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

A. 510(k) Number:

k103615

B. Purpose for Submission:

New device

C. Measurand:

Urea nitrogen, calcium, creatinine, phosphorus in urine

D. Type of Test:

Colorimetric, photometric and enzymatic

E. Applicant:

Alfa Wasserman Diagnostic Technologies LLC

F. Proprietary and Established Names:

ACE Urea Nitrogen Reagent

ACE Calcium Arsenazo Reagent

ACE Creatinine Reagent

ACE Inorganic Phosphorus U.V. Reagent

ACE Urine Standard

G. Regulatory Information:

Name	Regulation	Product Code	Classification
Urease, Photometric, Urea Nitrogen	21 C.F.R. § 862.1770	CDN	II
Azo Dye, Calcium	21 C.F.R. § 862.1145	CJY	II
Alkaline Picrate, Colorimetry, Creatinine	21 C.F.R. § 862.1225	CGX	II

Phosphomolybdate (Colorimetric), Inorganic Phosphorus	21 C.F.R. § 862.1580	CEO	Class I reserved
Calibrator, Multianalyte Mixture	21 C.F.R. § 862.1150	JIX	II

Panel: Clinical Chemistry (75)

H. Intended Use:

1. Intended use(s):

   See indications for use below.

2. Indication(s) for use:
   The ACE Urea Nitrogen Reagent is intended for the quantitative determination of urea nitrogen concentration in urine using the ACE and ACE Alera Clinical Chemistry Systems. Urea nitrogen 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 Calcium-Arsenazo Reagent is intended for the quantitative determination of calcium in urine using the ACE and ACE Alera Clinical Chemistry Systems. Calcium measurements are used in the diagnosis and treatment of parathyroid disease, a variety of bone diseases, chronic renal disease and tetany. 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 in urine using the ACE and ACE Alera Clinical Chemistry Systems. 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 Inorganic Phosphorus U.V. Reagent is intended for the quantitative determination of inorganic phosphorus concentration in urine using the ACE and ACE Alera Clinical Chemistry Systems. Measurements of inorganic phosphorus are used in the diagnosis and treatment of various disorders, including parathyroid gland and kidney diseases and vitamin D imbalance. This test is intended for use in clinical laboratories or physician office laboratories. For *in vitro* diagnostic use only.

   Alfa Wassermann Diagnostic Technologies, LLC ACE Urine Standard is intended for the calibration of quantitative urine reagents on Alfa Wassermann Clinical Chemistry Systems. For *in vitro* diagnostic use only.

3. Special conditions for use statement(s):

   For prescription use only.

4. Special instrument requirements:

   ACE and ACE Alera Clinical Chemistry Systems

I. Device Description:

ACE Urea Nitrogen, Calcium, Creatinine and Inorganic Phosphorus reagents are intended for use with the ACE and ACE Alera clinical chemistry systems.

The ACE Urea Nitrogen reagent consists of a single 30 mL reagent bottle containing α-Ketoglutarate, urease (Jack Bean), glutamate dehydrogenase (GLDH) (Beef Liver), adenosine diphosphate (ADP), nicotinamide adenine dinucleotide, reduced (NADH), buffer, preservative and stabilizer.

The ACE Calcium-Arsenazo Reagent consists of a single 30 mL reagent bottle containing Arsenazo III, buffer and surfactant.

The ACE Creatinine Reagent consists of two reagent bottles, R1 (sodium hydroxide and surfactants, 10 or 30 mL) and R2 (Picric Acid, 3 or 9 mL).

The ACE Inorganic Phosphorus U.V. Reagent consists of a single 10 or 30 mL reagent bottle containing ammonium molybdate, sulfuric acid, and surfactant.

The ACE Urine Standard consists of a single calibrator, contained in a dropper bottle, 15 mL. The standard contains known amounts of urea nitrogen, calcium, creatinine and phosphorus.

J. Substantial Equivalence Information:

1. Predicate device name(s) and 510(k) numbers:

   Roche Diagnostics COBAS Integra Urea/BUN, k954000
   Roche Diagnostics COBAS Integra Calcium, k896224
   Roche Diagnostics COBAS Integra Creatinine Jaffe Gen. 2, k941837
   Roche Diagnostics COBAS Integra Phosphate Inorganic ver. 2, k883962
   Verichem Laboratories Urine Chemistry Standard, k875285

2. Comparison with predicate:

   ACE Urea Nitrogen

Similarities and Differences		
Item	Device	Predicate k954000
Intended use	For the quantitative determination of urea nitrogen concentration in urine. Measurements are used in the diagnosis and treatment of certain renal and metabolic diseases.	Same
Test principle and reaction type	Enzymatic, kinetic	Same
Reactive Ingredients	α-Ketoglutarate Urease Glutamate dehydrogenase Adenosine diphosphate NADH	2-oxoglutarate Urease Glutamate dehydrogenase Adenosine diphosphate NADH
Calibration traceability	NIST SRM 912a	NIST SRM 909b

ACE Calcium

Similarities and Differences		
Item	Device	Predicate k896224
Intended use	For the quantitative determination of calcium in urine. Measurements are used in the diagnosis and treatment of parathyroid disease, a variety of bone diseases, chronic renal disease and tetany.	Same
Test principle and reaction type	Calcium-Arsenazo dye-binding method, endpoint	Calcium complexone method, endpoint
Reactive Ingredients	Arsenazo III	o-Cresolphthalein complexone 8-Hydroxyquinoline CAPS Buffer NaOH
Calibration traceability	NIST SRM 915b	NIST SRM 909b

ACE Creatinine

Similarities and Differences		
Item	Device	Predicate k941837
Intended use	For the quantitative determination of creatinine in urine. 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
Test principle and reaction type	Alkaline picrate chemistry, endpoint	Alkaline picrate chemistry, kinetic
Reactive Ingredients	Sodium hydroxide Picric acid	Potassium hydroxide Phosphate Picric acid
Calibration traceability	NIST SRM 914a	NIST SRM 914

ACE Inorganic Phosphorus U.V.

Similarities and Differences		
Item	Device	Predicate k883962
Intended use	For the quantitative determination of inorganic phosphorus in urine. Measurements are used in the diagnosis and treatment of various disorders, including parathyroid gland and kidney diseases and vitamin D imbalance.	Same
Test principle and reaction type	Phosphomolybdate method, endpoint	Same
Reactive Ingredients	Ammonium molybdate Sulfuric acid	Ammonium molybdate Sulfuric acid Sodium chloride
Calibration traceability	NIST SRM 3139a	Primary reference material (NERL)

ACE Urine Standard

Similarities and Differences		
Item	Device	Predicate k875285
Intended use	For the calibration of quantitative urine reagents on Alfa Wassermann Clinical	Same

Similarities and Differences		
Item	Device	Predicate k875285
	Chemistry Systems.	
Constituents	Urea nitrogen, creatinine, calcium, phosphorus	Sodium, potassium, chloride, urea nitrogen, creatinine, calcium, phosphorus, magnesium
Levels	One	Five
Bottle and fill volume	Dropper bottle, 15 mL	Same

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

- Evaluation of Precision Performance of Quantitative Measurement Methods; Approved Guideline- Second Edition (CLSI EP5-A2)
- Evaluation of the Linearity of Quantitative Measurement Procedures: A Statistical Approach; Approved Guideline (CLSI EP6-A)
- Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline-Second Edition (CLSI EP9-A2)
- Interference Testing in Clinical Chemistry; Approved Guideline, Second Edition (CLSI EP7-A2)

L. Test Principle:

To test urine, samples are loaded in sample cups, which are placed on the sample ring of the ACE and ACE Alera instruments. Prior to introduction of the sample into the cuvettes, urine samples are prediluted with the system diluent in a well segment using a ratio of 1:20. The diluted sample is transferred to the reaction cuvette, mixed with the specified reagent, and incubated. The chemical reactions are described below.

ACE Urea Nitrogen Reagent is a photometric test using a coupled enzymatic reaction (urease and glutamate dehydrogenase), which converts the reduced NADH cofactor substrate to the oxidized NAD^+ product. The reduced cofactor absorbs strongly at 340 nm, whereas its oxidized form does not. The rate of decrease in absorbance in the reaction cuvette is proportional to the urea nitrogen content of the sample.

ACE Calcium-Arsenazo Reagent is a photometric test, in which calcium in the sample reacts with Arsenazo III in an acidic solution to form a blue-purple colored complex. The intensity of color produced is directly proportional to the calcium concentration in the sample.

ACE Creatinine Reagent is based on a photometric test in which creatinine in the sample 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, during a fixed time interval, is directly proportional to the creatinine concentration.

ACE Inorganic Phosphorus U.V. Reagent is a photometric test. Under acidic conditions, inorganic phosphorus in urine reacts with ammonium molybdate to form an unreduced phosphomolybdate complex, which absorbs strongly at 340 nm. The increase in absorbance is directly proportional to the amount of phosphorus in the sample.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Five urine samples were tested by the sponsor using the Alfa Wassermann ACE Reagents on one ACE and one ACE Alera Clinical Chemistry System two times per run, two runs per day, for a total of 22 days. Three human urine-based sample pools (Samples 1-3) and two urine-based controls (Samples 4-5) were evaluated. For the calcium reagent study, two human urine sample pools were evaluated instead of three (Sample 3 was above the reportable range).

Precision studies were also performed at physician's office laboratory (POL) sites. One operator at each of four sites, reflective of the intended users of the device and the intended use setting, evaluated three urine sample pools once per day in triplicate for a total of 5 days on two ACE (Sites 1 and 4) and two ACE Alera (Sites 2 and 3) analyzers.

The results of each study are summarized in the tables below.

Urea Nitrogen on the ACE analyzer

Sample	**Mean (mg/dL)**	**Within Run**		**Total imprecision**	
		SD	CV%	SD	CV%
1	710	16.2	2.3	22.1	3.1
2	1115	21.2	1.9	37.4	3.4
3	1597	25.1	1.6	52.3	3.3
4	399	8.0	2.0	11.7	2.9
5	777	17.5	2.3	27.2	3.5

Urea Nitrogen on the ACE Alera analyzer

Sample	**Mean (mg/dL)**	**Within Run**		**Total imprecision**	
		SD	CV%	SD	CV%
1	700	10.3	1.5	17.7	2.5
2	1097	21.8	2.0	28.6	2.6
3	1576	16.8	1.1	31.5	2.0

4	392	6.9	1.8	11.8	3.0
5	762	13.2	1.7	21.5	2.8

Urea nitrogen POL Results

			SD (mg/dL) or %CV	
Lab	**Sample**	**Mean**	**Within-Run**	**Total**
POL 1 ACE	1	287.1	SD 9.6	SD 10.6
			3.3%	3.7%
POL 2 ACE Alera	1	301.9	SD 11.5	SD 13.9
			3.8%	4.6%
POL 3 ACE Alera	1	294.8	SD 4.3	SD 7.0
			1.5%	2.4%
POL 4 ACE	1	338.3	SD 3.1	SD 5.5
			0.9%	1.6%
POL 1 ACE	2	804.8	SD 20.1	SD 20.1
			2.5%	2.5%
POL 2 ACE Alera	2	798.3	SD 10.5	SD 17.3
			1.3%	2.2%
POL 3 ACE Alera	2	799.2	SD 9.8	SD 12.7
			1.2%	1.6%
POL 4 ACE	2	810.7	SD 11.2	SD 20.0
			1.4%	2.5%
POL 1 ACE	3	1337.7	SD 21.5	SD 21.5
			1.6%	1.6%
POL 2 ACE Alera	3	1300.7	SD 12.8	SD 33.2
			1.0%	2.5%
POL 3 ACE Alera	3	1300.1	SD 12.7	SD 21.7
			1.0%	1.7%
POL 4 ACE	3	1295.5	SD 18.0	SD 22.6
			1.4%	1.7%

Calcium on the ACE analyzer

Sample	**Mean (mg/dL)**	**Within Run**		**Total imprecision**	
		SD	CV%	SD	CV%
1	3.5	0.16	4.6	0.17	4.7
2	19.8	0.30	1.5	0.33	1.7
4	7.7	0.18	2.4	0.26	3.4

5	10.7	0.31	2.9	0.31	2.9

Calcium on the ACE Alera analyzer

Sample	Mean (mg/dL)	Within Run		Total imprecision	
		SD	CV%	SD	CV%
1	3.6	0.19	5.3	0.20	5.7
2	19.8	0.28	1.4	0.31	1.6
4	7.7	0.19	2.4	0.29	3.7
5	10.7	0.37	3.4	0.38	3.5

Calcium POL Results

			SD (mg/dL) or %CV	
Lab	**Sample**	**Mean**	**Within-Run**	**Total**
POL 1 ACE	1	6.16	SD 0.27	SD 0.46
			4.4%	7.5%
POL 2 ACE Alera	1	6.15	SD 0.42	SD 0.42
			6.9%	6.9%
POL 3 ACE Alera	1	5.81	SD 0.16	SD 0.16
			2.7%	2.7%
POL 4 ACE	1	6.73	SD 0.24	SD 0.24
			3.5%	3.5%
POL 1 ACE	2	13.47	SD 0.40	SD 0.40
			3.0%	3.0%
POL 2 ACE Alera	2	13.44	SD 0.19	SD 0.21
			1.4%	1.5%
POL 3 ACE Alera	2	12.97	SD 0.12	SD 0.12
			0.9%	0.9%
POL 4 ACE	2	13.72	SD 0.26	SD 0.29
			1.9%	2.1%
POL 1 ACE	3	20.85	SD 0.22	SD 0.26
			1.1%	1.2%
POL 2 ACE Alera	3	20.47	SD 0.24	SD 0.24
			1.2%	1.2%
POL 3 ACE Alera	3	19.93	SD 0.15	SD 0.15
			0.8%	0.8%
POL 4 ACE	3	20.29	SD 0.48	SD 0.57
			2.4%	2.8%

Creatinine on the ACE analyzer

Sample	Mean (mg/dL)	Within Run		Total imprecision	
		SD	CV%	SD	CV%
1	96.1	1.69	1.8	2.77	2.9
2	102	1.72	1.7	3.08	3.0
3	201	3.44	1.7	6.63	3.3
4	59.1	1.02	1.7	1.64	2.8
5	145	3.00	2.1	4.42	3.0

Creatinine on the ACE Alera analyzer

Sample	Mean (mg/dL)	Within Run		Total imprecision	
		SD	CV%	SD	CV%
1	96.4	1.45	1.5	2.76	2.9
2	102	1.24	1.2	3.15	3.1
3	201	2.10	1.0	6.36	3.2
4	59.2	1.16	2.0	1.79	3.0
5	145	1.63	1.1	3.77	2.6

Creatinine POL Results

			SD (mg/dL) or %CV	
Lab	**Sample**	**Mean**	**Within-Run**	**Total**
POL 1 ACE	1	40.19	SD 1.42	SD 1.81
			3.5%	4.5%
POL 2 ACE Alera	1	41.29	SD 1.32	SD 1.35
			3.2%	3.3%
POL 3 ACE Alera	1	40.13	SD 0.69	SD 1.37
			1.7%	3.4%
POL 4 ACE	1	46.32	SD 1.12	SD 1.33
			2.4%	2.9%
POL 1 ACE	2	138.65	SD 4.32	SD 8.02
			3.1%	5.8%
POL 2 ACE Alera	2	140.65	SD 4.09	SD 4.67
			2.9%	3.3%

POL 3 ACE Alera	2	137.87	SD 1.80	SD 3.44
			1.3%	2.5%
POL 4 ACE	2	133.67	SD 1.90	SD 2.70
			1.4%	2.0%
POL 1 ACE	3	237.04	SD 1.97	SD 9.86
			0.8%	4.2%
POL 2 ACE Alera	3	238.38	SD 6.78	SD 10.80
			2.8%	4.5%
POL 3 ACE Alera	3	232.87	SD 3.73	SD 6.90
			1.6%	3.0%
POL 4 ACE	3	236.49	SD 2.93	SD 3.59
			1.2%	1.5%

Inorganic Phosphorus on the ACE analyzer

Sample	**Mean (mg/dL)**	**Within Run**		**Total imprecision**	
		SD	CV%	SD	CV%
1	92.6	1.11	1.2	2.73	2.9
2	115	1.27	1.1	3.36	2.9
3	170	2.05	1.2	5.37	3.2
4	28.0	0.58	2.1	0.96	3.4
5	46.0	0.79	1.7	1.39	3.0

Inorganic Phosphorus on the ACE Alera analyzer

Sample	**Mean (mg/dL)**	**Within Run**		**Total imprecision**	
		SD	CV%	SD	CV%
1	93.1	1.12	1.2	1.13	1.2
2	115	0.99	0.9	1.16	1.0
3	171	1.14	0.7	1.43	0.8
4	28.2	0.61	2.2	0.65	2.3
5	46.3	0.55	1.2	0.66	1.4

Phosphorus POL Results

			SD (mg/dL) or %CV	
Lab	**Sample**	**Mean**	**Within-Run**	**Total**
POL 1 ACE	1	27.31	SD 0.59	SD 0.67
			2.2%	2.4%
POL 2 ACE Alera	1	27.84	SD 0.38	SD 0.44
			1.4%	1.6%
POL 3 ACE Alera	1	27.55	SD 0.40	SD 0.40
			1.5%	1.5%
POL 4 ACE	1	31.19	SD 0.26	SD 0.30
			0.8%	1.0%
POL 1 ACE	2	106.17	SD 3.52	SD 3.52
			3.3%	3.3%
POL 2 ACE Alera	2	105.22	SD 0.75	SD 0.79
			0.7%	0.7%
POL 3 ACE Alera	2	105.79	SD 0.66	SD 0.66
			0.6%	0.6%
POL 4 ACE	2	108.42	SD 1.00	SD 1.00
			0.9%	0.9%
POL 1 ACE	3	173.67	SD 2.05	SD 8.05
			1.2%	4.6%
POL 2 ACE Alera	3	180.10	SD 1.19	SD 1.63
			0.7%	0.9%
POL 3 ACE Alera	3	181.05	SD 1.10	SD 1.25
			0.6%	0.7%
POL 4 ACE	3	176.27	SD 0.77	SD 1.10
			0.4%	0.6%

b. Linearity/assay reportable range:

Linearity studies across the claimed assay ranges for urea nitrogen, calcium, creatinine and inorganic phosphorus were performed by preparing two urine samples with very low and high analyte concentrations. The high samples were prepared from a normal urine which was spiked with commercially available nitrogen, calcium, creatinine, and inorganic phosphorus. The low samples were prepared by further diluting urine with deionized water. The low and high pools were mixed in different proportions to create 13 dilutions. Fifteen samples in all were assayed in quadruplicate on the ACE and ACE Alera Clinical Chemistry Systems.

The percent recovery (observed compared to expected) and results of the linear regression analysis are summarized in the tables below.

ACE

Reagent	Units	Range of Samples	Regression Equation	r^2	Percent recovery
Urea Nitrogen	mg/dL	21-2116	y = 1.005x + 16.7	0.9979	99-107%
Calcium	mg/dL	0.3-29.5	y = 0.995x + 0.36	0.9967	98-108%
Creatinine	mg/dL	3.3-333.7	y = 1.005x + 1.14	0.9986	98-107%
Phosphorus	mg/dL	3.5-212	y = 1.020x + 3.48	0.9971	101-109%

ACE Alera

Reagent	Units	Range of Samples	Regression Equation	r^2	Percent recovery
Urea Nitrogen	mg/dL	21-2115	y = 1.028x + 13.3	0.9966	102-107%
Calcium	mg/dL	0.3-29.1	y = 0.995x + 0.22	0.9987	99-106%
Creatinine	mg/dL	3.3-333.2	y = 0.999x + 1.46	0.9990	99-103%
Phosphorus	mg/dL	3.5-210	y = 1.011x + 3.68	0.9943	98-110%

The results of the linearity studies and limits of quantitation studies support the sponsor's claimed reportable ranges.

Urea nitrogen	40-2115 mg/dL
Calcium	1.0-29.1 mg/dL
Creatinine	6.8-333.3 mg/dL
Inorganic Phosphorus	4.8-210 mg/dL

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

The calibrator material was cleared under k875285. The sponsor re-labels the calibrator from the manufacturer. The sponsor provided a certificate of analysis from the manufacturer as well as a procedure describing how the incoming calibrator material is verified for use on the ACE and ACE Alera systems.

The sponsor states that the ACE Urine Standard is traceable to the following standards: Urea Nitrogen-NIST SRM 912a, Calcium- NIST SRM 915b, Creatinine NIST SRM 914a, Inorganic phosphorus NIST SRM 3139a.

The sponsor claims that the ACE Urine Standard when stored, unopened or opened, at 2-8ºC is stable until the expiration date on the label.

d. Detection limit:

A detection limit study was performed using CLSI EP17-A as a guide. The sponsor performed the following studies. Limit of Blank (LoB) was determined by running a blank sample (saline) 20 times per day over three days (n=60) with each urine reagent on two ACE and two ACE Alera analyzers. The limit of detection (LoD) was determined by assaying 5 low analyte concentration urine samples, 20 times per day in parallel with the LoB samples over three days (n=60).

The Limit of Quantitation was evaluated by assaying six low analyte diluted urine samples in eight replicates in five assay runs over two days on one ACE and one ACE Alera analyzer, for a total of 40 replicates.

The claimed LoB, LoD, and LoQ are summarized in the table below:

Reagent	**LoB (mg/dL)**	**LoD (mg/dL)**	**LoQ (mg/dL)**
Urea Nitrogen	ACE: 5 ACE Alera: 8	ACE: 10 ACE Alera: 14	ACE: 40 (6.2% CV) ACE Alera: 39 (5.4% CV)
Calcium	ACE: 0.2 ACE Alera: 0.2	ACE: 0.3 ACE Alera: 0.3	ACE: 0.9 (5.1% CV) ACE Alera: 0.9 (5.2% CV)
Creatinine	ACE: 0.5 ACE Alera: 0.7	ACE: 0.8 ACE Alera: 1.2	ACE: 2.6 (5.7% CV) ACE Alera; 4.1 (5.0% CV)
Phosphorus	ACE: 1.0 ACE Alera: 0.9	ACE: 1.6 ACE Alera: 1.2	ACE: 4.8 (5.7% CV) ACE Alera: 4.7 (5.9% CV)

e. *Analytical specificity:*
Testing for endogenous interfering substances was based on CLSI EP-7A2. Testing was performed on a minimum of six concentrations for each potential interferent. Urine pools at normal and abnormal levels of analyte with were used in the evaluation. Samples with the interferents were tested in triplicate on the ACE and ACE Alera and compared to the same sample without the interferent (control).

The sponsor defined non-significant interference as the highest level tested that recovers within ±10% of the control sample. The results are summarized below.

ACE Urine nitrogen reagent
No interference up to these concentrations: Unconjugated bilirubin 50 mg/dL, Hemoglobin 1000 mg/dL, Ascorbic acid 200 mg/dL, Boric acid 250 mg/dL, Hydrochloric Acid 2.5 mg/dL, Acetic acid 6.25 mg/dL, Protein 60 mg/dL

Glucose 2100 mg/dL

ACE Calcium reagent
No interference up to these concentrations: Unconjugated bilirubin 50 mg/dL, Hemoglobin 1000 mg/dL, Ascorbic acid 200 mg/dL, Boric acid 250 mg/dL, Hydrochloric Acid 2.5 mg/dL, Acetic acid 6.25 mg/dL, Glucose 2100 mg/dL

ACE Creatinine reagent
No interference up to these concentrations: Unconjugated bilirubin 50 mg/dL, Hemoglobin 1000 mg/dL, Ascorbic acid 200 mg/dL, Boric acid 250 mg/dL, Hydrochloric Acid 2.5 mg/dL, Acetic acid 6.25 mg/dL, Protein 60 mg/dL Glucose 2100 mg/dL

ACE Inorganic Phosphorus reagent
No interference up to these concentrations: Unconjugated bilirubin 50 mg/dL, Hemoglobin 1000 mg/dL, Ascorbic acid 200 mg/dL, Boric acid 250 mg/dL, Hydrochloric Acid 2.5 mg/dL, Acetic acid 6.25 mg/dL, Protein 60 mg/dL Glucose 2100 mg/dL

f. Assay cut-off:

Not applicable.

2. Comparison studies:

a. Method comparison with predicate device:

A method comparison study was performed using CLSI document EP9-A2 as a guide. Natural and contrived urine specimens (up to 5 spiked or diluted) were evaluated by Alfa Wasserman and at four physician's office laboratory (POL) sites. The POL sites and operators who performed the testing were representative of the expected intended users and intended use sites. Sites 1 and 4 performed tested on the ACE analyzer and Sites 2 and 3 performed testing on the ACE Alera analyzer.

The results are summarized below, and include the number of specimens tested, specimen description, the comparative method, and linear regression statistics (Deming).

ACE Urea Nitrogen versus Roche Urea Nitrogen on the COBAS INTEGRA (predicate)

Lab	n	Range (ng/mL)	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept
Alfa Wasserman (ACE)	112	42-1833	y = 0.908x + 38.4	0.977	71.1	0.87 to 0.95	7.9 to 68.9
Alfa Wasserman (Alera)	112	48-1850	y = 0.919x + 22.5	0.981	66.2	0.88 to 0.95	-5.9 to 50.9
POL 1	51	56-1937	y = 0.946x - 8.2	0.985	75.1	0.90 to 0.99	-49.7 to 33.4
POL 2	51	40-1838	y = 0.909x + 23.9	0.987	68.5	0.87 to 0.95	-14.0 to 61.8
POL 3	51	51-1783	y = 0.920x + 27.4	0.990	61.5	0.88 to 0.96	-6.7 to 61.4
POL 4	48	42-1694	y = 0.926x - 2.0	0.986	65.9	0.88 to 0.97	-42.4 to 38.4

ACE Calcium versus Roche Calcium on the COBAS INTEGRA (predicate)

Lab	n	Range (ng/mL)	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept
Alfa Wasserman (ACE)	108	1.1-28.8	y = 1.017x + 0.19	0.975	1.35	0.973 to 1.06	-0.37 to 0.76
Alfa Wasserman (Alera)	108	1.0-28.8	y = 1.022x + 0.10	0.975	1.37	0.979 to 1.07	-0.46 to 0.66
POL 1	47	1.8-26.8	y = 1.012x + 0.31	0.976	1.38	0.945 to 1.08	-0.57 to 1.19
POL 2	48	3.5-28.4	y = 1.013x + 0.19	0.967	1.70	0.935 to 1.09	-0.87 to 1.24
POL 3	50	1.0-26.3	y = 1.035x - 0.69	0.981	1.35	0.977 to 1.09	-1.47 to 0.09
POL 4	46	1.8-28.9	y = 1.048x - 0.57	0.971	1.65	0.971 to 1.13	-1.64 to 0.50

ACE Creatinine versus Siemens Creatinine on the ADVIA (predicate)

Lab	n	Range	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept
Alfa Wasserman (ACE)	113	8.2-308.7	y = 0.986x + 6.77	0.982	11.40	0.95 to 1.02	2.62 to 10.92
Alfa Wasserman (Alera)	113	8.5-329.1	y = 1.029x + 1.10	0.982	11.95	0.992 to 1.07	-3.25 to 5.44
POL 1	56	8.7-320.9	y = 1.003x + 2.18	0.990	10.83	0.965 to 1.04	-2.96 to 7.33
POL 2	56	7.9-314.9	y = 1.022x + 0.44	0.988	12.24	0.980 to 1.07	-5.38 to 6.25
POL 3	56	8.4-332.5	y = 1.059x - 1.19	0.990	11.89	1.02 to 1.10	-6.84 to 4.46
POL 4	54	8.6-311.0	y = 0.966x + 4.50	0.990	10.72	0.928 to 1.00	-0.66 to 9.66

ACE Phosphorus versus Roche Phosphorus on the COBAS INTEGRA (predicate)

Lab	n	Range	Regression Equation	Correlation Coefficient	Standard Error	Confidence Interval Slope	Confidence Interval Intercept
AWDT (ACE)	113	6.1-182.4	y = 0.989x + 3.32	0.988	5.21	0.960 to 1.02	1.30 to 5.34
AWDT (Alera)	112	5.9-175.0	y = 0.968x + 3.99	0.989	4.89	0.940 to 0.995	2.06 to 5.91
POL 1	54	5.6-162.1	y = 0.961x + 3.30	0.9932	4.50	0.930 to 0.992	1.00 to 5.60
POL 2	54	6.1-181.0	y = 0.999x + 0.89	0.9952	3.94	0.972 to 1.03	-1.13 to 2.90
POL 3	54	6.3-179.6	y = 1.004x + 1.03	0.9954	3.88	0.977 to 1.030	-0.96 to 3.01
POL 4	50	5.5-178.4	y = 0.938x + 3.39	0.9809	8.40	0.885 to 0.992	-0.67 to 7.46

b. Matrix comparison:

Urine only

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:

Expected values for all analytes are based on literature.

ACE Urea Nitrogen
24 hour urine: 800-1666 mg/dL, assuming a urine volume of 1.5 L/24 h

ACE Calcium
24 hour urine: 6.8-19.9 mg/dL, assuming a urine volume of 1.5 L/24 h

Burtis, C.A., Ashwood, E.R. (Ed.), Tietz Textbook of Clinical Chemistry, 3rd Edition, W.B. Saunders Co., New Dehli, India, 1838 (1999).

ACE Creatinine
1st Morning urine: 39-259 mg/dL males, 28-217 mg/dL females

24 hour urine: 69-157 mg/dL males, 49-105 mg/dL females assuming a urine volume of 1.5 L/24 h

Mazzachi BC, Peake MJ, Ehrhardt V. Reference Range and Method Comparison Study for Enzymatic and Jaffé Creatinine assays in Plasma and Serum and early Morning Urine. Clin Lab 2000; 46:53-55.

Junge W, Wilke B, Halabi A, Klein G. Determination of reference intervals for

serum creatinine, creatinine excretion, and creatinine clearance with an enzymatic and a modified Jaffé method. Clin Chem Acta 2004; 344: 137-148.

ACE Inorganic Phosphorus
1st Morning urine: 40-136 mg/dL

24 hour urine: 27-87 mg/dL assuming a urine volume of 1.5 L/24 h and an unrestricted diet.

Heil W, Koberstein R, Zatwa B. Reference Ranges for Adults and Children, Pre-Analytical Considerations, 6th ed. 1999.

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.