6%	1.7	3.5%
POL 2	2	52.9	0.4	0.8%	1.7	3.2%
POL 3	2	49.2	0.6	1.2%	1.5	3.1%
POL 1	3	82.3	0.5	0.6%	2.6	3.2%
POL 2	3	87.7	0.5	0.6%	2.9	3.3%
POL 3	3	83.1	0.8	1.0%	4.1	4.9%

In-House: ACE Creatinine Reagent

Four serum samples, three serum based pool and one normal human serum sample, were tested on one ACE Axcel Clinical Chemistry System two times per run, two runs per day, for a total of 22 days. The results are summarized in the table below:

Sample 1 Mean 1.005 mg/dL Creatinine	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.053	0.000	0.029	0.060
Coefficient of Variation	5.3%	0.0%	2.8%	6.0%

Sample 2 Mean 8.366 mg/dL Creatinine	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.109	0.158	0.132	0.233
Coefficient of Variation	1.3%	1.9%	1.6%	2.8%

Sample 3 Mean 15.868 mg/dL Creatinine	Within Run	Between Run	Between Day	Total

Standard Deviation, mg/dL	0.224	0.132	0.350	0.436
Coefficient of Variation	1.4%	0.8%	2.2%	2.7%

Sample 4 Mean 0.556 mg/dL Creatinine	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.054	0.009	0.000	0.054
Coefficient of Variation	9.6%	1.6%	0.0%	9.8%

Point of Care Laboratory: ACE Creatinine Reagent

Four serum based samples, three serum-based pools and one normal human serum pool were tested on three ACE Axcel Clinical Chemistry Systems (one at each POL site) at least three times per run, one run per day, for a total of 5 days. The mean, standard deviations and % coefficients of variation (CV) were calculated for each sample.

Creatinine			Within-Run		Total	
Lab	Sample	Mean (mg/dL)	SD	%CV	SD	%CV
POL 1	1	1.000	0.038	3.8%	0.040	4.0%
POL 2	1	0.941	0.048	5.1%	0.058	6.1%
POL 3	1	0.967	0.032	3.3%	0.051	5.3%
POL 1	2	8.469	0.120	1.4%	0.222	2.6%
POL 2	2	8.639	0.115	1.3%	0.179	2.1%
POL 3	2	8.215	0.094	1.1%	0.200	2.4%
POL 1	3	16.262	0.254	1.6%	0.486	3.0%
POL 2	3	16.485	0.175	1.1%	0.367	2.2%
POL 3	3	15.773	0.144	0.9%	0.334	2.1%

In-House: ACE Uric Acid Reagent

Four serum samples, (three serum based pool and one normal human serum sample), were tested on one ACE Axcel Clinical Chemistry System two times per run, two runs per day, for a total of 22 days. The results are summarized in the table below:

Sample 1 Mean 2.90 mg/dL Uric Acid	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.14	0.00	0.06	0.16
Coefficient of Variation	4.9%	0.0%	2.1%	5.4%

Sample 2 Mean 7.74 mg/dL Uric Acid	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.18	0.00	0.08	0.20
Coefficient of Variation	2.4%	0.0%	1.1%	2.6%

Sample 3 Mean 12.34 mg/dL Uric Acid	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.23	0.00	0.10	0.25
Coefficient of Variation	1.8%	0.0%	0.8%	2.0%

Sample 4 Mean 4.02 mg/dL Uric Acid	Within Run	Between Run	Between Day	Total
Standard Deviation, mg/dL	0.10	0.08	0.08	0.15
Coefficient of Variation	2.6%	2.0%	2.0%	3.8%

Point of Care Laboratory: ACE Uric Acid Reagent

Four serum based samples, three serum-based pools and one normal human serum pool were tested on three ACE Axcel Clinical Chemistry Systems (one at each POL site) at least three times per run, one run per day, for a total of 5 days. The mean, standard deviations and % coefficients of variation (CV) were calculated for each sample.

Uric Acid			Within-Run		Total	
Lab	Sample	Mean (mg/dL)	SD	%CV	SD	%CV
POL 1	1	2.74	0.12	4.4%	0.14	5.2%
POL 2	1	2.95	0.09	3.0%	0.09	3.0%
POL 3	1	2.84	0.10	3.6%	0.10	3.6%
POL 1	2	7.65	0.15	2.0%	0.17	2.2%
POL 2	2	7.69	0.29	3.8%	0.29	3.8%
POL 3	2	7.78	0.14	1.8%	0.14	1.8%
POL 1	3	12.45	0.19	1.5%	0.29	2.3%
POL 2	3	12.53	0.26	2.1%	0.26	2.1%
POL 3	3	12.55	0.23	1.8%	0.23	1.8%

In-House: ACE CK Reagent

Four serum samples, three serum based pool and one normal human serum sample, were tested on one ACE Axcel Clinical Chemistry System two times per run, two runs per day, for a total of 22 days. The results are summarized in the table below:

Sample 1 Mean 84.9 U/L Creatine Kinase	Within Run	Between Run	Between Day	Total
Standard Deviation, U/L	2.5	0.0	0.7	2.6
Coefficient of Variation	2.9%	0.0%	0.8%	3.0%

Sample 2 Mean 658.8 U/L Creatine Kinase	Within Run	Between Run	Between Day	Total
Standard Deviation, U/L	11.5	0.0	6.1	13.0
Coefficient of Variation	1.7%	0.0%	0.9%	2.0%

Sample 3 Mean 1182.9 U/L Creatine Kinase	Within Run	Between Run	Between Day	Total
Standard Deviation, U/L	13.4	10.3	9.1	19.2
Coefficient of Variation	1.1%	0.9%	0.8%	1.6%

Sample 4 Mean 99.1 U/L Creatine Kinase	Within Run	Between Run	Between Day	Total
Standard Deviation, U/L	5.2	0.0	1.6	5.4
Coefficient of Variation	5.2%	0.0%	1.6%	5.5%

Point of Care Laboratory: ACE CK Reagent

Four serum based samples, three serum-based pools and one normal human serum pool were tested on three ACE Axcel Clinical Chemistry Systems (one at each POL site) at least three times per run, one run per day, for a total of 5 days. The mean, standard deviations and % coefficients of variation (CV) were calculated for each sample.

Creatine Kinase			Within-Run		Total	
Lab	Sample	Mean (U/L)	SD	%CV	SD	%CV
POL 1	1	82.1	2.2	2.7%	2.2	2.7%
POL 2	1	86.8	2.4	2.8%	3.9	4.5%
POL 3	1	83.6	1.4	1.7%	1.9	2.2%
POL 1	2	618.3	23.0	3.7%	29.5	4.8%
POL 2	2	659.4	9.6	1.5%	20.8	3.2%
POL 3	2	636.4	15.5	2.4%	15.7	2.5%
POL 1	3	1123.0	20.4	1.8%	21.1	1.9%
POL 2	3	1170.5	26.7	2.3%	3.6	3.1%
POL 3	3	1153.5	15.3	1.3%	18.1	1.6%

b. Linearity/assay reportable range:

ACE BUN/ Urea Reagent

Linearity studies were carried out using dilutions of a spiked serum samples. Twelve concentrations were prepared by mixing spiked serum samples in known proportion with saline. All samples were measured in triplicate. The sample range tested was 0.03 to 100.3 mg/dL. The linear regression between the expected values and the measured values yield the following correlations:

Claimed Measuring Range	Intercept	Slope	r^2
2 to 100 mg/dL	1.4	0.994	0.9984

Based on the linearity data, the measuring range claimed from 2 to 100 mg/dL was supported.

ACE Creatinine Reagent

Linearity studies were carried out using dilutions of a spiked serum samples. Fourteen concentrations were prepared by mixing spiked serum samples in known proportion with saline. All samples were measured in triplicate. The sample range tested was 0.12 to 24.75 mg/dL. The linear regression between the expected values and the measured values yield the following correlations:

Claimed Measuring Range	Intercept	Slope	r^2
0.23 to 25.0 mg/dL	0.05	0.990	0.9996

Based on the linearity data, the measuring range claimed from 0.23 to 25.0 mg/dL was supported.

ACE Uric Acid Reagent

Linearity studies were carried out using dilutions of a spiked serum samples. Fourteen concentrations were prepared by mixing spiked serum samples in known proportion with saline. All samples were measured in triplicate. The sample range tested was 0.43 to 17.43 mg/dL. The linear regression between the expected values and the measured values yield the following correlations:

Claimed Measuring Range	Intercept	Slope	r^2
1.2 to 16.0 mg/dL	-0.16	0.968	0.9964

Based on the linearity data, the measuring range claimed from 1.2 to 16.0 mg/dL was supported

ACE CK Reagent

Linearity studies were carried out using dilutions of a spiked serum samples. Eight concentrations were prepared by mixing spiked serum samples in known proportion with saline. All samples were measured in triplicate. The sample range tested was 3.5 to 1547.5 U/L. The linear regression between the expected values and the measured values yield the following correlations:

Claimed Measuring Range	Intercept	Slope	r^2
11 to 1350 U/L	-0.363	0.9987	0.9997

Based on the linearity data, the measuring range claimed from 11 to 1350 U/L was supported.

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

Traceability:

GEMCAL Reference Serum is traceable to NIST SRM 909 for BUN and uric acid and IDMS traceable to the NIST SRM 967 for creatinine.

For ACE CK reagent, enzyme activity (in IU/L) is determined directly by multiplying the absorbance change per minute of the unknown sample by a factor (10956) derived from the molar absorptivity of NADPH.

On-Board stability:

On-board stability studies were performed for all reagents by the sponsor. The stability protocols and acceptance criteria were reviewed and determined to be adequate. All ACE reagents in this submission demonstrated the on-board stability as stated in the table below when stored in the ACE Axcel reagent chamber (at 10-14°C**)** with Evap-Caps.

Reagent	ACE Axcel On-Board Stability (Days)
BUN	30
Creatinine	10
Uric Acid	30
Creatinine Kinase	25

d. Detection limit:

Detection limit studies (LoB, LoD, and LoQ) were performed in accordance with CLSI Guidance Document EP17-A. For LoB and LoD, testing was carried out using

blanks and low samples (total of 60 replicates each sample) over three days on two ACE Axcel Clinical Chemistry Systems. LoQ testing was performed using 5 low samples (total of 40 replicates for each sample). A curve was fit to estimate the relationship between the measured value and the %CV. LoQ is defined as the lowest concentration for which the imprecision %CV is ≤ 20%.

The sponsor's claimed detection limits for the four analytes are summarized below:

Reagent	Limit of Blank (LoB)	Limit of Detection (LoD)	Limit of Quantification (LoQ)
BUN	0.9 mg/dL	1.1 mg/dL	1.9 mg/dL
Creatinine	0.14 mg/dL	0.19 mg/dL	0.23 mg/dL
Uric Acid	0.97 mg/dL	1.13 mg/dL	1.2 mg/dL
CK	3.2 U/L	3.5 U/L	10.6 U/L

The sponsor's claimed measuring range for BUN is 2 to 100 mg/dL, for creatinine is 0.23 to 25.0 mg/dL, for uric acid is 1.2 to 16.0 mg/dL, and for CK is 11 to 1350 U/L.

e. Analytical specificity:

ACE BUN/ Urea Reagent

Interference studies were performed by using two serum pools containing 20 mg/dL and 50 mg/dL BUN with individual interferents at a range of concentrations. The sera were assayed for BUN (n = 3 replicates) and the mean result calculated. Interference was considered to be significant by the sponsor if the analyte recovery changed by ± 10%. The results reported were obtained on the ACE Axcel Clinical Chemistry System analyzer.

Interferent	No Significant Interference At or Below:
Unconjugated Bilirubin	54 mg/dL
Hemolysis	1000 mg/dL
Lipemia (Intralipid)	1000 mg/dL
Ascorbic Acid	6 mg/dL

ACE Creatinine Reagent

Interference studies were performed by using two serum pools containing 1 mg/dL and 9 mg/dL creatinine with individual interferents at a range of concentrations. The sera were assayed for creatinine (n = 3 replicates) and the mean result calculated. Interference was considered to be significant by the sponsor if the analyte recovery

changed by ± 10%. The results reported were obtained on the ACE Axcel Clinical Chemistry System analyzer.

Interferent	No Significant Interference At or Below:
Unconjugated Bilirubin	6.2 mg/dL
Hemolysis	500 mg/dL
Lipemia (Intralipid)	1000 mg/dL
Ascorbic Acid	6 mg/dL

ACE Uric Acid Reagent

Interference studies were performed by using two serum pools containing 4 mg/dL and 11 mg/dL uric acid with individual interferents at a range of concentrations. The sera were assayed for uric acid (n = 3 replicates) and the mean result calculated. Interference was considered to be significant by the sponsor if the analyte recovery changed by ± 10%. The results reported were obtained on the ACE Axcel Clinical Chemistry System analyzer.

Interferent	No Significant Interference At or Below:
Unconjugated Bilirubin	32 mg/dL
Hemolysis	62.5 mg/dL
Triglycerides	325 mg/dL
Ascorbic Acid	1.34 mg/dL

The sponsor has the following limitation in the labeling due to hemoglobin interference, "Hemolyzed samples cannot be used. Use clear, unhemolyzed sample."

For ascorbic acid, the following limitation was noted in the labeling: *" Ascorbic acid concentrations as low as 1.3 mg/dL have been shown to interfere with this assay. Non-fasting patients taking a high dose of vitamin C may cause low uric acid levels and results should be interpreted with caution."*

ACE CK Reagent

Interference studies were performed by using two serum pools containing 100 U/L and 600 U/L creatine kinase with individual interferents at a range of concentrations. The sera were assayed for creatine kinase (n = 3 replicates) and the mean result calculated. Interference was considered to be significant by the sponsor if the analyte recovery changed by ± 10%. The results reported were obtained on the ACE Axcel

Clinical Chemistry System analyzer.

Interferent	No Significant Interference At or Below:
Unconjugated Bilirubin	28 mg/dL
Hemolysis	125 mg/dL
Lipemia (Intralipid)	1000 mg/dL
Ascorbic Acid	6 mg/dL

The sponsor has the following limitation in the labeling due to hemoglobin interference, *"Hemolyzed samples cannot be used. Use clear, unhemolyzed sample."*

f. Assay cut-off:

Not applicable

2. Comparison studies:

Studies were carried out according to CLSI EP09-A2-IR.

In house: ACE BUN/ Urea Reagent

One hundred thirteen serum samples were assayed in parallel by both the candidate and predicate methods. The results were analyzed by using Deming regression. The range tested was 4 to 96 mg/dL. Altered samples were included in the study (no more than 10%).

The comparison by Deming regression resulted in a slope of 1.012 (95%CI = 0.995 to 1.028), an intercept of 0.2 (95%CI = -0.3 to 0.6), correlation coefficient (R^2) = 0.9963, and a standard error of 1.5.

Point of Care Laboratory: ACE BUN/ Urea Reagent

Serum samples were assayed in parallel by both the candidate and predicate methods at three POC sites. The results were analyzed by using Deming regression. (Some altered samples were used among all three sites.)

POL	n	Range	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept

1	59	4-97	y = 0.996x - 0.3	0.9988	1.0	0.983 to 1.009	-0.7 to 0.1
2	50	2-100	y = 1.022x + 0.6	0.9982	1.6	1.003 to 1.038	-0.1 to 1.2
3	45	3-98	y = 1.020x + 1.1	0.9987	1.1	1.004 to 1.036	0.5 to 1.6

In house: ACE Creatinine Reagent

One hundred thirty six serum samples were assayed in parallel by both the candidate and predicate methods. The results were analyzed by using Deming regression. The range tested was 0.28 to 22.95 mg/dL. Altered samples were included in the study (no more than 10%).

The comparison by Deming regression resulted in a slope of 0.979 (95%CI = 0.975 to 0.983), an intercept of - 0.006 (95%CI = -0.022 to 0.010), correlation coefficient (R^2) = 0.9998, and a standard error of 0.082.

Point of Care Laboratory: ACE Creatinine Reagent

Serum samples were assayed in parallel by both the candidate and predicate methods at three POC sites. The results were analyzed by using Deming regression. (Some altered samples were used among all three sites.)

POL	n	Range	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept
1	62	0.34-24.29	y = 1.022x - 0.036	0.9998	0.123	1.016 to 1.027	-0.072 to 0.001
2	68	0.47-22.98	y = 0.969x - 0.040	0.9995	0.129	0.961 to 0.976	-0.077 to -0.004
3	52	0.65-22.28	y = 1.006x - 0.073	0.9994	0.192	0.996 to 1.015	-0.136 to -0.009

In house: ACE Uric acid Reagent

One hundred and six serum samples were assayed in parallel by both the candidate and predicate methods. The results were analyzed by using Deming regression. The range tested was 1.7 to 15.9 mg/dL. Altered samples were included in the study (no more than 10%).

The comparison by Deming regression resulted in a slope of 1.042 (95%CI = 1.023 to 1.060), an intercept of - 0.06 (95%CI = -0.18 to 0.07), correlation coefficient (R^2) = 0.9958, and a standard error of 0.23.

Point of Care Laboratory: ACE Uric acid Reagent

Serum samples were assayed in parallel by both the candidate and predicate methods at three POC sites. The results were analyzed by using Deming regression. (Some altered samples were used among all three sites.)

POL	n	Range	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept
1	52	1.4-15.6	y = 1.024x - 0.11	0.9961	0.25	0.998 to 1.050	-0.28 to 0.05
2	72	2.1-13.6	y = 1.013x - 0.02	0.9858	0.44	0.972 to 1.053	-0.31 to 0.28
3	45	2.4-15.8	y = 1.026x - 0.08	0.9961	0.22	0.998 to 1.054	-0.27 to 0.11

In house: ACE CK Reagent

One hundred nineteen serum samples were assayed in parallel by both the candidate and predicate methods. The results were analyzed by using Deming regression. The range tested was 16 to 1345 U/L. Altered samples were included in the study (no more than 10%).

The comparison by Deming regression resulted in a slope of 1.016 (95%CI = 1.009 to 1.023), an intercept of - 0.1 (95%CI = -2.6 to 2.4), correlation coefficient (R^2) = 0.9994, and a standard error of 10.6.

Point of Care Laboratory: ACE CK Reagent

Serum samples were assayed in parallel by both the candidate and predicate methods at three POC sites. The results were analyzed by using Deming regression. (Some altered samples were used among all three sites.)

POL	n	Range	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept

1	62	28-1325	y = 1.048x - 2.9	0.9997	10.9	1.041 to 1.055	-6.4 to 0.6
2	46	21-1165	y = 1.044x - 3.0	0.9997	5.9	1.036 to 1.052	-5.2 to -0.8
3	48	15-1281	y = 0.996x + 0.9	0.9997	7.2	0.988 to 1.003	-1.8 to 3.5

3. Clinical studies:

   Not applicable

4. Clinical cut-off**:**

   Not applicable

5. Expected values/Reference range:

   BUN: 6-20 mg/dL

   Creatinine:
   Male: 0.9-1.3 mg/dL
   Female: 0.6-1.1 mg/dL

   Uric acid:
   Male: 3.5 - 7.2 mg/dL
   Female: 2.6 - 6.0 mg/dL

   CK:
   Male: 38 - 174 U/L
   Female: 26 - 140 U/L

   Reference: Tietz N.W..*Clinical Guide to Laboratory Tests* 3rd Ed (W.B. Saunders, 1995)

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.