

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

**A. 510(k) Number:**

k110675

**B. Purpose for Submission:**

Blood urea nitrogen: Addition of plasma to the already cleared device (k080823)

Creatinine: Addition of plasma to the already cleared device (k080874)

**C. Measurand:**

BUN, Creatinine

**D. Type of Test:**

Quantitative colorimetric chemistry tests

**E. Applicant:**

Medica Corp

**F. Proprietary and Established Names:**

EasyRA BUN Reagent  
EasyRA CREA Reagent

**G. Regulatory Information:**

<b>Measurand</b>	<b>Regulation Section</b>	<b>Classification</b>	<b>Product Code</b>	<b>Panel</b>
Urea Nitrogen test system	21CFR862.1770	2	CDQ	Chemistry (75)
Creatinine test system	21CFR862.1225	2	CGX	Chemistry (75)

## H. Intended Use:

1. Intended use(s):

See Indications for use below.

2. Indication(s) for use:

EasyRA Urea Nitrogen Reagent:

The EasyRA Urea Nitrogen (BUN) Reagent is for the measurement of urea nitrogen in serum and plasma using the “EasyRA chemistry analyzer”. Urea measurements are used for the diagnosis and treatment of certain renal and metabolic diseases.

EasyRA CREA Reagent:

The EasyRA Creatinine (CREA) Reagent is for the measurement of Creatinine in serum and plasma using the “EasyRA chemistry analyzer”. Creatinine measurements are used in the diagnosis and treatment of renal diseases, in monitoring renal dialysis.

For *in vitro* diagnostic use only

3. Special conditions for use statement(s):

Prescription use

4. Special instrument requirements:

EasyRA clinical chemistry analyzer

## I. Device Description:

The EasyRA BUN test is provided in 4 ready-to-use plastic wedges, each containing 39 mL of reagent. The reagent consists of buffer with alpha-ketoglutarate, urease, glutamate dehydrogenase, adenosine diphosphate, NADH analog, stabilizers and preservatives.

The EasyRA Creatinine reagents are dual reagent systems containing reagents, stabilizers and/or diluents. R1 reagent wedge contains 29 mL of reagent (Good buffer, creatine amidohydrolase, sarcosine oxidase, ascorbate oxidase, and N-ethyl-N-sulfopropyl-m-toluidine) and R2 reagent wedge contains 10 mL of reagent (Good buffer, creatinine amidohydrolase, peroxidase, and 4-aminoantipyrine).

**J. Substantial Equivalence Information:**

1. Predicate Device Name(s):  
EasyRA BUN Reagent  
EasyRA CREA Reagent
2. Predicate 510(k) number(s):  
k080823, k080874
3. Comparison with predicate:

<b>Similarities and Differences for BUN</b>		
<b>Item</b>	<b>Candidate Device EasyRA BUN Reagent</b>	<b>Predicate Device (k080823) EasyRA BUN Reagent</b>
Intended Use/Indications for use	For the quantitative determination of BUN using the “EasyRA chemistry analyzer” in clinical laboratories. Urea measurement is used for the diagnosis and treatment of certain renal and metabolic diseases.	Same
Specimen Type	Serum and plasma	Serum
Reagent Type	Liquid ready-for-use	Same
Assay Principle	Enzymatic reaction	Same
Analytical Range	1- 70 mg/dL	Same

<b>Similarities and Differences for CREA</b>		
<b>Item</b>	<b>Candidate Device EasyRA CREA Reagent</b>	<b>Predicate Device (k080874) EasyRA CREA Reagent</b>
Intended Use/Indications for use	For the quantitative measurement of creatinine using the “EasyRA chemistry analyzer”. Creatinine measurements are used in the diagnosis and treatment of renal diseases, in monitoring renal dialysis.	Same
Specimen Type	Serum and plasma	Serum
Reagent Type	Liquid ready-for-use	Same
Assay Principle	Enzymatic reaction based on the conversion of creatinine of glycine and hydrogen peroxide	Same
Analytical Range	0.2 to 15 mg/dL	Same

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

CLSI Guideline, EP5-A2 *Evaluation of Precision Performance of Clinical Chemistry Devices – Second Edition*

CLSI Guideline, EP9-A2 *Method Comparison and Bias Estimation Using Patient Samples – Second Edition*

**L. Test Principle:**

EasyRA BUN:

For the Medica EasyRA BUN test, urea in the sample is first hydrolyzed by urease to give ammonia and carbon dioxide. The ammonia produced reacts with 2-oxoglutarate and stabilized NADH analog in the presence of glutamate dehydrogenase (GLDH) to form glutamate and NAD (II). The decrease in the concentration of the reduced cofactor (NADH), monitored at 340 nm is proportional to the concentration of the Urea in the sample.

EasyRA Creatinine:

The method uses multistep enzymatic reactions. The creatinine is hydrolyzed to sarcosine with Creatinine Amidohydrolase and Creatine Amidinohydrolase. 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.

**M. Performance Characteristics (if/when applicable):**

1. Analytical performance:

a. *Precision/Reproducibility:*

**Serum and plasma-** Precision studies were performed on the EasyRA analyzer in conjunction with the matrix comparison study with lithium heparin tubes. Duplicate plasma and serum samples from the method studies were calculated for average SD for 3 partitioned bins covering the ranges tested. The average SD in each of the 3 bins for both plasma and serum are comparable.

BUN

	Low	Medium	High
Sample Range (mg/dL)	1.0-12.5	12.5-20.0	20-70
No. of Samples	25	31	15
No. of Replicates	2	2	2
Serum Mean	10.32	16.34	38.55
Serum SD	0.23	0.28	0.34
Serum % CV	2.2	1.7	0.89
Plasma Mean	9.99	15.86	38.10
Plasma SD	0.17	0.20	0.34
Plasma % CV	1.7	1.3	0.89

CREA

	Low	Medium	High
Sample Range (mg/dL)	0.20-0.70	0.7-1.0	1.0– 15.0
No. of Samples	21	27	21
No. of Replicates	2	2	2
Serum Mean	0.58	0.82	4.96
Serum SD	0.008	0.012	0.043
Serum % CV	1.4	1.4	0.87
Plasma Mean	0.59	0.83	4.89
Plasma SD	0.008	0.009	0.061
Plasma % CV	1.3	1.1	1.24

In addition a simplified within-run precision study was performed on the EasyRA analyzer by analyzing 3 plasma patient samples using lithium heparin tubes (N=20). The within-run precision data is summarized in the table below:

	Mean	SD	%CV
BUN (mg/dL)	Level 1 - 12.5	Level 1 - 0.22	Level 1 - 1.74
	Level 2 - 18.9	Level 2 - 0.29	Level 2 - 1.53
	Level 3 - 59.4	Level 3 - 0.42	Level 3 - 0.70
Creatinine (mg/dL)	Level 1 - 0.49	Level 1 - 0.01	Level 1 - 1.03
	Level 2 - 1.17	Level 2 - 0.01	Level 2 - 0.78
	Level 3 - 10.44	Level 3 - 0.06	Level 3 - 0.57

b. *Linearity/assay reportable range:*

**Plasma** - Linearity studies were not conducted in plasma. See previously cleared linearity data in k080823 (BUN) and k080874 (Creatinine) for serum samples. The linear reportable ranges for each assay are summarized below.

	BUN	Creatinine
Linear Reportable Range	1.0-70.0 mg/dL	0.2 to 15.0 mg/dL

An extended linearity study was performed for all analytes with the EasyRA analyzer to evaluate accuracy and precision. The sponsor recommends a dilution of 1:2 when the patient BUN and creatinine results in plasma fall outside the upper measuring range of 70 mg/dL and 15.0 mg/dL, respectively. A dilution study was performed for BUN on 3 different patient plasma samples spiked with standard albumin stock solution to increase the BUN level in the range of 70 to 140 mg/dL, for creatinine 5 different patient plasma samples were spiked with standard creatinine stock solution to increase the creatinine level in the range of 15 to 30 mg/dL. Each sample was then diluted with saline at 1:2 dilution by the analyzer or manually. Each diluted sample was run in triplicate on two EasyRA analyzers. The % recovery range of the system for each analyte is provided in the table below:

	EasyRA % Recovery
BUN	100.6 to 103.7
Creatinine	97.5. to 103.2

In addition a simplified within-run precision study was performed in the extended linearity range for all analytes by analyzing 3 plasma samples, 20 consecutive times. The within-run precision data is summarized in the table below:

	Mean	SD	CV
BUN	Level 1 - 98.2	Level 1 – 0.98	Level 1 – 1.00
	Level 2 – 120	Level 2 – 1.00	Level 2 – 0.84
	Level 3 – 126.8	Level 3 – 1.57	Level 3 – 1.24
Creatinine	Level 1 - 16.4	Level 1 – 0.14	Level 1 – 0.88
	Level 2 – 22.1	Level 2 – 0.30	Level 2 – 1.36
	Level 3 – 26.1	Level 3 – 0.23	Level 3 – 0.90

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

Calibrators were previously cleared under k080823 (BUN) and k080874 (Creatinine).

d. *Detection limit:*

Limit of detection studies were not conducted for plasma. See cleared serum data under k080823 (BUN) and k080874 (Creatinine)

e. *Analytical specificity:*

Plasma interference studies were not performed. See previously cleared interference data in k080823 (BUN) and k080874 (Creatinine) for serum samples.

f. *Assay cut-off:*

Not applicable.

2. Comparison studies:

a. *Method comparison with predicate device:*

**Plasma** – See previously cleared method comparison data in k080823 (BUN), and k080874 (Creatinine) for serum samples. Plasma matrix comparison data is provided below in part (b) of this section.

b. *Matrix comparison:*

**Plasma Lithium Heparin-** A matrix comparison study was performed in conjunction with CLSI EP9-A2 guidelines using lithium heparin tubes. The study was conducted with human plasma and serum samples. 71 total samples (56 unaltered and 15 altered samples) were analyzed for BUN and 69 total samples (56 unaltered and 13 altered samples) were analyzed for creatinine. Each sample was analyzed in duplicate using the EasyRA chemistry analyzer. One single set of plasma samples were used as test samples, while duplicate serum samples were used as references. Results of the linear regression correlations are as follows:

Analyte	Slope	Intercept	R <sup>2</sup>	Sample range
BUN	1.0028	-0.4871	0.9989	5.2-63.3
Creatinine	0.9876	0.0134	0.9993	0.24-14.35

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:

Reference ranges are provided in the labeling from literature as follows:

	Serum/Plasma
BUN	11-37 mg/dL
Creatinine	0.5-1.2 mg/dL

Tietz, N.W. Textbook of Clinical Chemistry, 3<sup>rd</sup> ed., Philadelphia, PA, WB Saunders and Co.

**N. Proposed Labeling:**

The labeling is sufficient and does satisfy 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.