

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

A. 510(k) Number:

k080874

B. Purpose for Submission:

New device

C. Measurand:

Albumin (ALB), Alkaline Phosphatase (ALP), Aspartate Aminotransferase (AST), Total Carbon Dioxide (CO₂), Creatinine (CREA) and Creatine Kinase (CK)

D. Type of Test:

Quantitative colorimetric chemistry tests

E. Applicant:

Medica Corporation

F. Proprietary and Established Names:

EasyRA Albumin Reagent
EasyRA Alkaline Phosphatase Reagent,
EasyRA Aspartate Aminotransferase Reagent,
EasyRA Carbon Dioxide (CO₂) Reagent,
EasyRA Carbon Dioxide (CO₂) Calibrator,
EasyRA Creatinine Reagent
EasyRA Creatine Kinase Reagent

G. Regulatory Information:

Device Classification Name	Regulation section	Classification	Product Code	Panel
Albumin	21 CFR § 862.1035	II	CIX	Chemistry (75)
Alkaline Phosphatase	21 CFR § 862.1050	II	CJE	Chemistry (75)
Aspartate Aminotransferase	21 CFR § 862.1100	II	CIT	Chemistry (75)
Bicarbonate/carbon dioxide	21 CFR § 862.1160	II	KHS	Chemistry (75)
Calibrator	21 CFR § 862.1150	II	JIT	Chemistry (75)
Creatinine	21 CFR § 862.1225	II	JFY	Chemistry (75)
Creatine Kinase	21 CFR § 862.1215	II	CGS	Chemistry (75)

H. Intended Use:

1. Intended use(s):

See indications for use below.

2. Indication(s) for use:

EasyRA Albumin

The EasyRA Albumin (ALB) reagent is intended for the quantitative determination of Albumin in human serum, using the MEDICA “EasyRA Chemistry Analyzer” in clinical laboratories. Albumin measurements are used in the diagnosis and treatment of numerous diseases involving primarily the liver or kidneys.

EasyRA Alkaline Phosphatase

The EasyRA Alkaline Phosphatase (ALP) reagent is intended for the quantitative determination of Alkaline Phosphatase in human serum, using the MEDICA “EasyRA Chemistry Analyzer” in clinical laboratories. Measurement of Alkaline Phosphatase or its isoenzymes are used in the diagnosis and treatment of liver, bone, parathyroid and intestinal diseases.

EasyRA Aspartate Aminotransferase

The EasyRA Aspartate Aminotransferase (AST) reagent is intended for the quantitative

determination of the enzyme Aspartate Aminotransferase in human serum, using the MEDICA “EasyRA Chemistry Analyzer” in clinical laboratories. Measurement of Aspartate Aminotransferase measurements are used in the diagnosis and treatment of certain types of liver and heart diseases.

EasyRA Carbon Dioxide

The EasyRA Carbon Dioxide (CO₂) reagent is intended for the quantitative measurement of Carbon Dioxide (CO₂) in human serum. Bicarbonate/carbon dioxide measurements are used in the diagnosis and treatment of numerous potentially serious disorders associated with changes in body acid-base balance.

EasyRA Carbon Dioxide Calibrator

The Carbon Dioxide calibrator establishes points of reference that are used in the determination of values in the measurement of Bicarbonate/Carbon dioxide on the EasyRA clinical chemistry analyzer when used in conjunction with Medica’s CO₂ reagent.

EasyRA Creatinine

The EasyRA CREA reagent is a device intended to measure creatinine levels 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.

EasyRA Creatine Kinase

The EasyRA CK reagent is a device intended to measure creatinine kinase activity in serum. Measurements of CK are used in the diagnosis and treatment of myocardial infarction and muscle diseases such as progressive, Duchenne-type muscular dystrophy.

3. **Special conditions for use statement(s):**

Prescription use only

4. **Special instrument requirements:**

Medica EasyRA Analyzer

I. Device Description:

The EasyRA Alkaline Phosphatase, EasyRA Aspartate Aminotransferase, EasyRA Creatinine, and EasyRA Creatine Kinase reagents are dual reagent systems containing reagents, stabilizers and/or diluents. The EasyRA Albumin and EasyRA CO₂ are single reagents containing reagent, stabilizers and/or diluents. All of the above listed reagents are for use on the Easy RA analyzer.

The EasyRA CO2 calibrator is an aqueous calibrator with pre-assigned value for CO2 used for a one point calibration. It is provided in a ready to use dripper bottle with end-user instructions for use on the EasyRA clinical chemistry analyzer.

J. Substantial Equivalence Information:

New Device	Predicate Device Name	Predicate K Number(s)
EasyRA Albumin Reagent	Stanbio LiquiColor Albumin	k771771
EasyRA Alkaline Phosphatase Reagent	Roche Alkaline Phosphatase Reagent	k902560
EasyRA Aspartate Aminotransferase Reagent	Roche AST Reagent	k924244
EasyRA CO2 Reagent	Roche CO ₂ Reagent	k844987
EasyRA CO2 Calibrator	Raichem Carbon Dioxide Calibrator	k864819
EasyRA Creatinine Reagent	Stanbio Creatinine LiquiColor Liquicolor Reagent	k050283
EasyRA Creatine Kinase	Roche Creatine Kinase Reagent	k891462

Comparison with predicate:

	Albumin	
Item	Device	Predicate
Product Attribute	Medica ALB Reagent	Stanbio Albumin Reagent
Intended Use	Clinical chemistry reagent used to provide a quantitative measurement of albumin in human serum, using the EasyRA chemistry analyzer.	Clinical chemistry reagent used to provide a quantitative measurement of albumin in human serum, using an automated chemical analyzer
Sample	Serum	Serum
Reagent type	Liquid ready-for-use	Liquid ready-for-use
Linearity range	0.4 – 7.0 g/dL	Up to 7 g/dL
Wavelength	600/700 nm	550 nm
Reaction type	End point	End point
Reagent storage	2 – 8 °C	2 – 8 °C
Test Methodology	Non-enzymatic reaction based on the binding of the analyte to an organic compound to produce a chromogen at endpoint. The chromogen absorbs light of specific wavelength, where the EasyRA measures absorbance according to Beer's law.	Non-enzymatic reaction based on the binding of the analyte to an organic compound to produce a chromogen at endpoint. The chromogen absorbs light of specific wavelength, where the COBAS-Mira measures absorbance according to Beer's law.

Alkaline Phosphatase (ALP)		
Item	Device	Predicate
Product Attribute	Medica ALP Reagent	Roche Alkaline phosphatase Reagent
Intended Use	Clinical chemistry reagent used to provide a quantitative measurement of alkaline phosphatase in human serum, using the EasyRA chemistry analyzer.	Clinical chemistry reagent used to provide a quantitative measurement of alkaline phosphatase in human serum, using an automated chemical analyzer
Sample	Serum	Serum
Reagent type	Liquid ready-for-use	Liquid ready-for-use
Linearity range	8 – 800 U/L	Up to 1500 U/L
Wavelength	405 nm	405 nm
Reaction type	Rate	Rate
Reagent storage	2 – 8 °C	2 – 8 °C
Test Methodology	An enzymatic reaction based on the catalytic activity of a serum based enzyme, which is quantified by monitoring the reaction rate. The chromogen absorbs light of specific wavelength, where the EasyRA measures absorbance according to Beer's law.	An enzymatic reaction based on the catalytic activity of a serum based enzyme, which is quantified by monitoring the reaction rate. The chromogen absorbs light of specific wavelength, where the COBAS-Mira measures absorbance according to Beer's law.

Aspartate Aminotransferase(AST)		
Item	Device	Predicate
Product Attribute	Medica AST Reagent	Roche AST Reagent
Intended Use	Clinical chemistry reagent used to provide a quantitative measurement of AST in human serum, using the EasyRA chemistry analyzer.	Clinical chemistry reagent used to provide a quantitative measurement of AST in human serum, using an automated chemical analyzer
Sample	Serum	Serum
Reagent type	Liquid ready-for-use	Liquid ready-for-use
Linearity range	5.5 – 400 U/L	Up to 440 U/L
Wavelength	550 nm	550 nm
Reaction type	Rate	Rate
Reagent storage	2 – 8 °C	2 – 8 °C
Test Methodology	An enzymatic reaction based on the catalytic activity of a serum based enzyme, which is quantified by monitoring the reaction rate. The chromogen absorbs light of specific wavelength, where the EasyRA	An enzymatic reaction based on the catalytic activity of a serum based enzyme, which is quantified by monitoring the reaction rate. The chromogen absorbs light of specific wavelength, where the COBAS-Mira

	measures absorbance according to Beer's law.	measures absorbance according to Beer's law.
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Carbon Dioxide CO2		
Item	Device	Predicate
Product Attribute	EasyRA CO2 Reagent	Roche Carbon Dioxide Reagent
Intended Use	Bicarbonate/carbon dioxide measurements are used in the diagnosis and treatment of numerous potentially serious disorders associated with changes in body acid-base balance.	Bicarbonate/carbon dioxide measurements are used in the diagnosis and treatment of numerous potentially serious disorders associated with changes in body acid-base balance.
Sample	Serum	Serum
Reagent type	Liquid ready-for-use	Liquid ready-for-use
Linearity range	2.3 – 45.0 mmol/L	Up to 40 mmol/L
Wavelength	405 nm	340 nm
Reaction type	End point	End point
Reagent storage	2 – 8 °C	2 – 8 °C
Test Methodology	An enzymatic reaction based on the carboxylation of Phosphoenolpyruvate (PEP). The product of this reaction is oxidized and a chromogen is produced. The rate of chromogen loss is monitored by the EasyRA over time.	An enzymatic reaction based on the carboxylation of Phosphoenolpyruvate (PEP). The product of this reaction is oxidized and a chromogen is produced. The rate of chromogen loss is monitored by the Cobas-Mira over time.

CO2 Calibrator		
Item	Device	Predicate
Product Attribute	Medica CO2 Calibrator	RAICHEM CO2 Calibrator
Reagent storage	2 – 8 °C	2 – 8 °C
Test Methodology	The calibrator is used to establish the calibration factor in Beer's equation using a known concentration reagent and the measured absorbance. The calibration factor is used to determine the CO2 concentration in the patient sample.	The calibrator is used to establish the calibration factor in Beer's equation using a known concentration reagent and the measured absorbance. The calibration factor is used to determine the CO2 concentration in the patient sample.

Creatinine		
Item	Device	Predicate
Product Attribute	Medica CREA Reagent	Stanbio Creatinine Reagent
Intended Use	Clinical chemistry reagent used to provide a quantitative measurement of Creatinine in human serum, using the EasyRA chemistry analyzer.	Clinical chemistry reagent used to provide a quantitative measurement of Creatinine in human serum, using an automated chemical analyzer
Sample	Serum	Serum
Reagent type	Liquid ready-for-use	Liquid ready-for-use
Linearity range	0.2 – 15.0 mg/dL	Up to 30 mg/dL
Wavelength	550/700 nm	550 nm
Reaction type	End point	End point
Reagent storage	2 – 8 °C	2 – 8 °C
Test Methodology	An enzymatic reaction based on the conversion of creatinine to glycine and hydrogen peroxide. The latter, is reduced in the presence of peroxidase to form a chromogen. The chromogen absorption is monitored by the EasyRA and is directly related to the amount of Creatinine present in the sample.	An enzymatic reaction based on the conversion of creatinine to glycine and hydrogen peroxide. The latter, is reduced in the presence of peroxidase to form a chromogen. The chromogen absorption is monitored by the Cobas-Mira and is directly related to the amount of Creatinine present in the sample.

Creatine Kinase (CK)		
Item	Device	Predicate
Product Attribute	Medica CK Reagent	Roche CK Reagent
Intended Use	Clinical chemistry reagent used to provide a quantitative measurement of CK in human serum, using the EasyRA chemistry analyzer.	Clinical chemistry reagent used to provide a quantitative measurement of CK in human serum, using an automated chemical analyzer
Sample	Serum	Serum
Reagent type	Liquid ready-for-use	Liquid ready-for-use
Linearity range	3 – 1200 U/L	Up to 2000 U/L
Wavelength	340 nm	340 nm
Reaction type	Rate	Rate
Reagent	2 – 8 °C	2 – 8 °C

storage		
Test Methodology	An enzymatic reaction based on the catalytic activity of a serum based enzyme, which is quantified by monitoring the reaction rate. The chromogen absorbs light of specific wavelength, where the EasyRA measures absorbance according to Beer's law.	An enzymatic reaction based on the catalytic activity of a serum based enzyme, which is quantified by monitoring the reaction rate. The chromogen absorbs light of specific wavelength, where the COBAS-Mira measures absorbance according to Beer's law.

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)

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

L. Test Principle:

EasyRA Albumin

Albumin binds with bromocresol green to produce a blue-green color. This color is measured at 600 nm with a blanking wavelength of 700 nm. The color intensity is proportional to the concentration of Albumin in the sample.

EasyRA Alkaline Phosphatase

ALP hydrolyses 4-nitrophenyl phosphate substrate to form 4-nitrophenol and phosphates. The 4-nitrophenol component is yellow in color at pH 10.4, with an absorbance peak at 405 nm. The rate of the formation of 4-nitrophenol is directly proportional to the Alkaline Phosphatase activity in the sample.

EasyRA Aspartate Aminotransferase

The AST enzyme catalyzes the transfer of the Aspartate amino group to α -Ketoglutarate (α -KG) with the formation of L-glutamate and oxaloacetate (OAA). The OAA is then reduced to L-malate by reacting with NADH in a reaction catalyzed by malate dehydrogenase (MDH). In this second reaction the amount of NADH that is oxidized to NAD results in a decrease in absorbance at 340 nm. This decrease is

followed spectrophotometrically and is directly proportional to the activity of AST in serum.

EasyRA Carbon Dioxide

Carbon dioxide (in the form of bicarbonate ion) reacts with phosphoenolpyruvate (PEP), catalyzed by phosphoenol pyruvate carboxylase (PEPC), to form oxaloacetate and phosphate. The oxaloacetate, in turn, is oxidized by malate dehydrogenase (MDH) in the presence of NADH or an analog. The decrease in NADH analog concentration is monitored at 405 nm and is proportional to the total carbon dioxide in the sample.

EasyRA Creatinine

The method uses multi-step enzymatic reactions. The creatinine is hydrolyzed to sarcosine with Creatinine Amidohydrolase. The sarcosine is then oxidized *via* sarcosine oxidase to produce glycine and hydrogen peroxide. The hydrogen peroxide is reacted with 4-aminoantipyrene and N-ethyl-N-sulfopropyl-m-toluidine (ESPMT) to produce a quinoneimine dye. The reaction is monitored at 550 nm. The increase in absorbance is proportional to the level of creatinine in the sample.

EasyRA Creatine Kinase

CK catalyzes transfer of phosphate groups from creatine phosphate to ADP to form ATP. The rate of production of ATP is measured by two coupled reactions. Hexokinase (HK) catalyzes the reaction of Glucose and ATP to form glucose-6-phosphate. The glucose-6-phosphate with NAD in the presence of glucose-6-phosphate dehydrogenase (G6PDH) forms 6-phosphogluconate and NADPH. The increase in NADPH absorbance at 340 nm is directly related to CK activity in the sample.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Within-Run and Total precision evaluations were determined following CLSI EP5-A2. Three levels of commercial serum-based Quality Control material were tested on one EasyRA analyzer twice a day over a twenty-day period. In addition, a within-run precision study was performed in the extended measuring range to verify precision.

EasyRA Albumin

	Level 1	Level 2	Level 3
Mean (mg/dL)	2.66	4.58	3.06
Within Run Precision:			
Std. Dev.	0.03	0.03	0.03
CV %	1.21	0.62	0.91
Total Precision:			
Std. Dev.	0.03	0.05	0.03
CV %	1.27	1.18	0.97

EasyRA ALP

	Level 1	Level 2	Level 3
Mean (mg/dL)	170	85	353
Within Run Precision:			
Std. Dev.	2.4	3.0	4.4
CV %	1.4	3.5	1.3
Total Precision:			
Std. Dev.	3.6	3.5	7.4
CV %	2.1	4.1	2.1

EasyRA AST

	Level 1	Level 2	Level 3
Mean (mg/dL)	35.5	31.2	132.6
Within Run Precision:			
Std. Dev.	1.05	1.34	1.60
CV	2.96	4.28	1.21
Total Precision:			
Std. Dev.	1.05	1.46	1.86
CV	2.97	4.69	1.40

EasyRA CO2

	Level 1	Level 2	Level 3
Mean (mmol/L)	27.8	32.2	18.3
Within Run Precision:			
Std. Dev.	0.48	0.35	0.30
CV %	1.73	1.09	1.63
Total Precision:			
Std. Dev.	1.49	1.71	0.93
CV %	5.34	5.30	5.05

EasyRA CREA

	Level 1	Level 2	Level 3
Mean (mg/dL)	0.72	1.24	6.73
Within Run Precision:			
Std. Dev.	0.01	0.01	0.04
CV %	1.25	1.07	0.66
Total Precision:			
Std. Dev.	0.02	0.02	0.09
CV %	2.50	1.50	1.30

EasyRA CK

	Level 1	Level 2	Level 3
Mean (U/L)	96	191	500
Within Run Precision:			
Std. Dev.	1.1	1.6	4.3
CV %	1.1	0.9	0.9
Total Precision:			
Std. Dev.	1.7	4.7	10.8
CV %	1.7	2.5	2.2

b. *Linearity/assay reportable range:*

EasyRA Albumin

Linearity was determined using the guidelines provided by CLSI EP6-A. Commercially available albumin standards were used. The sponsor obtained values from 0.3 mg/dL to 8.3 mg/dL. The data was 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. The results are summarized below.

Fitted regression models are:

Linear: $y = 1.04624x - 0.2886$, $R^2 = 0.9957$, *Std. Error = 0.178*

Second order: $y = -0.0046x^2 + 1.0861x - 0.3497$, $R^2 = 0.9958$, *Std. Error = 0.184*

Third order: $y = -0.0116x^3 - 0.1569x^2 + 1.6336x - 0.8015$, $R^2 = 0.9979$, *Std. Error = 0.138*

The results of this study support the sponsor's claim that the device is linear from 0.4 g/dL to 7.0 g/dL.

EasyRA ALP

Linearity was determined using the guidelines provided by CLSI EP6-A. Commercially available alkaline phosphatase standards were used. These seven standards had target values from 8.0 U/L to 817 U/L. The data was analyzed using linear regression as well as second and third order non-linear fitted polynomial regression with the first order regression demonstrating the best fit. The results are summarized below.

Fitted regression models are:

Linear: $y = 0.9255x + 3.9244$, $R^2 = 0.9992$, *Std. Error* = 8.503

Second order: $y = -9E-06x^2 + 0.9327x + 3.2684$, $R^2 = 0.9992$, *Std. Error* = 8.856

Third order: $y = 1E-08x^3 - 3E-05x^2 + 0.9386x + 0.3.0036$,
 $R^2 = 0.9992$, *Std. Error* = 9.285

The results of this study support the sponsor's claim that the device is linear from 8 U/L to 800 U/L.

EasyRA AST

Commercially available standards ranging in value from 6.4 U/L to 450.8 U/L were used for the study. The sponsor obtained values from 3.3-463.3 U/L. The data was analyzed using linear regression as well as second and third order non-linear fitted polynomial regression with the third order regression demonstrating the best fit. The results are summarized below.

Fitted regression models are:

Linear: $y = 1.0215x - 4.2094$, $R^2 = 0.9991$, *Std. Error* = 2.646

Second order: $y = 0.0002x^2 + 0.9502x + 0.0242$, $R^2 = 0.9995$, *Std. Error* = 4.099

Third order: $y = 1E-06x^3 - 0.0007x^2 + 1.1028x - 4.217$,
 $R^2 = 0.9998$, *Std. Error* = 2.646

The results of this study support the sponsor's claim that the device is linear from 5.5 U/L to 400 U/L.

EasyRA CO2

Seven linearity standards were gravimetrically prepared covering the target range of 2 – 52 mmol/L. The data was analyzed using linear regression as well as second and third order non-linear fitted polynomial regression with the second order regression demonstrating the best fit. The results are summarized

below.

Fitted regression models are:

Linear: $y = 0.9911x + 17.661$, $R^2 = 0.9988$, *Std. Error*=0.340

Second order: $y = -7E-05x^2 + 1.0811x + 8.2543$, $R^2 = 0.9993$, *Std. Error*=0.270

Third order: $y = 2E-07x^3 + 0.0005x^2 + 1.2763x - 2.318$, $R^2 = 0.9999$, *Std. Error*=0.273

The results of this study support the sponsor's claim that the device is linear from 2.3 mmol/L to 45 mmol/L.

EasyRA CREA

Six commercially available standards ranging in value from 0.20 mg/dL to 15.20 mg/dL were used for the study. The sponsor obtained values from 0.00 mg/dL to 15.89 mg/dL. The data was analyzed using linear regression as well as second and third order non-linear fitted polynomial regression with the third order regression demonstrating the best fit. The results are summarized below.

Fitted regression models are:

Linear: $y = 1.0387x - 0.1646$, $R^2 = 0.9975$, *Std. Error* = 0.296

Second order: $y = 0.0036x^2 + 0.984x - 0.0541$, $R^2 = 0.9977$, *Std. Error*=0.297

Third order: $y = 0.00134x^3 - 0.0269x^2 + 11608x - 0.1974$, $R^2 = 0.9982$, *Std. Error* = 0.285

The results of this study support the sponsor's claim that the device is linear from 0.2 mg/dL to 15.00 mg/dL.

EasyRA CK

Nine commercially available standards ranging in value from 2.5 U/L to 1353.4 U/L were used for the study. The data was analyzed using linear regression as well as second and third order non-linear fitted polynomial regression with the third order regression demonstrating the best fit. The results are summarized below.

Fitted regression models are:

Linear: $y = 1.0505x - 0.0033$, $R^2 = 0.9997$, *Std. Error*=17.763

Second order: $y = -0.0002x^2 + 1.0517x - 0.0042$, $R^2 = 0.9997$, *Std. Error* = 14.135

Third order: $y = 0.0014x^3 - 0.0134x^2 + 1.0814x - 0.0127$, $R^2 = 0.9997$, *Std. Error*=5.007

The results of this study support the sponsor's claim that the device is linear from 3 U/L to 1,200 U/L.

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

1) Traceability of CO2 Calibrator: The CO2 calibrator is a ready-to-use liquid, single level calibrator. The sponsor provided a certificate of analysis showing that the calibrator was verified to NIST material.

2) Calibrator and Reagent Stability: The sponsor performed stability studies at 2°C to 8°C and found them to be adequate for the CO2 Calibrator, Albumin, ALP, AST, CO2, Creatinine, and CK reagents. Accelerated stability studies were performed by the sponsor to verify stability in the sponsor's containers.

The sponsor also performed on-board stability studies and calibration frequency studies for the various assays and the conclusions are below. Enzyme methods are not calibrated. This information is included in the labeling.

Assay	On-board Stability (days)	Calibration Frequency (days)
Albumin	30	30
Alkaline Phosphatase (ALP)	14	
Aspartate Aminotransferase (AST)	30	
Carbon Dioxide (CO2)	10	10
Creatinine (CREA)	20	20
Creatine Kinase (CK)	30	

d. Detection limit:

To determine the Limits of Blank (LoB) for EasyRA Albumin, Alkaline Phosphatase (ALP), Aspartate Aminotransferase (AST), Carbon Dioxide (CO2), Creatinine (CREA), and Creatine Kinase (CK) the sponsor used deionized water assayed twenty (20) times on each of three Easy RA analyzers. Limits of Detection (LoD) were determined by preparing a serum sample with a value slightly above the LoBs for the assays listed above, also analyzed 20 times on three EasyRA analyzers. Statistical analyses following CLSI EP-17A were used for calculating the LoB and LoD results. Results are summarized below:

Device	Reportable Range	LoB	LoD
Albumin	0.4 -7.0 g/dL	0.0 g/dL	0.02 g/dL

ALP	10-800 U/L	4.73 U/L	7.55 U/L
AST	5.5 – 400 U/L	4.0 U/L	5.5 U/L
CO2	2.3 – 45 mmol/L	0.56 mmol/L	1.0 mmol/L
Creatinine	0.2 -15.0 mg/dL	0.02 mg/dL	0.03 mg/dL
CK	7 – 1,200 U/L	1.73 U/L	2.38 U/L

e. Analytical specificity:

EasyRA Albumin

Endogenous Interferences:

Testing for interfering substances was based on CLSI EP-7A. Testing was performed on a minimum of two concentrations for each measurand. Samples with increasing amounts of hemoglobin, bilirubin or triglycerides (Intralipid®) were tested on these samples and compared to the same sample without the interferent, unless otherwise noted.

The sponsor defined interference as the highest level tested that does not cause > 10% change in analytical result.

The table below summarizes the lowest concentration of interferent determined to cause interference with the assays.

	Analyte level tested	No interference up to:
Albumin	3.3 g/dL, 4.0 g/dL	500 mg/dL hemoglobin
	3.5 g/dL, 4.4 g/dL	1,350 mg/dL of triglyceride
	3.7 g/dL, 4.8 g/dL	25 mg/dL of bilirubin
ALP	145 U/L, 219 U/L	500 mg/dL of hemoglobin
	138 U/L, 380 U/L	1,446 mg/dL of triglyceride
	71 U/L, 1089 U/L	47 mg/dL of bilirubin
AST	Hemoglobin interference testing not performed	The sponsor did not test for hemoglobin interference since there are large amounts of AST in red blood cells. The sponsor is only recommending non-hemolyzed serum samples be used. ¹
	31.2 U/L, 102 U/L	31 mg/dL of triglyceride*
	33 U/L, 109 U/L	32.7 mg/dL of bilirubin
CO2		

	19.3 mmol/L, 25 mmol/L	125 mg/dL of hemoglobin*
	20.6 mmol/L, 30.9 mmol/L	850 mg/dL of triglyceride
	25.4 mmol/L, 31.5 mmol/L	40 mg/dL of bilirubin
Creatinine		
	0.68 mg/dL, 2.2 mg/dL	156 mg/dL of hemoglobin*
	0.79 mg/dL, 2.59 mg/dL	1,350 mg/dL of triglyceride
	2.43, 4.82	20 mg/dL of bilirubin
CK		
	209 U/L, 386 U/L	250 mg/dL of hemoglobin*
	119 U/L, 218 U/L	1,000 mg/dL of triglyceride
	112 U/L, 189 U/L	25 mg/dL of bilirubin

¹Demetriou JA et al. *In Clinical Chemistry – Principles and Technics* 2nd ed. RJ Henry et al. Eds. Harper & Row, Hagerstown, MD 1974, p 873.

*The labeling recommends not using visibly hemolyzed specimens for: AST, CO₂, Creatinine and CK. The labeling also recommends not using visibly lipemic specimens for AST.

Exogenous Interference

The sponsor did not perform any studies to investigate the effect of exogenous substances such as pharmaceuticals; however a literature reference is included to alert users that these potential interferences should be checked.

The sponsor cites the following references for exogenous interference in the labeling.

Young DS. *Effects of Drugs on Clinical Laboratory Tests* 4th ed. Washington, DC: AACC Press; 1995.

Young DS. *Effects of Preanalytical Variables on Clinical Laboratory Tests*. 2nd ed. Washington, DC. AACC Press; 1997.

f. *Assay cut-off:*

Not Applicable

2. Comparison studies:

a. *Method comparison with predicate device:*

Serum samples for the candidate devices were tested in singlicate on the Medica system and compared to duplicate results of the predicate devices.

EasyRA Albumin

A method comparison was performed with the Medica EasyRA Albumin test system and the Stanbio Albumin reagent on the COBAS MIRA test system. A total of 43 samples were tested across the range of the predicate assay (0.6 g/dL to 7.1 g/dL). Of these 43 samples, 38 were native samples and 5 were manipulated to create very low and very high level samples. The comparison resulted in a slope of 0.9651, an intercept of - 0.0945, correlation coefficient of $R^2 = 0.9959$, and a std. error of 0.1325. The reportable range is 0.4-7.0 mg/dL.

EasyRA Alkaline Phosphatase (ALP)

A method comparison was performed with the Medica EasyRA ALP test system and the Roche ALP reagent on the COBAS MIRA test system. A total of 62 samples were tested across the range of the predicate assay (10 U/L to 758 U/L). Of these 62 samples, 55 were native samples and 7 were manipulated to create very low or very high level samples. The comparison resulted in a slope of 0.977, an intercept of 9.743, correlation coefficient of $R^2 = 0.9988$ and a std. error of 6.308. The reportable range is 10-800 U/L.

EasyRA Aspartate Aminotransaminase (AST):

A method comparison was performed with the Medica EasyRA AST test system and the Roche AST reagent on the COBAS MIRA test system. A total of 45 samples were tested across the range of the predicate assay (8.0-392.3 U/L). Of these 46 samples, 41 were native samples and 4 were spiked or diluted to span the measuring range. The comparison resulted in a slope of 1.000, an intercept of -1.6771, correlation coefficient of $R^2 = 0.9996$, and a std. error of 1.7410. The reportable range is 5.5 -400 U/L.

EasyRA Carbon Dioxide (CO2):

A method comparison was performed with the Medica EasyRA CO2 test system and the Roche CO2 reagent on the COBAS MIRA test system. A total of 60 samples were tested across the range of the predicate assay (2.1-43.9 mmol/L). Of these 60 samples, 56 were native samples and 4 were spiked or diluted to span the measuring range. The comparison resulted in a slope of 0.9414, an intercept of 0.6015, correlation coefficient of $R^2 = 0.9921$, and a std. error of 0.7856. The reportable range is 2.3 – 45 mmol/L.

EasyRA Creatinine:

A method comparison was performed with the Medica EasyRA Creatinine test system and the StanBio Creatinine reagent on the COBAS MIRA test system. A total of 62 samples were tested across the range of the predicate assay (0.37 mg/dL to 14.37 mg/dL). Of these 62 samples, 58 were native samples and 4 were spiked or diluted to span the measuring range. The comparison resulted in a slope of 1.0449, an intercept of -0.0819, correlation coefficient of $R^2 = 0.9973$, and a std. error of 0.1638. The reportable range is 0.2-15.0 mg/dL.

EasyRA Creatine Kinase (CK):

A method comparison was performed with the Medica EasyRA CK test system and the Roche CK reagent on the COBAS MIRA test system. A total of 54 samples were tested across the range of the predicate assay (7-1182 U/L). Of these 54 samples, 49 were native samples and 5 were spiked or diluted to span the measuring range. The comparison resulted in a slope of 1.0185, an intercept of 5.5223, correlation coefficient of $R^2 = 0.9987$, and a std. error of 8.2879. The reportable range is 7-1200 U/L

- b. *Matrix comparison:*
Not applicable
- 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):*
- 4. Clinical cut-off:
Not applicable
- 5. Expected values/Reference range:

EasyRA Albumin: Adult: 3.8-5.1 g/dL⁴

EasyRA Alkaline Phosphatase: Adult: 34-114 U/L²

EasyRA Aspartate Aminotransaminase: Adult: 8-40 U/L²

EasyRA Carbon Dioxide: 23-34 mmol/L³

EasyRA Creatinine: 0.5-1.2 mg/dL¹

EasyRA Creatine Kinase: Male: 24-195 U/L, Female: 24-170 U/L²

The expected values for all the analytes were cited from the following references:

¹Burtis, C.A. and Ashwood, E.R. (Eds), Tietz Textbook of Clinical Chemistry, 2nd edition, W.B. Saunders CO., Philadelphia (1994).

²Tietz NW. Editor, Clinical Guide to Laboratory Tests, 3rd ed., WB Saunders and Co., Philadelphia, PA, (1995).

³Henry RJ, Carmon D Winkelman JW, editors, Clinical Chemistry: Principles and Techniques. Hagerstown, MD: Harper and Row Publishers; 1974.

⁴Doumas BT, Watson WA, Biggs HG. Albumin standards and the measurement of serum albumin with bromocresol green. *Clin Chem Acta*. 1971;31:87-96.

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.