Creatinine FS*

Order Information

Cat. No.	Kit size				
1 1711 99 10 021	R1	4 x 20 mL	+	R2	1 x 20 mL
	+	1 x 3 mL	Standard		
1 1711 99 10 026	R1	5 x 80 mL	+	R2	1 x 100 mL
1 1711 99 10 023	R1	1 x 800 mL	+	R2	1 x 200 mL
1 1711 99 10 704	R1	8 x 50 mL	+	R2	8 x 12.5 mL
1 1711 99 10 917	R1	8 x 60 mL	+	R2	8 x 15 mL
1 1711 99 90 314	R1	10 x 20 mL	+	R2	2 x 30 mL

Intended Use

Diagnostic reagent for quantitative in vitro determination of creatinine in serum, plasma or urine on photometric systems.

Summary

Creatinine is a waste product excreted by the kidneys mainly by glomerular filtration. The concentration of creatinine in plasma of a healthy individual is fairly constant, independent from water intake, exercise and rate of urine production. Therefore, increased plasma creatinine values always indicate decreased excretion, i.e. impaired kidney function. Creatinine clearance is a good indicator for the glomerular filtration rate (GFR) which allows better detection of kidney diseases and monitoring of renal function. For this purpose, creatinine is measured simultaneously in serum and urine collected over a defined time period. [1,2]

Method

Kinetic test without deproteinization according to the Jaffé method

Creatinine forms a colored orange-red complex in an alkaline picrate solution. The difference in absorbance at fixed times during conversion is proportional to the concentration of creatinine in the sample.

Creatinine + Picric acid ⟶ Creatinine picrate complex

Reagents

Components and Concentrations

R1:	Sodium hydroxide	0.2 mol/L
R2:	Picric acid	20 mmol/L
Standard:		2 mg/dL (177 µmol/L)

Storage and Stability

The reagents and the standard are stable up to the date of expiry indicated on the kit, if stored at 2 – 25°C and contamination is avoided. Protect the reagents and the standard from light.

Warnings and Precautions

1. ⚠ Reagent 1: Warning. H290 May be corrosive to metals. H315 Causes skin irritation. H319 Causes serious eye irritation. P234 Keep only in original packaging. P264 Wash hands and face thoroughly after handling. P280 Wear protective gloves/protective clothing/eye protection. P302+P352 If on skin: Wash with plenty of water/soap. P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P332+P313 If skin irritation occurs: Get medical advice/attention. P337+P313 If eye irritation persists: Get medical advice/attention. P390 Absorb spillage to prevent material damage
2. ⚠ Reagent 2: Warning. H290 May be corrosive to metals. P234 Keep only in original packaging. P280 Wear protective gloves/protective clothing/eye protection. P390 Absorb spillage to prevent material damage.
3. High homogentisic acid concentrations in urine samples lead to false results.
4. In very rare cases, samples of patients with gammopathy might give falsified results [3].
5. Eltrombopag medication leads to falsely low or high results in patient samples.
6. Please refer to the safety data sheets and take the necessary precautions for the use of laboratory reagents. For diagnostic purposes, the results should always be assessed with the patient's medical history, clinical examinations and other findings.
7. For professional use only.

Waste Management

Refer to local legal requirements.

Reagent Preparation

The reagents and the standard are ready to use.

Materials Required

General laboratory equipment

Specimen

Serum, heparin plasma or urine

Stability [4]:

in serum/plasma:	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

Dilute urine 1 + 49 with dist. water; multiply the result by 50. TruLab Urine controls must be prediluted the same way as patient samples.

Only freeze once. Discard contaminated specimens.

Assay Procedure

Applications for automated systems are available on request.

Wavelength	Hg 492 nm, (490 – 510 nm)
Optical path	1 cm
Temperature	20 – 25°C/37°C
Measurement	Against reagent blank

	Blank	Sample/Standard
Sample/Standard	-	50 µL
Dist. Water	50 µL	-
Reagent 1	1000 µL	1000 µL
Mix, incubate 0 – 5 min., then add:		
Reagent 2	250 µL	250 µL
Mix and read absorbance A1 after 60 sec, read absorbance A2 after another 120 sec.		

ΔA = (A2 – A1) Sample or Standard

Calculation

With standard or calibrator

Serum/Plasma

$$\text{Creatinine [mg/dL]} = \frac{\Delta A \text{ Sample}}{\Delta A \text{ Std /Cal}} \times \text{Conc. Std/Cal [mg/dL]}$$

Urine

$$\text{Creatinine [mg/dL]} = \frac{\Delta A \text{ Sample}}{\Delta A \text{ Std /Cal}} \times \text{Conc. Std/Cal [mg/dL]} \times 50$$

Creatinine Clearance [mL/min/1.73 m^2] [5]

$$= \frac{\text{mg Creatinine/ 100 mL Urine} \times \text{mL Urine}}{\text{mg Creatinine/ 100 mL Serum} \times \text{min Urine collection time}}$$

The calculated creatinine clearance refers to the average body surface of an adult (1.73 m^2).

Calibrators and Controls

DiaSys TruCal U is recommended for calibration. TruCal U calibrator values for the compensated method have been made traceable to the NIST (National Institute for Standardization) Standard Reference Material SRM 967 using level 1 and 2 and, therefore, to GC-IDMS (gas chromatography - isotope dilution mass spectrometry). Use DiaSys TruLab N, P and TruLab Urine controls for internal quality control. Each laboratory should establish corrective action in case of deviations in control recovery.

	Cat. No.	Kit size	
TruCal U	5 9100 99 10 063	20 x	3 mL
	5 9100 99 10 064	6 x	3 mL
TruLab N	5 9000 99 10 062	20 x	5 mL
	5 9000 99 10 061	6 x	5 mL
TruLab P	5 9050 99 10 062	20 x	5 mL
	5 9050 99 10 061	6 x	5 mL
TruLab Urine Level 1	5 9170 99 10 062	20 x	5 mL
	5 9170 99 10 061	6 x	5 mL
TruLab Urine Level 2	5 9180 99 10 062	20 x	5 mL
	5 9180 99 10 061	6 x	5 mL
Creatinine Standard FS	1 1700 99 10 030	6 x	3 mL

Compensated Method

Picric acid which forms the colored complex reacts unspecifically with interfering serum components, so-called pseudo-creatinines. This leads to falsely elevated creatinine values in serum and plasma samples especially in the low measuring range. To compensate these interferences, the calibrator value for the compensated method indicated in the value sheet of TruCal U has to be used for calculation. Additionally, 0.3 mg/dL (27 µmol/L) has to be subtracted from the calculated creatinine value. For use of the compensated method, calibration with the calibrator TruCal U is strictly recommended. The method is applicable only for serum and plasma samples. The compensated method is traceable to GC-IDMS. [6,7]

Performance Characteristics

Data evaluated on BioMajesty® JCA-BM6010/C

Exemplary data mentioned below may slightly differ in case of deviating measurement conditions.

Measuring range up to 14 mg/dL. When values exceed this range samples should be diluted 1 + 1 with NaCl solution (9 g/L) and the result multiplied by 2.

Limit of detection**	0.1 mg/dL

Interfering substance	**Interferences ≤ 10% up to**
Ascorbic acid	30 mg/dL
Bilirubin (conjugated)	3 mg/dL
Bilirubin (unconjugated)	1.5 mg/dL
Hemoglobin	600 mg/dL
Lipemia (triglycerides)	1800 mg/dL
For further information on interfering substances refer to Young DS [8,9].	

Precision (Serum/Plasma)			
Within run (n=20)	**Sample 1**	**Sample 2**	**Sample 3**
Mean [mg/dL]	0.66	1.52	4.70
CV [%]	1.49	1.26	0.70
Between day (n=20)	**Sample 1**	**Sample 2**	**Sample 3**
Mean [mg/dL]	0.64	1.50	4.65
CV [%]	3.07	2.05	0.94

Method comparison (Serum/Plasma; n=98)	
Test x	DiaSys Creatinine FS
Test y	Competitor Creatinine
Slope	1.03
Intercept	0.029 mg/dL
Coefficient of correlation	0.9998

Precision (Urine)			
Within run (n=20)	**Sample 1**	**Sample 2**	**Sample 3**
Mean [mg/dL]	27.8	58.3	107
CV [%]	1.03	0.63	0.67
Between day (n=20)	**Sample 1**	**Sample 2**	**Sample 3**
Mean [mg/dL]	35.4	60.5	123
CV [%]	2.74	2.13	1.81

Method comparison (Urine; n=99)	
Test x	DiaSys Creatinine FS
Test y	Competitor Creatinine
Slope	0.957
Intercept	0.113 mg/dL
Coefficient of correlation	0.9999

** lowest measurable concentration which can be distinguished from zero; mean + 3 SD (n = 20) of an analyte free specimen.

Conversion Factor
Creatinine [mg/dL] x 88.4 = Creatinine [µmol/L]
Creatinine [mg/dL] x 0.0884 = Creatinine [mmol/L]

Reference Range

Serum/Plasma, Jaffé-method not compensated

	mg/dL	µmol/L
Adults [1]		
Women	0.6 – 1.1	53 – 97
Men	0.7 – 1.3	62 – 115
Children [2,10]		
Neonate	0.5 – 1.2	44 – 106
Infant	0.4 – 0.7	35 – 62
Child	0.5 – 1.2	44 – 106

Serum/Plasma, Jaffé-method compensated

	mg/dL	µmol/L
Adults [6]		
Women	0.5 – 0.9	44 – 80
Men	0.7 – 1.2	62 – 106
Children [11]		
Neonate	0.24 – 1.04	21 – 92
Infant	0.17 – 0.42	15 – 37
Child	0.24 – 0.87	21 – 77

24h urine [1]

Women	11 – 20 mg/kg/24h	97 – 177 µmol/kg/24h
Men	14 – 26 mg/kg/24h	124 – 230 µmol/kg/24h

Albumin/creatinine ratio (early morning urine) [12]:
< 30 mg/g Creatinine

Creatinine clearance [2]

Women	95 – 160 mL/min/1.73 m^2
Men	98 – 156 mL/min/1.73 m^2

Each laboratory should check if the reference ranges are transferable to its own patient population and determine own reference ranges if necessary.

Literature

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DiaSys Diagnostic Systems GmbH
Alte Strasse 9 65558 Holzheim Germany
www.diasys-diagnostics.com

* Fluid Stable