

## Overview

### Useful For

Assessing renal reabsorption of phosphorus in a variety of pathological conditions associated with hypophosphatemia including hypophosphatemic rickets, tumor-induced osteomalacia, and tumoral calcinosis

Adjusting phosphate replacement therapy in severe deficiency states monitoring the renal tubular recovery from acquired Fanconi syndrome

### Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
ACREA	Creatinine, S	Yes, (CRTS1)	Yes
CRETR	Creatinine, Random, U	Yes, (RCTUR)	Yes
PHOSS	Phosphorus (Inorganic), S	Yes, (PHOS)	Yes
RTRP	Tubular Phosp Reabsorption, Random	No	Yes

### Method Name

ACREA, CRETR: Enzymatic Colorimetric Assay

PHOSS: Photometric, Ammonium Molybdate

RTRP: Calculation

### NY State Available

Yes

## Specimen

### Specimen Type

Serum

Urine

### Specimen Required

Both serum and urine are required.

### Patient Preparation:

Fasting: 12 hours, required

**Specimen Type:** Serum

**Collection Container/Tube:****Preferred:** Serum gel**Acceptable:** Red top**Submission Container/Tube:** Plastic vial**Specimen Volume:** 0.5 mL**Collection Instructions:**

1. Centrifuge and aliquot serum into a plastic vial.
2. Label specimen as serum.

**Specimen Type:** Urine**Container/Tube:** Plastic, 5-mL tube**Specimen Volume:** 4 mL**Collection Instructions:**

1. Collect a random urine specimen.
2. No preservative.
3. Label specimen as urine.

**Forms**[If not ordering electronically, complete, print, and send a Renal Diagnostics Test Request \(T830\) with the specimen.](#)**Specimen Minimum Volume**

Urine: 1 mL; Serum: See Specimen Required

**Reject Due To**

Gross hemolysis	Reject
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**Specimen Stability Information**

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	7 days	
	Frozen	90 days	
Urine	Refrigerated (preferred)	14 days	
	Ambient	7 days	
	Frozen	30 days	

**Clinical & Interpretive****Clinical Information**

The tubular reabsorption of phosphate (TRP) is the fraction (or percent) of filtered phosphorus that is reabsorbed by renal tubules. Its measurement is useful when evaluating patients with hypophosphatemia. In general, a reduced TRP in the presence of hypophosphatemia is indicative of a renal defect in phosphate reabsorption.

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The ratio of the maximum rate of tubular phosphate reabsorption to the glomerular filtration rate (TmP/GFR) is considered the most convenient way to evaluate renal phosphate transport and is referred to as the theoretical renal phosphate threshold. This corresponds to the theoretic lower limit of plasma phosphate below which all filtered phosphate would be reabsorbed. Although direct measurements of parathyroid hormone, which increases renal phosphate excretion, have replaced much of the utility of TmP/GFR measurements, it may still be useful in assessing renal reabsorption of phosphorus in a variety of pathological conditions associated with hypophosphatemia.

**Reference Values****TUBULAR REABSORPTION OF PHOSPHORUS**

>80%

(Although, tubular reabsorption of phosphorus levels must be interpreted in light of the prevailing plasma phosphorus and glomerular filtration rate.)

**TUBULAR MAXIMUM PHOSPHORUS REABSORPTION/GLOMERULAR FILTRATION RATE (TmP/GFR)**

2.6-4.4 mg/dL (0.80-1.35 mmol/L)

**PHOSPHORUS (INORGANIC)**

Males

<1 year: Not established

1-4 years: 4.3-5.4 mg/dL

5-13 years: 3.7-5.4 mg/dL

14-15 years: 3.5-5.3 mg/dL

16-17 years: 3.1-4.7 mg/dL

> or =18 years: 2.5-4.5 mg/dL

Females

<1 year: Not established

1-7 years: 4.3-5.4 mg/dL

8-13 years: 4.0-5.2 mg/dL

14-15 years: 3.5-4.9 mg/dL

16-17 years: 3.1-4.7 mg/dL

> or =18 years: 2.5-4.5 mg/dL

**PHOSPHORUS, RANDOM URINE**

No established reference values

Random urine phosphorus may be interpreted in conjunction with serum phosphorus, using both values to calculate fractional excretion of phosphorus.

The calculation for fractional excretion (FE) of phosphorus (P) is

$$FE(P) = ([P(\text{urine}) \times \text{Creat}(\text{serum})] / [P(\text{serum}) \times \text{Creat}(\text{urine})]) \times 100$$

**CREATININE, SERUM**

**Males(1)**

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

&gt; or =15 years: 0.74-1.35 mg/dL

**Females(1)**

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

&gt; or=16 years: 0.59-1.04 mg/dL

**CREATINE, RANDOM URINE**

&lt;18 years: Not established

&gt; or =18 years: 16-326 mg/dL

**Interpretation**

Interpretation of tubular reabsorption of phosphate (TRP) and the maximum rate of TRP to the glomerular filtration rate (TmP/GMR) is dependent upon the clinical situation and should be interpreted in conjunction with the serum phosphorous concentration.

The glomerular filtration rate is independent of dietary phosphorus intake, tissue release of phosphorus, and GFR.

**Cautions**

No significant cautionary statements

**Clinical Reference**

1. Kulasingam V, Jung BP, Blaustig IM, et al. Pediatric reference intervals for 28 chemistries and immunoassays on the Roche cobas 6000 analyzer--a CALIPER pilot study. *Clin Biochem*. 2010;43(13-14):1045-1050
2. Suki WN, Lederer ED, Rouse D. Renal transport of calcium, magnesium, and phosphate. In: Brenner B, ed: *The kidney*. 6th ed. WB Saunders Company; 2000:chap 12
3. Bijvoet OL. Relation of plasma phosphate concentration to renal tubular reabsorption of phosphate. *Clin Sci*. 1969;37(1):23-36
4. Walton RJ, Bijvoet OL. Nomogram for derivation of renal threshold phosphate Concentration. *Lancet*. 1975;2(75):309-310
5. Payne RB. Renal tubular reabsorption of phosphate (TmP/GFR): indications and interpretation. *Ann Clin Biochem*. 1998;35(Pt 2):201-206
6. Delaney MP, Lamb EJ. Kidney disease. In: Rifai N, Horvath AR, Wittwer CT, eds. *Textbook of Clinical Chemistry*. 6th ed. Elsevier; 2018:1256-1323

**Performance**

**Method Description**

Creatinine is performed by the enzymatic method, which 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 ver 2. Roche Diagnostics; V15.0 03/2019)

Inorganic phosphate forms an ammonium phosphomolybdate complex with ammonium molybdate in the presence of sulfuric acid. The concentration of phosphomolybdate formed is directly proportional to the inorganic phosphate concentration and is measures photometrically.(Package insert: Phosphate (Inorganic) ver 2. Roche Diagnostics; V11.0 07/2019)

**PDF Report**

No

**Day(s) Performed**

Monday through Sunday

**Report Available**

Same day/1 day

**Specimen Retention Time**

See Individual Test IDs

**Performing Laboratory Location**

Mayo Clinic Laboratories - Rochester Main Campus

**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 has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

**CPT Code Information**

82565

82570

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84100  
84105

**LOINC® Information**

Test ID	Test Order Name	Order LOINC® Value
RTRP2	Tubular Phosp Reabsorption, Random	In Process

Result ID	Test Result Name	Result LOINC® Value
TRA	TRP	50057-9
GFRR	Random TmP/GFR	103542-7
ACREA	Creatinine, S	2160-0
CRETR	Creatinine, Random, U	2161-8
PHOSS	Phosphorus (Inorganic), S	2777-1