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

A. 510(k) Number:

k102568

B. Purpose for Submission:

New Device

C. Measurand:

Uric Acid

D. Type of Test:

Quantitative, enzymatic, colorimetric assay

E. Applicant:

Abbott Laboratories Diagnostics Division

F. Proprietary and Established Names:

Architect Uric Acid

G. Regulatory Information:

Product Code	Classification	Regulation Section	Panel
KNK	Class I, reserved	21 CFR §862.1775, uric acid test system	Clinical Chemistry (75)

H. Intended Use:

1. Intended use(s):

   See indications for use below:

2. Indication(s) for use:
   Architect Uric Acid test system is a device intended to measure uric acid in serum, plasma, and urine. Measurements obtained by this device 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.

3. Special conditions for use statement(s):

   For prescription use only

4. Special instrument requirements:

   Abbott ARCHITECT c8000

I. Device Description:

The uric acid reagent kit is packaged as two ready to use reagents, R1 and R2. The following reactive ingredients are presented in the following table:

	Reactive Ingredients	Concentration
R1	5-Chloro-2-methyl-4-isothiazoline-3-one	0.5 mmol/L
	Ascorbic Oxidase	3500 U/L
	HMMPS	100 mmol/L
R2	4-Aminoantipyrine	4 mmol/L
	5-Chloro-2-methyl-4-isothiazoline-3-one	0.5 mmol/L
	Peroxidase	2000 U/L
	Uricase	880 U/L

Inactive Ingredients: R2 contains sodium azide (0.05%) as a preservative.

J. Substantial Equivalence Information:

1. Predicate device name(s):

   Abbott On-Market Uric Acid

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

   K981766

3. Comparison with predicate:

Similarities and Differences

Characteristic	**Candidate** device: Architect Uric Acid	**Predicate device:** Abbott On-Market Uric Acid (k981766)
Intended Use	Same	For the quantitation of uric

		acid in human serum, plasma, or urine
Product Type	Same	Clinical Chemistry
Methodology	Same	Uricase
Where Used	Same	Clinical Laboratories
Assay Protocol	Same	Competitive
Calibration Curve Type	Same	3-point
Specimen Type	Same	Serum (including serum separator tubes) or plasma (collected in lithium heparin, lithium heparin separator tubes, and sodium heparin). 24-hour urine specimens are preferred.
Platform	ARCHITECT *c*8000 System	ARCHITECT *c*Systems and AEROSET System
Components	Reagent Kit: Uric Acid is supplied as a liquid, ready-to-use, two-reagent kit which contains: R1 Contains: 5-Chloro-2-methyl-4-isothiazoline-3-one 0.5 mmol/L; Ascorbic Oxidase 3500 U/L; HMMPS 100 mmol/L. R2 contains: 5-Chloro-2-methyl-4-isothiazoline-3-one 0.5 mmol/L; 4-Aminoantipyrine 4 mmol/L; Peroxidase 2000 U/L; Uricase 880 U/L.	Reagent Kit: Uric Acid is supplied as a liquid, ready-to-use, single-reagent kit which contains: R1 contains: 4-Aminoantipyrine 0.5 mmol/L; TBHB 1.75 mmol/L; Uricase > 120 U/L; Peroxidase > 500 U/L; TRIS Buffer 50 mmol/L.
Measuring Interval	Serum: 1.0 mg/dL to 33.1 mg/dL Urine: 5.0 mg/dL to 250.0 mg/dL	Serum: 0.3 mg/dL to 33.1 mg/dL Urine: 1.0 mg/dL to 433.8 mg/dL

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

CLSI documents:

Defining, Establishing, and Verifying Reference Intervals in the Clinical Laboratory; Approved Guideline (C28-A3)

Evaluation of Precision Performance of Clinical Chemistry Devices; Approved Guideline (EP5-A2)

Evaluation of the Linearity of Quantitative Measurement Procedures: A Statistical

Approach (EP6-A)

Interference Testing in Clinical Chemistry; Approved Guideline (EP 7-A2)

Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline (EP9-A2)

Protocols for Determination of Limits of Detection and Limits of Quantitation (EP17-A)

L. Test Principle:

The uric acid assay is a two-part reaction. Uric acid is oxidized to allantoin by uricase with production of hydrogen peroxide (H2O2). The H2O2 reacts with 4-aminoantipyrine (4-AAP) and N-(3-sulfopropyl)-3-methoxy-5-methylanaline (HMMPS) in the presence of peroxidase (POD) to yield a quinoneimine dye. The resulting change in absorbance at 604 nm is proportional to the uric acid concentration in the sample. The two-part (R1/R2) configuration of this assay allows reduction of interference from ascorbic acid by inclusion of ascorbic oxidase in the R1 portion of the assay.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

   a. Precision/Reproducibility:

   Precision was performed for 20 days using one lot of reagent, one lot of calibrators, and one lot of controls following procedures outlined in CLSI EP5-A2. All testing was performed on the ARCHITECT c8000. Two serum samples, two serum controls, and two urine controls were tested in replicates of five, in two runs per day for 8 days (N=80). Results are summarized in the following tables:

20 day precision for serum and urine controls

Matrix	Level	N	Mean (mg/dl)	Within-run		Total precision	
				SD	%CV	SD	%CV
Serum Controls	1	80	4.49	0.02	0.49	0.03	0.68
	2	80	9.14	0.04	0.41	0.05	0.52
Urine Controls	1	80	9.09	0.09	0.99	0.19	2.10
	2	80	17.48	0.11	0.64	0.18	1.02

Precision for serum and urine samples

Matrix	Level	N	Mean (mg/dl)	Within-run		Total precision	
				SD	%CV	SD	%CV
Serum Samples	1	80	1.23	0.01	0.70	0.05	4.18
Urine Sample	1	50	242.10	1.26	0.5	2.03	0.80

An additional 5 day precision study was conducted for a high serum sample using spiked serum sample pool. The results are shown in the following table:

Matrix	Level	N	Mean (mg/dL)	Within-run		Total precision	
				SD	%CV	SD	%CV
Serum	2	50	31.59	0.130	0.4	0.156	0.50

b. Linearity/assay reportable range:

A linearity study was performed following the CLSI EP6-A guideline. Samples were prepared by diluting a high patient sample with a low patient sample to obtain twelve different concentrations spanning the measuring range; ranging from 0.00 – 70.00 mg/dL for serum samples and 0.00 – 300.00 mg/dL for urine samples. Each serum and urine sample was tested in replicates of four using two lots of reagents on one instrument (One represented lot of reagent result was summarized below). The observed values were plotted against the expected values and an appropriate line fitted by standard linear regression. Results were summarized below:

	Serum (lot 1)	Urine (lot 1)
Correlation (r)	0.9999	0.9996
Slope	0.9920	1.0105
Intercept	0.1677	0.6791

The linearity data support the sponsor's claim that the measuring range for serum is 1-33.1 mg/dL, and urine is 5-250 mg/dL

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

Calibrators were previously cleared- See k103403 for traceability, stability, and expected value information.

d. Detection limit:

The sponsor conducted a Limit of Blank (LoB), Limit of Detection (LoD) and a Limit of Quantitation (LoQ) study following the CLSI EP-17A guideline. To determine the limit of blank (LoB), zero level samples were prepared for serum and urine (4 aliquots each) with testing performed on two instruments, using two reagent lots, one lot of calibrators, and one lot of controls for a total of 160 replicates. Four low level serum (target concentrations 0.16, 0.18, 0.20, and 0.22 mg/dL) and four low level urine samples (target concentrations 1.60, 1.80, 2.00, and 2.20 mg/dL) were prepared. The low level samples also had testing performed on two instruments, using two reagent lots, one lot of calibrators, and one lot of controls for a total of 40 replicates each. LoQ was determined based on 5 separate runs over 3 days. LoQ for serum was determined at 0.22 mg/dL based on an interassay imprecision of ≤18.3%, and LoQ for urine was 2.20 mg/dL based on an interassay imprecision of ≤6%

Results are summarized in the following tables:

	Serum (mg/dL)	Urine (mg/dL)
LoB	0.02	0.07
LoD	0.06	0.24
LoQ	0.22	2.20

Sponsor's claimed measuring range for serum is 1-33.1 mg/dL, and urine is 5-250 mg/dL

e. Analytical specificity:

A study of common interfering substances was conducted. The results of the study were evaluated following recommendations by CLSI EP7-A2. Serum samples were prepared at target uric acid concentrations of 3 and 9 mg/dL. Urine uric acid samples were prepared at a target concentration of 12.5 mg/dL and 30 mg/dL. Various concentrations of interfering substances were spiked into the serum or urine sample pools. The sponsor states that interferences are considered to be non-significant if the bias between the spiked and non-spiked samples are within ±10%. Results are summarized in the following tables.

The following table summarizes serum uric acid specificity:

Endogenous Interferences

		Percent Recovery	
Interfering Substance	Interferent Concentration	3.0 mg/dL Uric Acid	9.0 mg/dL Uric Acid
Ascorbic Acid	3.0 mg/dL	95.3	97.8

Bilirubin*	60 mg/dL	92.3	98.1
Glucose	1000 mg/dL	100.1	100.1
Hemoglobin	2000 mg/dL	101.3	98.6
Intralipid	750 mg/dL	92.7	95.4

* Bilirubin solutions were prepared by addition of half conjugated/half unconjugated bilirubin to human serum pools.

The following tables summarize urine uric acid specificity:

Endogenous Interferences

		Percent Recovery	
Interfering Substance	Interferent Concentration	12.5 mg/dL Uric Acid	30 mg/dL Uric Acid
Albumin	50 mg/dL	101.2	99.1
Ascorbic Acid	200 mg/dL	94.9	95.8
Conjugated Bilirubin	60 mg/dL	97.7	91.4
Glucose	1000 mg/dL	100.1	99.7
Hemoglobin	2000 mg/dL	102.4	99.1

Urine Preservative Interferences

		Percent Recovery	
Interfering Substance	Interferent Concentration	12.5 mg/dL Uric Acid	30 mg/dL Uric Acid
Boric Acid	1000 mg/dL	101.2	99.0
6N HCl	1.0 mL/dL	97.3	98.0
2.5N NaOH	2.5 mL/dL	102.5	99.6

f. Assay cut-off:

Not Applicable

2. Comparison studies:

a. Method comparison with predicate device:

A method comparison study was conducted using 103 human serum samples and 103 urine samples. All samples were tested on the Architect c8000 analyzer with the candidate device (Architect Uric Acid) against the predicate device (Abbott On-Market Uric Acid). Some samples were diluted and spiked to cover the hard-to-find sample range. The following table provides a summary of regression analysis:

Sample type	N	Range (mg/dL)	Slope	Intercept	Correlation Coefficient
Serum	103	1.6 – 31.2	0.95	0.20	0.9955
Urine	103	10.3 – 247.6	0.95	1.34	0.9955

b. Matrix comparison:

For matrix comparison study, matched serum and heparinized plasma samples were assayed on the ARCHITECT c8000. A total of 20 sample sets of human specimens were collected in the following blood collection tube types: glass tube (serum), and plastic tubes – SST tube, lithium heparin, sodium heparin, and plasma lithium heparin separator. All the results generated from the plastic tubes (SST tube, lithium heparin, sodium heparin, and plasma lithium heparin with gel separator) had less than 5% differences when compared to the glass tube (control).

The sponsor states that their device can be used with serum and the following anticoagulants:

Lithium heparin, sodium heparin, and plasma lithium heparin with gel separator

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:

In the labeling the expected values are provided from Burtis CA, Ashwood ER,

Bruns DE, eds. *Tietz Textbook of Clinical Chemistry and Molecular Diagnostics*, 4th ed. St. Louis, MO: Elsevier Saunders; 2006:2301.

Literature Reference Intervals for Uric Acid:

Serum:

Male: 3.5 – 7.2 mg/dL

Female: 2.6 – 6.0 mg/dL

Urine:

Urine	Range (mg/day)	Range (mmol/day)
Purine-free diet		
Male	<420	<2.48
Female	Slightly lower	Slightly lower
Low purine diet		
Male	<480	2.83
Female	<400	<5.90
High purine diet	<1,000	<5.90
Average	250 to 750	1.48 to 4.43

To convert results from mg/day to mmol/day, multiply mg/day by 0.0059.

It is recommended that each laboratory determine its own reference range based upon its particular locale and population characteristics.

24 Hour Urinary Excretion

To convert results from mg/dL to mg/day (24 hour urinary excretion)

Where:

V = 24 hour urine volume (mL)

C = analyte concentration (mg/dL)

24 hour excretion = [(V x c) / 100] mg/day

To convert results from mmol/L to mmol/day (24 hour urinary excretion)

Where:

V = 24 hour urine volume (mL)

C = analyte concentration (mmol/L)

24 hour excretion = [(V x c) / 1000] mmol/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.