

Overview

Useful For

Confirmation of a diagnosis of acute intermittent porphyria using washed erythrocyte specimens

Genetics Test Information

This test is for diagnosis of acute intermittent porphyria.

Testing Algorithm

The following algorithms are available in Special Instructions:

[-Porphyria \(Acute\) Testing Algorithm](#)

[-Porphyria \(Cutaneous\) Testing Algorithm](#)

[-The Heme Biosynthetic Pathway](#)

Special Instructions

- [The Heme Biosynthetic Pathway](#)
- [Informed Consent for Genetic Testing](#)
- [Porphyria \(Acute\) Testing Algorithm](#)
- [Porphyria \(Cutaneous\) Testing Algorithm](#)
- [Informed Consent for Genetic Testing \(Spanish\)](#)

Method Name

Enzymatic End point/Spectrofluorometric

NY State Available

Yes

Specimen

Specimen Type

Washed RBC

Advisory Information

This test is for diagnosis of acute intermittent porphyria. Porphobilinogen deaminase, also known as uroporphyrinogen I synthase, is commonly confused with uroporphyrinogen III synthase, the enzyme deficient in congenital erythropoietic porphyria (CEP). For CEP cases, order UPGC / Uroporphyrinogen III Synthase (Co-Synthase), Erythrocytes.

Necessary Information

1. Volume of packed cells and total volume of erythrocyte suspension (red cells + saline) are required and must be sent with specimen.

2. Include a list of medications the patient is currently taking.

Specimen Required

Patient Preparation: Abstinence from alcohol for at least 24 hours prior to specimen collection is essential as

ethanol induces porphobilinogen deaminase (PBGD) activity, which may lead to a false-normal result.

Collection Container/Tube:

Preferred: Green top (sodium heparin)

Acceptable: Lavender top (EDTA) or green top (lithium heparin)

Submission Container/Tube: Plastic vial

Specimen Volume: Washed erythrocyte suspension

Collection Instructions: Collect and process whole blood specimen as follows:

1. Transfer entire specimen to a 12-mL graduated centrifuge tube.
2. Centrifuge specimen for 10 minutes at 2000 rpm.
- 3. Record volume of packed cells and the total volume of the specimen.**
4. Discard supernatant plasma.
5. Wash packed erythrocytes 2 times by resuspension of at least an equal amount of cold 0.9% saline, mix, and centrifuge for 5 minutes at 2000 rpm, discarding supernatant after each washing.
6. Resuspend packed cells to the original total volume with 0.9% saline. Invert specimen gently to mix.

Forms

1. **New York Clients-Informed consent is required.** Document on the request form or electronic order that a copy is on file. The following documents are available in Special Instructions:

-[Informed Consent for Genetic Testing](#) (T576)

-[Informed Consent for Genetic Testing-Spanish](#) (T826)

2. If not ordering electronically, complete, print, and send an [Inborn Errors of Metabolism Test Request](#) (T798) with the specimen.

Specimen Minimum Volume

1 mL of washed and resuspended erythrocytes

Reject Due To

Other	Cell suspension not available
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Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Washed RBC	Frozen (preferred)	14 days	
	Refrigerated	14 days	

Specimen Type	Temperature	Time	Special Container
	Ambient	48 hours	

Clinical and Interpretive

Clinical Information

The porphyrias are a group of inherited disorders resulting from enzyme defects in the heme biosynthetic pathway. Acute intermittent porphyria (AIP) is caused by diminished erythrocyte activity of porphobilinogen deaminase (PBGD), also known as uroporphyrinogen I synthase or hydroxymethylbilane synthase (HMBS).

Onset of AIP typically occurs during puberty or later. Individuals may experience acute episodes of neuropathic symptoms. Common symptoms include severe abdominal pain, peripheral neuropathy, and psychiatric symptoms. Crises may be precipitated by a broad range of medications (including barbiturates and sulfa drugs), alcohol, infection, starvation, heavy metals, and hormonal changes. AIP is inherited in an autosomal dominant manner. At-risk family members of patients with a biochemical diagnosis of AIP should undergo appropriate testing. Timely diagnosis is important as acute episodes of AIP can be fatal. Treatment of AIP includes the prevention of symptoms through avoidance of precipitating factors. More than 80% of individuals with a deficiency variant in the *HMBS* gene remain asymptomatic throughout their lives.

The biochemical diagnosis of AIP is made by demonstrating increased urinary excretion of porphobilinogen (PBG) and is most accurate during an acute episode. In addition, the diagnosis of AIP can be confirmed through the measurement of PBGD enzyme activity in erythrocytes, although 5% to 10% of affected individuals exhibit normal erythrocyte PBGD activity. In addition, molecular genetic confirmation (*HMBSZ* / *HMBS* Gene, Full Gene Analysis, Varies) is available on a clinical basis and can be particularly helpful in identifying asymptomatic family members at risk of acute symptoms.

The workup of patients with a suspected porphyria is most effective when following a stepwise approach. See [Porphyria \(Acute\) Testing Algorithm](#) in Special Instructions or call 800-533-1710 to discuss testing strategies.

Reference Values

Reference ranges have not been established for patients who are <16 years of age.

> or =7.0 nmol/L/sec

6.0-6.9 nmol/L/sec (indeterminate)

<6.0 nmol/L/sec (diminished)

Interpretation

Abnormal results are reported with a detailed interpretation that may include an overview of the results and their significance, a correlation to available clinical information provided with the specimen, differential diagnosis, recommendations for additional testing when indicated and available.

Cautions

A normal result does not rule-out acute intermittent porphyria; 5% to 10% of affected individuals will have normal erythrocyte PBGD activity. Additionally, enzyme activity may be increased during an acute attack; therefore, the enzyme level should be assessed when the patient is asymptomatic.

Clinical Reference

1. Tortorelli S, Kloke K, Raymond K: Chapter 15: Disorders of porphyrin metabolism. In Biochemical and Molecular Basis of Pediatric Disease. Fourth edition. Edited by DJ Dietzen, MJ Bennett, ECC Wong. AACC Press, 2010, pp 307-324
2. Nuttall KL, Klee GG: Analytes of hemoglobin metabolism - porphyrins, iron, and bilirubin. In Tietz Textbook of Clinical Chemistry. Fifth edition. Edited by CA Burtis, ER Ashwood. WB Saunders Company, 2001, pp 584-607
3. Anderson KE, Sassa S, Bishop DF, Desnick RJ: Disorders of Heme Biosynthesis: X-Linked Sideroblastic Anemia and the Porphyrins In The Online Metabolic and Molecular Bases of Inherited Disease. Edited by D Valle, AL Beaudet, B Vogelstein, et al. McGraw-Hill, Accessed August 9, 2017. Available at <http://ommbid.mhmedical.com/content.aspx?bookid=971&Sectionid=62638866>

Performance

Method Description

Measurement of porphobilinogen deaminase (PBGD) activity is based on the measurement of the rate of synthesis of uroporphyrin from porphobilinogen (PBG) in incubated, lysed erythrocytes. Low yield of uroporphyrin from PBG indicates a deficiency of PBGD.(Ford RE, Ou CN, Ellefson RD: Assay for erythrocyte uroporphyrinogen I synthase activity, with porphobilinogen as substrate. Clin Chem 1980;26:1182-1185; Bustad HJ, et al: Conformational stability and activity analysis of two hydroxymethylbilane synthase mutants, K132N and V215E, with different phenotypic association with acute intermittent porphyria. Biosci Rep. 2013 Aug 8;33(4))

PDF Report

No

Day(s) and Time(s) Test Performed

Tuesday, Thursday; 1 p.m.

Analytic Time

2 days (not reported on Saturday or Sunday)

Maximum Laboratory Time

4 days

Specimen Retention Time

14 days

Performing Laboratory Location

Rochester

Fees and 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 U.S. Food and Drug Administration.

CPT Code Information

82657

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
PBGDW	PBG Deaminase, RBC	2812-6

Result ID	Test Result Name	Result LOINC Value
31944	PBG Deaminase, RBC	2812-6
31945	Interpretation	59462-2
BG575	Total cell Suspension	94496-7
BG576	Packed cell volume	94497-5
606471	Reviewed By	18771-6