Creatinine Jaffé

Compensated Method for Serum and Plasma

Order information

COBAS INTEGRA® Creatinine Jaffé	700 Tests	Cat. No. 20764345 System-ID 07 6434 5
Calibrator f.a.s.	12 × 3 mL	Cat. No. 10759350 System-ID 07 3718 6
Precinorm® U	20 × 5 mL	Cat. No. 10171743 System-ID 07 7997 0
Precipath® U	20 × 5 mL	Cat. No. 10171778 System-ID 07 7998 9
Precinorm® U plus	10 × 3 mL	Cat. No. 12149435 System-ID 07 7999 7
Precipath® U plus	10 × 3 mL	Cat. No. 12149443 System-ID 07 8000 6

● Indicates analyzer(s) on which cassette can be used

INTEGRA 400/ 400 plus	INTEGRA/ INTEGRA 700	INTEGRA 800
●	●	●

Intended use

The cassette COBAS INTEGRA Creatinine Jaffé (CREAJ) contains an in vitro diagnostic reagent system intended for use on COBAS INTEGRA systems for the quantitative determination of the creatinine concentration in serum and plasma. This method sheet describes the applications for serum and plasma (compensated method[1]) (test CREJC, 0-433 on INTEGRA 400, 0-233 on INTEGRA 700/800).

Summary[2]

Serum creatinine is a waste product formed by the spontaneous dehydration of body creatine. Most of the body creatine is found in muscle tissue where it is present as creatine phosphate and serves as a high energy storage reservoir for conversion to adenosine triphosphate. The rate of creatinine formation is fairly constant with 1 to 2 percent of the body creatine being converted to creatinine every 24 hours.
Serum creatinine and urea levels are elevated in patients with renal malfunction, especially decreased glomerular filtration. In the early stages of kidney damage, the rise in the serum urea levels usually precedes the increase in serum creatinine. The advantage is offset by the fact that serum urea levels are affected by factors such as diet, degree of hydration and protein metabolism. Serum creatinine levels on the other hand tend to be constant and unaffected by factors affecting serum urea levels. Thus serum creatinine is a significantly more reliable renal function screening test than serum urea.
A considerably more sensitive test for measuring glomerular filtration is the creatinine clearance test. For this test a precisely timed urine collection (usually 24 hours) and a blood sample are needed.

Test principle

Buffered kinetic Jaffé reaction without deproteinization. Compensated for serum/plasma.[3,4,5]
In alkaline solution creatinine reacts with picrate to form a yellow-red adduct.

Creatinine + picric acid $\xrightarrow{\text{Alkaline pH}}$ yellow-red complex

The rate of the dye formation (color intensity) is directly proportional to the creatinine concentration in the specimen. It is determined by measuring the increase in absorbance at 512 nm. Serum and plasma samples contain proteins which react non-specifically in the Jaffé method. For compensation of serum and plasma results, values are automatically corrected by -18 µmol/L (-0.2 mg/dL).

Reagents - working solutions

R1 Alkaline buffer in vial B (liquid).
R2 = SR Picric acid in vial C (liquid).

Active ingredients

Components	Concentrations R1	SR	Test	
Potassium hydroxide	900		80	mmol/L
Phosphate	135		12	mmol/L
Picric acid		50	4.4	mmol/L
pH	≥13.5	6.5	13	

Reagent SR contains a nonreactive buffer.
Please see cassette label for reagent filling volumes.

Precautions and warnings

Pay attention to all precautions and warnings listed in Chapter 1, Introduction.
This kit contains components classified as follows according to the European Directive 88/379/EEC:


C
R1 contains potassium hydroxide 5% w/w.
Corrosive
R 35 Causes severe burns.
S 26-37/39-45 In case of contact with eyes rinse immediately with plenty of water and seek medical advice. In case of possible direct contact with the reagent, wear suitable gloves and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Contact phone: all countries: +49-621-7590,
USA: +1-800-428-2336

Reagent handling

Ready for use.

Storage and stability

Shelf life at 15 to 25°C	See expiration date on cassette
INTEGRA 400	
On-board in use at 10 to 15°C	8 weeks
INTEGRA 700/800	
On-board in use at 8°C	8 weeks

Specimen collection and preparation[6]

Only the specimens listed below were tested and found acceptable.
Serum (free from lipemia): Collect serum using standard sampling tubes.
Plasma (free from lipemia): Li-heparin or EDTA plasma.
When processing samples in primary tubes, follow the instructions of the tube manufacturer.

Stability in *serum/plasma:*	7 days at 20-25°C
	7 days at 4-8°C
	3 months at -20°C

Centrifuge samples containing precipitates before performing the assay.

Materials provided

See "Reagents - working solutions" section for reagents.

Assay

For optimal performance of the assay follow the directions given in this document for the analyzer concerned. Refer to the appropriate operator manual for analyzer-specific assay instructions.

Applications for serum and plasma

INTEGRA 400 test definition

Measuring mode	Absorbance
Abs. calculation mode	Kinetic
Reaction direction	Increase
Wavelength A/B	512/583 nm
Calc. first/last	40/49
Reaction mode	R1-S-SR
Test range	36[a]-1300 µmol/L (0.4-15 mg/dL)
with postdilution	36-13 000 µmol/L (0.4-150 mg/dL)
Postdilution factor	10 recommended
Unit	µmol/L
Compensation	-18 µmol/L (-0.2 mg/dL)

a) Cumulative value of technical limit (18 µmol/L) and bias from compensation step (18 µmol/L).

Pipetting parameters

		Diluent (H_2O)
R1	13 µL	71 µL
Sample	10 µL	20 µL
SR	13 µL	20 µL
Total volume	147 µL	

INTEGRA 700/800 test definition

Measuring mode	Absorbance
Abs. calculation mode	Kinetic
Reaction direction	Increase
Wavelength A/B	512/583 nm
Calc. first/last	55/70
Reaction mode	R1-S-SR
Test range	36[b]-1300 µmol/L (0.4-15 mg/dL)
with postdilution	36-13 000 µmol/L (0.4-150 mg/dL)
Postdilution factor	10 recommended
Unit	µmol/L
Compensation	-18 µmol/L (-0.2 mg/dL)

b) Cumulative value of technical limit (18 µmol/L) and bias from compensation step (18 µmol/L).

Pipetting parameters

		Diluent (H_2O)
R1	13 µL	41 µL
Sample	10 µL	30 µL
SR	13 µL	40 µL
Total volume	147 µL	

Calibration

Calibrator	Calibrator f.a.s.
	Use deionized water as zero calibrator.
Calibration mode	Linear regression
Calibration replicate	Duplicate recommended
Calibration interval	Each cassette and 7 days (INTEGRA 400), and as required following quality control procedures
	Each lot (INTEGRA 700/800) and as required following quality control procedures

Traceability:[7] This method has been standardized against ID/MS.[c] For the USA, this method has been standardized against a primary reference material (SRM[d] 914).
c) Isotope Dilution Mass Spectrometry
d) Standard Reference Material

Quality control

Quality control serum, plasma	Precinorm U or Precinorm U plus
	Precipath U or Precipath U plus
Control interval	24 hours recommended
Control sequence	User defined
Control after calibration	Recommended

Calculation

COBAS INTEGRA analyzers automatically calculate the analyte concentration of each sample. For more details please refer to Chapter 7, Data Analysis, User Manual (COBAS INTEGRA 700), or to Data analysis in the online Help (COBAS INTEGRA 400/800).

Conversion factor: µmol/L × 0.0113 = mg/dL

Limitations - interference

Criterion: Recovery in the creatinine decision range for adults (90 µmol/L in serum) within ±10% of initial value.

Hemolysis	INTEGRA 400: No significant interference up to an H index of 800 (approximate hemoglobin concentration: 800 mg/dL or 497 µmol/L).
	INTEGRA 700/800: No significant interference up to an H index of 400 (approximate hemoglobin concentration: 400 mg/dL or 248 µmol/L).
	Do not use Creatinine Jaffé when testing for creatinine in hemolyzed samples from neonates, infants or adults with an HbF level of ≥60 mg/dL (INTEGRA 400) or ≥30 mg/dL (INTEGRA 700/800).
Icterus	INTEGRA 400/700/800: No significant interference up to an I index of 5 (approximate conjugated and unconjugated bilirubin concentration: 5 mg/dL or 85 µmol/L).

Lipemia (Intralipid)	INTEGRA 400/700/800: No significant interference up to an L index of 250. There is poor correlation between the L index (corresponds to turbidity) and triglycerides concentration.
Other	In very rare cases gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results.

Values <0.2 mg/dL (<18 µmol/L) or negative results are reported in rare cases in children <3 years and elderly patients. In such cases use the Creatinine plus test to assay the sample.
Estimation of the Glomerular Filtration Rate (GFR) on the basis of the Schwartz Formula can lead to an overestimation.[8]
For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

Expected values

Adults[9]		
Females	44-80 µmol/L	(0.50-0.90 mg/dL)
Males	62-106 µmol/L	(0.70-1.20 mg/dL)
Children[10]		
Neonates (premature)	25-91 µmol/L	(0.29-1.04 mg/dL)
Neonates (full term)	21-75 µmol/L	(0.24-0.85 mg/dL)
2-12 m	15-37 µmol/L	(0.17-0.42 mg/dL)
1-<3 y	21-36 µmol/L	(0.24-0.41 mg/dL)
3-<5 y	27-42 µmol/L	(0.31-0.47 mg/dL)
5-<7 y	28-52 µmol/L	(0.32-0.59 mg/dL)
7-<9 y	35-53 µmol/L	(0.40-0.60 mg/dL)
9-<11 y	34-65 µmol/L	(0.39-0.73 mg/dL)
11-<13 y	46-70 µmol/L	(0.53-0.79 mg/dL)
13-<15 y	50-77 µmol/L	(0.57-0.87 mg/dL)

Creatinine clearance for adults[11,12] 71-151 mL/min

Refer to reference 8 for a prospective study on creatinine clearance in children.[8]

Each laboratory should investigate the transferability of the expected values to its own patient population and if necessary determine its own reference ranges.

Specific performance data for serum and plasma[7]

Representative performance data on the COBAS INTEGRA analyzers are given below. Results obtained in individual laboratories may differ.

Precision

Reproducibility was determined using human samples and controls in an internal protocol (within run n = 21, between run n = 21). The following results were obtained.

	Level 1	Level 2
Mean	66.0 µmol/L (0.75 mg/dL)	330 µmol/L (3.73 mg/dL)
CV within run	3.1%	1.4%
Mean	65.6 µmol/L (0.74 mg/dL)	323 µmol/L (3.65 mg/dL)
CV between run	2.8%	1.3%

Analytical sensitivity (lower detection limit)

18 µmol/L (0.2 mg/dL)
The detection limit represents the lowest measurable analyte level that can be distinguished from zero. It is calculated on the basis of precision studies with human sera (between day, n = 10).

Method comparison

Creatinine values for human serum and plasma samples obtained on COBAS INTEGRA 700 with the cassette COBAS INTEGRA Creatinine Jaffé (compensated method) were compared to those determined with commercially available reagents for creatinine on COBAS INTEGRA 700 (Creatinine plus method).
Values ranged from 20.2 to 821 µmol/L (0.23 to 9.29 mg/dL).

		COBAS INTEGRA 700
Method		enzymatic
Sample size	(n)	90
Corr. coefficient	(r)	0.999
Lin. regression		$y = 1.03x - 1.81$ µmol/L
Passing Bablok		$y = 1.03x - 2.58$ µmol/L

References

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