Creatinine PAP

DiaSystem Scandinavia AB

Diagnostic reagent for quantitative in vitro determination of creatinine in serum and urine on photometric systems

Order Information

Cat. No.	Kit size						
01 00020 70 10 0160	R1	4 x	30 mL	+	R2	4 x	10 mL
CDT-CREAP	R1	4 x	30 mL	+	R2	4 x	10 mL

Summary

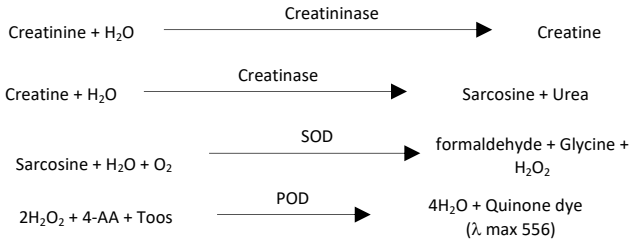
Creatinine is a chemical waste molecule that is generated from muscle metabolism. Creatinine is produced from creatine, a molecule of major importance for energy production in muscles. Approximately 2% of the body's creatine is converted to creatinine every day. Creatinine is transported through the bloodstream to the kidneys. The kidneys filter out most of the creatinine and dispose of it in the urine. The kidneys maintain the blood creatinine in a normal range. Creatinine has been found to be a fairly reliable indicator of kidney function. As the kidneys become impaired the creatinine level in the blood will rise. Abnormally high levels of creatinine thus warn of possible malfunction or failure of the kidneys, sometimes even before a patient reports any symptoms. It is for this reason that standard blood and urine tests routinely check the amount of creatinine in the blood.[1-2]

Method

Enzymatic test

Principle

Diasystem Creatinine Liquid Reagents Assay is a quick, easy to use enzymatic procedure applicable to routine laboratory instrumentation. Enzymatic methodology is a better clinical choice for the accurate measurement of creatinine, especially for neonates, pediatrics, and hematology units.[3] The enzymatic assay for creatinine involves a series of coupled enzymatic reactions including creatininase enzymatic conversion of creatinine into the product creatine which itself is converted to sarcosine by creatine amidinohydrolase (creatinase), followed by oxidation of sarcosine by sarcosine oxidase (SOD) producing hydrogen peroxide. In the presence of peroxidase (POD) the hydrogen peroxide is quantified at 550 nm by the formation of a colored dye.[4]



Any endogenous creatine present in the sample is removed by creatinase and sarcosine oxidase during pre-incubation.

Reagents

Components and Concentrations

R1:	CREATININASE	12 IU - 60 IU/mL
	Sarcosine oxidase	4 – 17 IU/mL
	TOOS	0.07 mg – 0.21 mg/mL
R2:	Creatininase	135 IU – 670 IU/mL
	4-Aminoantipyrine (4-AA)	0.3 – 0.9 mg/mL
	Peroxidase	

Storage Instructions and Reagent Stability

The reagents are stable up to the end of the indicated month of expiry, if stored at 2 – 8 °C and contamination is avoided.

Warnings and Precautions

1. Specimens containing human sourced materials should be handled as if potentially infectious using safe laboratory procedures, such as those outlined in Biosafety in Microbiological and Biomedical Laboratories (HHS Publication Number [CDC] 93-8395).
2. As with any diagnostic test procedure, results should be interpreted considering all other test results and the clinical status of the patient.
3. Avoid ingestion and contact with skin or mucous membranes. See Material Safety Data Sheet.
4. R1 and R2 reagents contain < 0.1% sodium azide (NaN3) as a preservative, which may react with lead and copper plumbing to form highly explosive metal azide. On disposal, flush with a large volume of water to prevent azide buildup. Reagents are light-sensitive. Do not let bottles remain open. Keep containers tightly stoppered.
5. N-acetylcysteine (NAC), acetaminophen, metamizole and phenindione medication leads to falsely low, eltrombopag medication to falsely low or high results in patient samples. Some clinical chemistry reagents may cause interferences. Please take care to avoid contamination and carry-over. Special caution is needed when using reagents for the measurement of triglycerides, HDL-C and LDL-C. Consumables have to be cleaned thoroughly after use with other tests. I case of automated measurements please refer to the system manual for special programs.
6. Please refer to the safety data sheets and take the necessary precautions for the use of laboratory reagents.

Waste Management

Please refer to local legal requirements.

Reagent Preparation

DiaSystem Creatinine PAP reagent is ready to use.

Materials required but not provided

NaCl solution 9 g/L
General laboratory equipment

Specimen

Serum, urine
Dilute urine 1 + 9 with NaCl solution 9 g/L

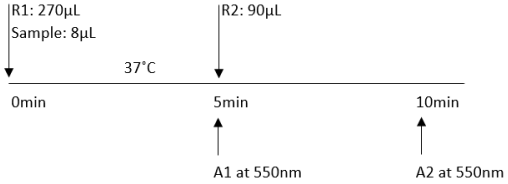
Stability [4]

in serum:	7 days	at	4 – 25 °C
	3 months	at	-20 °C
in urine:	2 days	at	20 – 25 °C
	6 days	at	4 – 8 °C
	6 months	at	-20 °C

Discard contaminated specimens!

Assay Procedure

Application sheets for automated systems are available on request.



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Calibrators and Controls

For the calibration of automated photometric systems the DiaSystem UniCal Creatinine is recommended. The calibrator values have been made traceable to NIST (National Institute for Standardization) Standard Reference Material NIST SRM 914a. For internal quality control DiaSystem UniLab Creatinine should be assayed with each batch of samples.

	Cat.-No.	Kit size
UniCal Creatinine	06 00286 70 04 0002	1 x 2 mL
UniLab Creatinine	07 00287 70 04 0002	1 x 2 mL

Performance Characteristics

Sensitivity/Limit of Detection

The limit of detection is 12 µmol/L (1.4 mg/L).

A sample with a creatinine level exceeding the linearity limit should be diluted with 0.9% saline and re-assayed incorporating the dilution factor in the calculation of the value.

Conversion factor

Creatinine [mg/L] x 88.4 = Creatinine [µmol/L]

Specificity/Interferences

The following substances normally present in serum produced less than 10% deviation at the listed concentrations: Triglyceride at 10000 mg/L, Ascorbic Acid at 10 mM, Bilirubin at 400 mg/L, Bilirubin Conjugate at 300 mg/L, Hemoglobin at 5000 mg/L. The following substances normally present in urine produced less than 10% deviation at the listed concentrations: Triglycerides at 10000 mg/L, Ascorbic Acid at 10 mM, Bilirubin at 400 mg/L, Bilirubin Conjugate at 400 mg/L, Hemoglobin at 10000 mg/L.

Precision

Assay precision was evaluated according to Clinical Laboratory Standards Institute (formerly NCCLS) EP5-A guideline. In the study, four serum specimens were tested on a Hitachi 917 twice daily, in duplicates over 20 days.

Serum Testing	**Within-Run Precision**			
	7.5 mg/L (66.3 µM)	14.1 mg/L (125 µM)	41.1 mg/L (346 µM)	102.8 mg/L (908.7 µM)
No. of Data Points	80	80	80	80
Mean mg/L (µM)	7.4 (65.4)	13.8 (122.3)	40.4 (357.5)	102.8 (908.7)
SD mg/L (µM)	0.15 (1.3)	0.15(1.37)	0.29(2.54)	0.15 (1.3)
C_V%	2.1	1.1	0.7	0.1
Serum Testing	**Total Precision**			
	7.5 mg/L (66.3 µM)	14.1 mg/L (125 µM)	41.1 mg/L (346 µM)	102.8 mg/L (908.7 µM)
No. of Data Points	80	80	80	80
Mean mg/L (µM)	7.4 (65.4)	13.8 (122.3)	40.4 (357.5)	102.8 (908.7)
SD mg/L (µM)	0.22(1.9)	0.26(2.29)	0.58(5.11)	1.4(12.4)
C_V%	3.0	1.9	1.4	1.4

Assay precision was also evaluated with urine samples with a modified EP10 protocol. For within-run precision, 21 replicates of commercial urine controls were tested. For total precision, 2 runs of each commercial urine control were performed consecutively for 5 days. The samples were diluted ten-fold with 0.9% saline and tested for Creatinine values. The values were multiplied by the dilution factor (i.e.10) to obtain the final results indicated below.

Urine Testing	**Within-Run Precision**		
	Level 1	Level 2	Level 3
No. of Data Points	21	21	21
Mean mg/L (µM)	290.9 (2572)	871 (7711)	1967 (17407)
SD mg/L (µM)	1 (8.84)	2.7 (23.60)	9.0 (79.71)
C_V%	0.36	0.31	0.46
Urine Testing	**Total Precision**		
	Level1	Level 2	Level 3
No. of Data Points	20	20	20
Mean mg/L (µM)	298.6 (2640)	877 (7765)	1950 (17265)
SD mg/L (µM)	7.9 (69.8)	6.7 (59.2)	11.9 (105.2)
C_V%	2.64	0.76	0.60

Accuracy

The performance of this assay was compared with the performance of a legally marketed creatinine assay using serum samples ranging from 2 – 135.1 mg/L (17.7 – 1194.3 µmol/L) and urine samples ranging from 1.4 – 1410 mg/L (12.4 – 12434.4 µmol/L). The serum correlation study was performed with 50 unaltered and 5 altered serum samples. The urine correlation study was performed with 42 unaltered and 9 altered urine samples. The correlation analyses are presented below for both serum and urine sample matrices.

Accuracy/Serum samples:
Correlation Coefficient: 0.9981
Slope/Intercept: y = 0.9467x + 0.0643

Accuracy/Urine samples:
Correlation Coefficient: 0.9968
Slope/Intercept: y = 1.0002x – 0.0518

Linearity

The linearity of the procedure is from 1.4-135.6 mg/L (12 - 1200 µmol/L) in serum and 1.4–1412.5 mg/L (12-12500 µmol/L) in urine. Results below 1.4 mg/L (12 µmol/L) are invalid. Results that exceed 1412.5 mg/L (12500 µmol/L) should be diluted 10-fold with saline and retested.

Reference Range

Serum/Plasma

	mg/L	**µmol/L**
Adults [3]		
Women	5 – 10	45 – 84
Men	7 – 12	59 – 104
Children [3,7]		
Neonate	3 – 10	27 – 87
Infant	2 – 4	14 – 34
Child	2 – 8	23 – 68

Morning urine [3]

Women	290 – 2260 mg/L	2.55 – 20.0 mmol/L
Men	400 – 2780 mg/L	3.54 – 24.6 mmol/L

Literature

1. Tietz, N. W. (Ed): Fundamentals of Clinical Chemistry, W. B. Saunders Co., Philadelphia, 865 (1982).
2. National Kidney Foundation K/DOQI. Clinical Practice Guidelines for chronic kidney disease: evaluation, classification, and stratification. Am J Kidney Dis 2002; 39:S1-S200.
3. Badiou S, Dupuy AM, Descomps B, Cristolead, JP. Comparison between the enzymatic vitros assay for creatinine determination and three other methods adapted on the Olympus analyzer, Journal of Clinical Laboratory Analysis 2003:17**,** 235 – 240.
4. Hayes AW. Principles and Methods of Toxicology, Taylor & Francis, 1028 (2001).
5. Cristenson RH, Johnson LJ, Gregory, LC. Appleton and Lange's Outline Review Clinical Chemistry, McGraw-Hill Professional, 118 (2001).
6. Mazzachi BC, Peake MJ, Ehrhardt V. Reference Range and Method Comparison Studies for Enzymatic and Jaffé Creatinine Assays in Plasma and Serum and Early Morning Urine. Clin Lab 2000; 46; 53-55.

Manufacturer

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