Clinical Chemistry

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A93A01237EEN

ABX Pentra Urea CP

REF A11A01641
REAGENT 1 60 mL
REAGENT 2 15 mL

IVD CE

HORIBA ABX SAS
Parc Euromédecine
Rue du Caducée
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34184 Montpellier Cedex 4
FRANCE

- **Pentra C200**

Diagnostic reagent for quantitative *in vitro* determination of Urea / Blood Urea Nitrogen in serum, plasma and urine by colorimetry.

Application Release

Serum, plasma: UREA

01.xx

Urine: UREA

01.xx

Intended Use

ABX Pentra Urea CP reagent is intended for the quantitative *in vitro* diagnostic determination of urea/urea nitrogen (an end-product of nitrogen metabolism) in human serum, plasma and urine based on an enzymatic UV test using urease and glutamate dehydrogenase. Measurements obtained by this device are used in the diagnosis and treatment of certain renal and metabolic diseases.

Clinical Interest (1, 2)

Urea is the nitrogen-containing end product of protein catabolism. States associated with elevated levels of urea in blood are referred to as hyperuremia or azotemia. Parallel determination of urea and creatinine is performed to differentiate between pre-renal and post-renal azotemia. Pre-renal azotemia, caused by e.g. dehydration, increased protein catabolism, cortisol treatment or decreased renal perfusion, leads to increased urea levels, while creatinine values remain within the reference range. In post-renal azotemias, caused by the obstruction of the urinary tract, both urea and creatinine levels rise, but creatinine in a smaller extent. In renal diseases urea concentrations are elevated when the glomerular filtration rate is markedly reduced and when the protein intake is higher than 200 g/ day.

Method (3)

''Urease - GLDH'': enzymatic UV test.

$$\text{Urea} + 2H_2O \xrightarrow{\text{Urease}} 2NH_4^+ + 2\,HCO_3^-$$

$$\text{2-Oxoglutarate} + NH_4^+ + \text{NADH} \xrightarrow{\text{GLDH}} \text{L-Glutamate} + NAD^+ + H_2O$$

(GLDH = Glutamate dehydrogenase)

Reagents

ABX Pentra Urea CP is ready-to-use.

Reagent 1:	
TRIS pH 7.8	150 mmol/L
2-Oxoglutarate	9 mmol/L
ADP	0.75 mmol/L
Urease	≥ 7 kU/L
GLDH (Glutamate dehydrogenase)	≥ 1 kU/L
Sodium azide	< 1 g/L
Reagent 2:	
NADH	1.3 mmol/L
Sodium azide	< 1 g/L

ABX Pentra Urea CP should be used according to this notice. The manufacturer cannot guarantee its performance if used otherwise.

Handling

1. Remove both caps of the cassette.

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2. If present, remove foam by using a plastic pipette.
3. Place the cassette into the refrigerated Pentra C200 reagent compartment.

Calibrator

For calibration, use:
ABX Pentra Multical (A11A01652) (not included)
10 x 3 mL (lyophilisate)

Control [a]

For internal quality control, use:

- **ABX Pentra N Control / ABX Pentra N MultiControl** (A11A01653 / 1300054414) (not included)
  10 x 5 mL (lyophilisate)
- **ABX Pentra P Control / ABX Pentra P MultiControl** (A11A01654 / 1300054415) (not included)
  10 x 5 mL (lyophilisate)
- **ABX Pentra Urine Control L/H / Yumizen C Urine Level 1 Control** (A11A01674 / 1300023946) (not included)
  1 x 10 mL + 1 x 10 mL / 6 x 5 mL
- **Yumizen C Urine Level 2 Control** (1300023947) (not included)
  6 x 5 mL

Each control should be assayed daily and/or after a calibration.
The frequency of controls and the confidence intervals should correspond to laboratory guidelines and country-specific directives. You should follow federal, state and local guidelines for testing quality control materials. The results must be within the range of the defined confidence limits. Each laboratory should establish a procedure to follow if the results exceed these confidence limits.

Materials Required but not Provided [a]

- Automated clinical chemistry analyzer: Pentra C200
- Calibrator: **ABX Pentra Multical** (A11A01652)
- Controls:
  ABX Pentra N Control / ABX Pentra N MultiControl (A11A01653 / 1300054414)
  ABX Pentra P Control / ABX Pentra P MultiControl (A11A01654 / 1300054415)
  ABX Pentra Urine Control L/H / Yumizen C Urine Level 1 Control (A11A01674 / 1300023946)
  Yumizen C Urine Level 2 Control (1300023947)
- Standard laboratory equipment.

Specimen

- Serum.
- Plasma in lithium heparin.
- Fresh urine

Anticoagulants other than those listed have not been tested by HORIBA Medical and are therefore not recommended for use with this assay.

Stability in serum/plasma (1):
2 days at room temperature
1 week at 4-8°C

Stability in urine (4):
4 weeks at - 20°C if pH < 7.0
4 days at 4-8°C if pH < 7.0
2 days at 20-25°C if pH < 7.0

Reference Range

Each laboratory should establish its own reference ranges. The values given here are used as guidelines only.

Serum, plasma (1)**:**

	Urea		BUN
Adults:	**[mg/dL]**	**[mmol/L]**	**[mg/dL]**
Global	17 - 43	2.8 - 7.2	7.9 - 20.2
Women < 50 years	15 - 40	2.6 - 6.7	7.3 - 18.8
Women > 50 years	21 - 43	3.5 - 7.2	9.8 - 20.2
Men < 50 years	19 - 44	3.2 - 7.3	9.0 - 20.5
Men > 50 years	18 - 55	3.0 - 9.2	8.4 - 25.8

	Urea		BUN
Children:	**[mg/dL]**	**[mmol/L]**	**[mg/dL]**
1 - 3 years	11 - 36	1.8 - 6.0	5.1 - 16.8
4 - 13 years	15 - 36	2.5 - 6.0	7.0 - 16.8
14 - 19 years	18 - 45	2.9 - 7.5	8.1 - 21.1

Urine (5):

Urea [mmol/24h]	BUN [mg/24h]
430 - 710	1207 - 1993

[a]Modification: new control.

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Storage and Stability

Stability before opening:

Stable up to the expiry date on the label if stored at 2-8°C.

Stability after opening:

Refer to the paragraph "Performance on Pentra C200".

Do not freeze.

Waste Management

- Please refer to local legal requirements.
- This reagent contains less than 0.1% of sodium azide as a preservative. Sodium azide may react with lead and copper to form explosive metal azides.

General Precautions

- This reagent is for professional *in vitro* diagnostic use only.
- For prescription use only.
- This reagent is classified as non-hazardous in compliance with regulation (EC) N°.1272/2008.
- **Reagent 1 (R1):**
  Warning: This reagent is obtained from substances of animal origin. Consequently, it should be treated as potentially infectious and handled with the appropriate cautions in accordance with good laboratory practices (6).
- Do not pipette by mouth.
- Do not replenish the reagents.
- Do not swallow. Avoid contact with skin and mucous membranes.
- Observe the standard laboratory precautions for use.
- The reagent cassettes are disposable and should be disposed of in accordance with the local legal requirements.
- Please refer to the SDS associated with the reagent.
- Do not use the product if there is visible evidence of biological, chemical or physical deterioration.
- It is the user's responsibility to verify that this document is applicable to the reagent used.

Performance on Pentra C200

The performance data listed below have been obtained on the Pentra C200 analyzer.

Serum, plasma

Number of tests: approximately 271 tests

On Board Reagent Stability

Once opened, the reagent cassette placed in the refrigerated Pentra C200 compartment is stable for 54 days.

Sample Volume: 3 µL/test

Limit of Quantitation

The limit of quantitation is determined according to CLSI (NCCLS), EP17-A protocol (7) and equals:
Urea: 0.58 mmol/L (3.48 mg/dL)
BUN: 1.63 mg/dL

Accuracy and Precision

Repeatability (within-run precision)

Repeatability according to the recommendations found in the Valtec protocol (8) with samples tested 20 times:

- 2 controls
- 3 specimens (low / medium / high levels)

	Mean value Urea		CV %
	mmol/L	mg/dL	
Control specimen 1	7.07	42.44	2.31
Control specimen 2	24.56	147.35	0.58
Specimen 1	2.84	17.01	4.06
Specimen 2	10.3	62.09	1.04
Specimen 3	24.42	146.51	0.49

	Mean value BUN (mg/dL)	CV %
Control specimen 1	19.86	2.31
Control specimen 2	68.96	0.58
Specimen 1	7.96	4.06
Specimen 2	29.06	1.04
Specimen 3	68.57	0.49

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Reproducibility (total precision)

Reproducibility according to the recommendations found in the CLSI (NCCLS), EP5-A2 protocol (9) with samples tested in duplicate for 20 days (2 series per day):

- 2 controls
- 3 specimens (low / medium / high levels)

	Mean value Urea		CV %
	mmol/L	mg/dL	
Control specimen 1	7.26	43.58	2.79
Control specimen 2	24.67	148.01	1.45
Specimen 1	2.93	17.58	5.74
Specimen 2	10.55	63.29	2.07
Specimen 3	24.64	147.82	1.84

	Mean value BUN (mg/dL)	CV %
Control specimen 1	20.40	2.79
Control specimen 2	69.27	1.45
Specimen 1	8.23	5.74
Specimen 2	29.62	2.07
Specimen 3	69.18	1.84

Measuring Range

Urea:

The assay confirmed a measuring range from 0.58 to 35.00 mmol/L (3.48 to 210.00 mg/dL), with an automatic post-dilution up to 175 mmol/L (1050 mg/dL).
The reagent linearity has been assessed up to 35.00 mmol/L (210.2 mg/dL) according to the recommendations found in the CLSI (NCCLS), EP6-A protocol (10).

BUN:

The assay confirmed a measuring range from 1.63 to 98.30 mg/dL, with an automatic post-dilution up to 491.5 mg/dL.
The reagent linearity has been assessed up to 98.3 mg/dL according to the recommendations found in the CLSI (NCCLS), EP6-A protocol (10).

Correlation

81 patient samples (serum and plasma) are correlated with a commercial reagent taken as reference according to the recommendations found in the CLSI (NCCLS), EP9-A2 protocol (11).

Values ranged for Urea from 0.85 to 32.12 mmol/L (5.12 to 192.73 mg/dL).

Values ranged for BUN from 2.40 to 90.20 mg/dL.

The equation for the allometric line obtained using Passing-Bablok regression procedure (12) is:

Urea:

$Y = 1.00 X + 0.04$ (mmol/L)

with a correlation coefficient $r^2 = 0.992$

BUN:

$Y = 1.01 X + 0.11$ (mg/dL)

with a correlation coefficient $r^2 = 0.992$

Interferences

Haemoglobin: No significant influence is observed up to 290 µmol/L (500 mg/dL).
Triglycerides: No significant influence is observed up to an Intralipid® concentration (representative of lipemia) of 7.0 mmol/L (612.5 mg/dL).
Total Bilirubin: No significant influence is observed up to 380 µmol/L (22.2 mg/dL).
Direct Bilirubin: No significant influence is observed up to 380 µmol/L (22.2 mg/dL).

Other limitations are given by Young as a list of drugs and preanalytical variables known to affect this methodology (13, 14).

Calibration Stability

The reagent is calibrated on Day 0. The calibration stability is checked by testing 2 control specimens.
The calibration stability is 35 days.
Note: A recalibration is recommended when reagent lots change, and when quality control results fall outside the range established.

Urine

Number of tests: approximately 271 tests

On Board Reagent Stability

Once opened, the reagent cassette placed in the refrigerated Pentra C200 compartment is stable for 54 days.

Sample volume: 3 µL/test

Limit of Quantitation

The limit of quantitation is determined according to CLSI (NCCLS), EP17-A protocol (7) and equals:

Urea: 14.28 mmol/L (85.7 mg/dL)

BUN: 40.10 mg/dL

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Accuracy and Precision

Repeatability (within-run precision)

Repeatability according to the recommendations found in the Valtec protocol (8) with samples tested 20 times:

- 2 controls
- 3 specimens (low / medium / high levels)

	Mean value Urea		CV %
	mmol/L	mg/dL	
Control specimen 1	171.64	1030	2.31
Control specimen 2	277.76	1667	3.11
Specimen 1	94.12	565	3.79
Specimen 2	173.71	1042	2.90
Specimen 3	322.02	1932	1.46

	Mean value BUN (mg/dL)	CV %
Control specimen 1	482.0	2.31
Control specimen 2	780.0	3.11
Specimen 1	264.3	3.79
Specimen 2	487.8	2.90
Specimen 3	904.2	1.46

Reproducibility (total precision)

Reproducibility according to the recommendations found in the CLSI (NCCLS), EP5-A2 protocol (9) with samples tested in duplicate for 20 days (2 series per day):

- 2 controls
- 3 specimens (low / medium / high levels)

	Mean value Urea		CV %
	mmol/L	mg/dL	
Control specimen 1	164.9	989	4.31
Control specimen 2	257.9	1547	3.76
Specimen 1	81.3	488	5.42
Specimen 2	135.5	813	3.67
Specimen 3	312.9	1878	3.90

	Mean value BUN (mg/dL)	CV %
Control specimen 1	463	4.31
Control specimen 2	724	3.76
Specimen 1	228	5.42
Specimen 2	380	3.67
Specimen 3	879	3.90

Measuring Range

Urea:

The assay confirmed a measuring range from 14 to 700 mmol/L (84 to 4200 mg/dL), with an automatic post-dilution up to 175 mmol/L (1050 mg/dL).

The reagent linearity has been assessed up to 700 mmol/L (4200 mg/dL) according to the recommendations found in the CLSI (NCCLS), EP6-A protocol (10).

BUN:

The assay confirmed a measuring range from 29.04 to 1911.61 mg/dL, with an automatic post-dilution up to 491.5 mg/dL.

The reagent linearity has been assessed up to 1965.6 mg/dL according to the recommendations found in the CLSI (NCCLS), EP6-A protocol (10).

Correlation

90 patient samples (urine) are correlated with a commercial reagent taken as reference according to the recommendations found in the CLSI (NCCLS), EP9-A2 protocol (11).

Values ranged for Urea from 10.34 to 680.77 mmol/L (62.1 to 4084.6 mg/L).

Values ranged for BUN from 29.04 to 1911.61 mg/dL.

The equation for the allometric line obtained using Passing-Bablok regression procedure (12) is:

Urea:

$Y = 1.12 X + 4.94$ (mmol/L)

with a correlation coefficient $r^2 = 0.9936$

BUN:

$Y = 1.12 X + 82.80$ (mg/dL)

with a correlation coefficient $r^2 = 0.9936$

Interferences

Haemoglobin: No significant influence is observed up to 200 µmol/L (345 mg/dL).

Intralipid: No significant influence is observed up to a turbidity of Intralipid (as Intralipid®, representative of lipemia) of 7.0 mmol/L (612.5 mg/dL).

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Direct Bilirubin: No significant influence is observed up to 627 µmol/L (36.7 mg/dL).
Ascorbic Acid: No significant influence is observed up to 3.35 mmol/L (59.0 mg/dL).
*Other limitations are given by Young as a list of drugs and preanalytical variables known to affect this methodology (*13, 14*).*

Calibration Stability

The reagent is calibrated on Day 0. The calibration stability is checked by testing 2 control specimens.
The calibration stability is 35 days.
Note: A recalibration is recommended when reagent lots change, and when quality control results fall outside the range established.

Conversion Factor (1)

Urea (mmol/L) = Urea (mg/dL) x 0.1665
BUN (mg/dL) = Urea (mg/dL)/ 2.14
BUN (mg/dL) = Urea (mmoL/L) / 0.3561

Reference

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