MAYO CLINIC LABORATORIES

Test Definition: CARU

Cyclic Adenosine Monophosphate (cAMP), Urinary Excretion, Serum and Urine

Overview

Useful For

Differential diagnosis of hypercalcemia

As an adjunct to serum parathyroid hormone measurements, especially in the diagnosis of parathyroid hormone resistance states, such as pseudohypoparathyroidism

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
ACREA	Creatinine, S	Yes, (order CRTS1)	Yes
CAMP	Cyclic Amp, Urinary Excretion	No	Yes
CRETR	Creatinine, Random, U	Yes, (order RCTUR)	Yes

Method Name

ACREA, CRETR: Enzymatic Colorimetric Assay
CAMP: Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)

NY State Available

Yes

Specimen

Specimen Type

Serum
Urine

Specimen Required

Both serum and urine are required. Serum must be obtained at the time of the urine collection.

Specimen Type: Serum
Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 1 mL
Collection Instructions:

1. Serum gel tubes should be centrifuged within 2 hours of collection.
2. Red-top tubes should be centrifuged, and the serum aliquoted into a plastic vial within 2 hours of collection.
3. Label specimen as serum.

Specimen Type: Urine
Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Container/Tube: Plastic vial
Specimen Volume: 5 mL
Collection Instructions:
1. Collect a random urine specimen.
2. Label specimen as urine.

Specimen Minimum Volume

Serum: 0.5 mL
Urine: 2.0 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	7 days	
	Frozen	90 days	
Urine	Refrigerated (preferred)	28 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Adenosine cyclic 3',5'-monophosphate (cAMP) functions as an intracellular "second messenger" regulating the activity of intracellular enzymes or proteins in response to a variety of hormones (eg, parathyroid hormone).

Urinary cAMP is elevated in about 85% of patients with hyperparathyroidism.

Reference Values

CYCLIC AMP
1.3-3.7 nmol/dL of glomerular filtrate

CREATININE, SERUM
Males
0-11 months: 0.17-0.42 mg/dL
1-5 years: 0.19-0.49 mg/dL
6-10 years: 0.26-0.61 mg/dL
11-14 years: 0.35-0.86 mg/dL
> or =15 years: 0.74-1.35 mg/dL

Females
0-11 months: 0.17-0.42 mg/dL
1-5 years: 0.19-0.49 mg/dL
6-10 years: 0.26-0.61 mg/dL
11-15 years: 0.35-0.86 mg/dL
> or =16 years: 0.59-1.04 mg/dL

CREATININE, URINE
No reference values apply. Interpret with other clinical data.

Interpretation
Urinary adenosine cyclic 3',5'-monophosphate (cAMP) is elevated in about 85% of patients with hyperparathyroidism and in about 50% of patients with humoral hypercalcemia of malignancy.

Cautions
Parathyroid suppression (hypoparathyroidism) does not lower urinary adenosine cyclic 3',5'-monophosphate (cAMP) excretion to definitively subnormal values.

Clinical Reference
1. Aurbach GD, Marx SJ, Spiegel AM: Parathyroid hormone, calcitonin, and the calciferols. In: Wilson JD, Foster DW, eds. Williams Textbook of Endocrinology. 8th ed. WB Saunders Company; 1992:1413-1415
2. Melmed S, Auchus RJ, Goldfine AB, Koenig RJ, Rosen CJ, eds. Williams Textbook of Endocrinology. 14th ed. Elsevier; 2020

Performance

Method Description
Adenosine 3',5'-cyclic monophosphate (cAMP) is isolated from the urine using a single anion exchange column. An internal standard (8-methyl amino cAMP) is used to correct for recovery losses. Once the cAMP has been eluted from the column, it is added to a solution and injected onto the liquid chromatography tandem mass spectrometry system. Quantitation is by peak area measurement against a calibration standard containing known quantities of cAMP and internal standard. Urine and serum creatinine levels are used to determine the clearance of cAMP from the kidneys.(Unpublished Mayo method)

Creatinine:

The enzymatic method is based on the determination of sarcosine from creatinine with the aid of creatininase, creatinase, and sarcosine oxidase. The liberated hydrogen peroxide is measured via a modified Trinder reaction using a colorimetric indicator. Optimization of the buffer system and the colorimetric indicator enables the creatinine concentration to be quantified both precisely and specifically.(Package insert: Creatinine plus v2. Roche Diagnostics; V15.0, 03/2019)

PDF Report
No

Day(s) Performed
Wednesday

Report Available
2 to 9 days

Specimen Retention Time
14 days

Performing Laboratory Location
Rochester

Fees & Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification
This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information
82030
82570
82565

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CARU	Cyclic Amp, Urinary Excretion	21052-6

Result ID	Test Result Name	Result LOINC® Value

179	Cyclic Amp, Urinary Excretion	22712-4
ACREA	Creatinine, S	2160-0
CRETR	Creatinine, Random, U	2161-8