Test Definition: RTRP2

Tubular Reabsorption of Phosphorus, Random
Urine and Serum

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: Colorimetric
PHOSS: Photometric
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

Supplies: Sarstedt Aliquot Tube, 5 mL (T914
Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 0.5 mL Serum
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

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.

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%

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)

Age	Range (mg/dL)	Range (mmol/L)
0 days-2 months	4.4-10.6	1.43-3.43
3 months-5 months	4.6-10.2	1.48-3.30
6 months-1 year	3.6-8.1	1.15-2.60
2-15 years	3.6-7.6	1.15-2.44
> or =16 years	2.6-4.4	0.80-1.35

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(urine)XCreat(serum)]/[P(serum)XCreat(urine)]) X 100

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

*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

CREATINE, RANDOM URINE
<18 years: Not established
> 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/GFR) depends 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
7. Bistarakis L, Voskaki I, Lambadaridis J, Sereti H, Sbyrakis S. Renal handling of phosphate in the first six months of life. Arch Dis Child. 1986;61(7):677-681
8. Shaw NJ, Wheeldon J, Brocklebank JT. Indices of intact serum parathyroid hormone and renal excretion of calcium, phosphate, and magnesium. Arch Dis Child. 1990;65(11):1208-1211
9. Kruse K, Kracht U, Gopfert G. Renal thresthold phosphate concentration ($TmPO_4$/GFR). Arch Dis Child. 1982;57(3):217-223
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Performance

Method Description

Creatinine:
This enzymatic method is based on the conversion of creatinine with the aid of creatininase, creatinase, and sarcosine oxidase to form glycine, formaldehyde, and hydrogen peroxide. Catalyzed by peroxidase the liberated hydrogen peroxide reacts with 4-aminophenazone and HTIB (2,4,6-triiodo03-hydroxybenzoic acid) to form a quinone imine chromogen. The color intensity of the quinone imine chromogen formed is directly proportional to the creatinine concentration in the reaction mixture.(Package insert: Creatinine plus. Roche Diagnostics; 07/2024)

Phosphorus:
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 measured photometrically.(Package insert: Phosphate (Inorganic). Roche Diagnostics; 10/2023)

PDF Report

No

Day(s) Performed

Monday through Sunday

Report Available

Same day/1 day

Specimen Retention Time

1 week

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
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