# Test Definition: PBGD_

PBG Deaminase, WB

## Overview

### Useful For

Confirmation of a diagnosis of acute intermittent porphyria (AIP)

### 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

Whole blood

### 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

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.

**Container/Tube:**

**Preferred:** Green top (sodium heparin)

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

**Specimen Volume:** 4 mL

## 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

3 mL

## Reject Due To

| | |
|---|---|
| Gross hemolysis | Reject |

## Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Whole blood | Refrigerated (preferred) | 8 days | |
| | Ambient | 7 days | |

# 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 Porphyrias 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, el 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 |
|---|---|---|
| PBGD_ | PBG Deaminase, WB | 12810-8 |

| Result ID | Test Result Name | Result LOINC Value |
|---|---|---|
| 4022 | PBG Deaminase, WB | 12810-8 |
| 28400 | Interpretation | 59462-2 |
| 606470 | Reviewed By | 18771-6 |