MAYO CLINIC LABORATORIES

# Test Definition: CARU

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

## Overview

### Useful For

Differential diagnosis of hypercalcemia

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 time of urine collection**.

**Specimen Type:** Serum
**Container/Tube:**
**Preferred:** Serum gel
**Acceptable:** Red top
**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 within 2 hours of collection.
3. Label specimen as serum.

**Specimen Type:** Urine
**Supplies:** Sarstedt 5 mL Aliquot Tube (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 definitely 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. Badiu C MD, PhD. In: Melmed S, Auchus RJ, Goldfine AB, et al, 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 100mM ammonium acetate solution and injected onto the liquid chromatography-tandem mass spectrometer. 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 Regional Manager. 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. This test 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 |