510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY

I Background Information:

A 510(k) Number

K203530

B Applicant

Abbott Ireland Diagnostics Division

C Proprietary and Established Names

Albumin BCP2

D Regulatory Information

Product Code(s)	Classification	Regulation Section	Panel
CJW	Class II	21 CFR 862.1035 - Albumin Test System	CH - Clinical Chemistry

II Submission/Device Overview:

A Purpose for Submission:

New device

B Measurand:

Albumin

C Type of Test:

Quantitative colorimetric

III Intended Use/Indications for Use:

A Intended Use(s):

See Indications for Use below.

B Indication(s) for Use:

The Albumin BCP2 assay is used for the quantitation of albumin in human serum or plasma on the ARCHITECT c System.

The Albumin BCP2 assay is to be used as an aid in the diagnosis and treatment of numerous diseases involving primarily the liver or kidneys.

C Special Conditions for Use Statement(s):

Rx - For Prescription Use Only

D Special Instrument Requirements:

ARCHITECT c8000 System

IV Device/System Characteristics:

A Device Description:

The Albumin BCP2 Reagent Kit contains the Reagent 1 (R1). The active ingredient is Bromocresol Purple (0.154 g/L). Other ingredients are sodium hydroxide/acetic acid (pH 5.4), detergent/surfactant (0.8%), ProClin 300 and ProClin 950 (preservatives).

B Principle of Operation:

The Albumin BCP2 assay is an automated clinical chemistry assay. The Albumin BCP2 procedure is based on the binding of bromocresol purple specifically with human albumin to produce a colored complex. The absorbance of the complex at 604 nm is directly proportional to the albumin concentration in the sample.

V Substantial Equivalence Information:

A Predicate Device Name(s):

Albumin BCP

B Predicate 510(k) Number(s):

K981814

C Comparison with Predicate(s):

Device & Predicate Device(s):		
Device Trade Name	Albumin BCP2	Albumin BCP
General Device Characteristic Similarities		
Intended Use/Indications For Use	The Albumin BCP2 assay is used for the quantitation of albumin in human serum or plasma on the ARCHITECT c System. The Albumin BCP2 assay is to be used as an aid in the diagnosis and treatment of numerous diseases involving primarily the liver or kidneys.	Same
Methodology	Colorimetric (Bromocresol Purple)	Same
General Device Characteristic Differences		
Assay Range	Analytical Measuring Interval: 0.3 – 9.0 g/dL Extended Measuring Interval: 9.0 – 22.4 g/dL	Analytical Measuring Interval: 0.31 to 11.0 g/dL
Tube Types	**Serum:** - Serum tubes - Serum separator tubes **Plasma:** - Dipotassium EDTA tubes - Lithium heparin tubes - Lithium heparin separator tubes - Sodium heparin tubes	**Serum**: - Glass or plastic tubes with or without gel barrier **Plasma:** - Glass or plastic lithium heparin tubes (with or without gel barrier) - Glass or plastic sodium heparin tubes

VI Standards/Guidance Documents Referenced:

- CLSI - EP05-A3: Evaluation of precision of Qualitative Measurement Procedures; Approved Guideline – Third Edition.
- CLSI - EP06-A: Evaluation of linearity of Quantitative of Quantitative Measurement Procedures: A Statistical Approach; Approved Guideline
- CLSI – EP17-A2: Evaluation of detection Capability for Clinical Laboratory Measurement procedures; Approved Guidance -Second Edition.

- CLSI – EP34: Establishing and Verifying an Extended Measuring Interval Through Specimen Dilution and Spiking – First Edition

VII Performance Characteristics (if/when applicable):

A Analytical Performance:

1. Precision/Reproducibility:

The Abbott Albumin BCP2 assay was evaluated in accordance with CLSI EP05-A3. Testing was conducted using 3 lots of the Albumin BCP2 reagent, 3 lots of the calibrators, 1 lot of controls, and 3 instruments. Samples were prepared by spiking pooled normal human serum to a target concentration of 0.4 g/dL, 5.4 g/dL, and 8.0 g/dL. The samples were tested in 2 replicates, 2 times per day, for 20 days, for a total of 80 measurements.

The performance from a representative lot and an instrument shown in the following table.

Sample	n	Mean (g/dL)	Within-Run (Repeatability)		Within-Laboratory*	
			SD	%CV	SD (Range)**	%CV (Range)**
Control Level 1	80	3.7	0.04	1.1	0.05 (0.05 – 0.05)	1.4 (1.3 – 1.4)
Control Level 2	80	2.5	0.04	1.6	0.04 (0.04 – 0.04)	1.6 (1.4 – 1.7)
Panel 1	80	0.4	0.02	5.3	0.04 (0.02 - 0.04)	10.4 (5.5 - 10.4)
Panel 2	80	5.3	0.05	1.0	0.05 (0.03 – 0.06)	1.0 (0.6 – 1.0)
Panel 3	80	8.2	0.03	0.3	0.05 (0.05 – 0.07)	0.7 (0.7 – 0.9)

*Includes within-run, between-run, and between day variability.
**Minimum and maximum SD or %CV across all reagent lot and instrument combinations.

2. Linearity:

The linearity studies were performed following CLSI EP06-A. Twelve unique samples were prepared by dilution of a high albumin sample (ranging from 0.0 – 11.6 g/dL) and assayed using one lot of the Albumin BCP2 reagent, 1 lot of calibrator, on a single instrument and a single run. Two replicates were tested per sample/pool and all replicates were used in the analysis. The data were analyzed using linear regression as well as second and third order non-linear fitted polynomial regression with the third order model demonstrating the best fit. For all test samples, the absolute value of the degree of non-linearity met the sponsor's pre-defined acceptance criteria for deviation from linearity and the results support that the assay is linear across the claimed analytical measuring interval of 0.3 to 9.0 g/dL.

Dilution study:

To support the claimed extended measuring interval (EMI), five samples spanning the extended measuring interval were prepared at target concentration values of 10.0 g/dL, 12.5 g/dL, 15.0 g/dL, 17.5 g/dL, and 20.0 g/dL. Samples were tested using the 1:2.5 automated and manual dilution protocol (dilution factor = 1:2.49) on the ARCHITECT c8000 System with one reagent lot for a total of 30 replicates (2 instruments x 3 runs/instrument x 5 replicates/run).

The % dilution recovery values ranged from 104.87% to 107.20% for the auto-diluted samples and from 106.49% to 109.89% for the manually diluted samples, when compared to expected values. The total % CV ranged from 1.1% to 1.3% for auto-diluted samples and 0.8% to 1.2% for manually diluted samples. Samples within the EMI demonstrated within-laboratory imprecision within or equal to 5% CV. The dilution study results support that samples with concentrations above 9.0 g/dL may be diluted 1:2.5 either manually or on-onboard the analyzer to obtain results up to 22.4 g/dL.

3. Analytical Specificity/Interference:

The interference was evaluated using test samples that were prepared by spiking each potentially interfering substance into a human serum pool with low albumin (approximately 3.5 g/dL) or high albumin (approximately 5.0 g/dL) concentrations. Each sample as well as a matched control sample without the interfering substance were tested in replicates of 10. The sponsor stated that interference was considered to be non-significant if the difference between the samples with and without interferent was less or equal to ± 10%.

The results of the highest concentration tested without significant interference are summarized in the table below.

Interfering Substance	**Highest concentration tested that did not show significant interference**
Conjugated Bilirubin	60 mg/dL
Unconjugated Bilirubin	60 mg/dL
Hemoglobin	2000 mg/dL
Triglycerides	3025 mg/dL
Acetaminophen	250 mg/L
Acetylcysteine	1663 mg/L
Acetylsalicylic acid	1000 mg/L
Ampicillin-Na	1000 mg/L
Ascorbic acid	300 mg/L
Ca-dobesilate	200 mg/L
Cefoxitin	2500 mg/L
Cyclosporine	5 mg/L
Doxycycline	50 mg/L
Sodium heparin	10 U/mL
Ibuprofen	500 mg/L

Interfering Substance	Highest concentration tested that did not show significant interference
Levodopa	20 mg/L
Methyldopa	20 mg/L
Metronidazole	200 mg/L
Phenylbutazone	400 mg/L
Rifampicin	60 mg/L
Theophylline (1.3-dimethylxanthine)	100 mg/L

4. Assay Reportable Range:

   The analytical measuring interval of the assay is 0.3 - 9.0 g/dL. The extended measuring interval of the assay is 9.0 - 22.4 g/dL.

5. Traceability, Stability, Expected Values (Controls, Calibrators, or Methods):

   The Albumin BCP2 assay is traceable to the ERM-DA470/IFCC standard.

6. Detection Limit:

   The limit of blank (LoB), limit of detection (LoD), and limit of quantitation (LoQ) studies were performed in accordance with CLSI EP17-A2.

   The LoB study was performed by testing 4 blank samples (0 g/dL), using 3 reagent lots over 3 days on 2 different instruments. Each day, for each reagent lot, 5 replicate measurements were recorded (60 results). The LoB was calculated non-parametrically at the 95th percentile for each lot. The higher LoB for both reagent lots was chosen as the assay's LoB.

   The LoD study was performed by testing 6 levels level samples using 3 reagent lots over 3 days on 2 instruments. Each day, for each reagent lot, 10 replicate measurements were recorded (60 results per reagent lot). LoD was calculated non-parametrically. The higher LoD of the 3 lots was chosen as the assay's LoD.

   The LoQ study was performed using 6 low level human sera samples measured over 3 days on 2 instruments using 3 reagent lots. Each day, for each reagent lot, 10 replicate measurements were recorded (60 results total). The sponsor defined LoQ as the LoD or the mean concentration of the samples with the lowest concentration at which the maximum allowable precision of 20 %CV was met, whichever was greater.

	g/dL
LoB	0.0
LoD	0.3
LoQ	0.3

7. Assay Cut-Off:

Not applicable.

B Comparison Studies:

1. Method Comparison with Predicate Device:

Human native serum samples (n=127) spanning the analytical measuring interval of the assay were tested. For the candidate device, samples were tested internally using 3 lots of reagents and 1 lot each of calibrator and controls across 2 ARCHITECT c8000 instruments. For the predicate device, samples were tested internally using 1 lot each of reagents, calibrator, and controls across 2 ARCHITECT c8000 instruments. Each sample was tested in a minimum of 2 replicates using both methods and testing occurred over a minimum of 3 calendar days.

A Passing-Bablok evaluation was performed by comparing the first replicate result from the candidate device versus the mean result from the predicate device.

The results are summarized below:

Albumin BCP2 vs Albumin BPG on the ARCHITECT c System						
	n	**Units**	**Correlation Coefficient**	**Intercept**	**Slope**	**Concentration Range (per the predicate)**
Serum	127	g/dL	1.00	-0.20	1.00	0.4 – 8.1

2. Matrix Comparison:

A matrix comparison study was performed to evaluate plasma samples and blood collection tube types suitable for use with the Albumin BCP2 assay. Samples containing 0.7-9.0 g/dL albumin (as determined in serum samples) were obtained from 40 donors in the control tube type (serum separator tube) and in the evaluation tube types (K_2EDTA, lithium heparin, sodium heparin, lithium heparin (separator tube)).

All samples were processed according to the blood collection tube manufacturer's instructions. The samples were evaluated on the candidate device and tested in a minimum of 2 replicates using 1 lot of the Albumin BCP2 reagent, 1 lot of the Consolidated Chemistry Calibrator, 1 lot of commercially available controls, and1 instrument. For the control tube type, all 3 replicates were analyzed. For the evaluation tube types, only the 1st replicate was analyzed.

The results are shown below:

Evaluation Tube Type	Slope	Intercept	R^2
Dipotassium EDTA	0.98	0.10	1.00
Lithium heparin	0.97	0.04	1.00
Sodium heparin	0.97	0.11	0.99
Lithium heparin – with separator	0.94	0.23	0.99

The study results support the sponsor's claim that serum and K2 EDTA, lithium heparin, and sodium heparin plasma are acceptable sample types to be used with this assay.

C Clinical Studies:

1. Clinical Sensitivity:

   Not applicable.

2. Clinical Specificity:

   Not applicable.

3. Other Clinical Supportive Data (When 1. and 2. Are Not Applicable):

   Not applicable.

D Clinical Cut-Off:

Not applicable.

E Expected Values/Reference Range:

The following reference ranges, cited from the scientific literature, were included in the labeling:

Serum

Age	Range (g/dL)	Range (g/L)
0 - 4 days	2.8 - 4.4	28 - 44
4 days - 14 years	3.8 - 5.4	38 - 54
Adult	3.5 - 5.0	35 - 50
60 - 90 years	3.2 - 4.6	32 - 46
> 90 years	2.9 - 4.5	29 - 45

(Burtis CA, Bruns DE, editors. *Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics*. 7th ed. St Louis, MO: Saunders Elsevier; 2015).:2177.

VIII Proposed Labeling:

The labeling supports the finding of substantial equivalence for this device.

IX Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.