# Test Definition: PBALP

PBG and ALA, P

## Overview

### Useful For

An equivalent option to urine for first-line test for evaluation of a suspected acute porphyria

Monitoring patients undergoing treatment for an acute intermittent porphyria or other acute porphyria

### Genetics Test Information

Plasma porphobilinogen (PBG) and aminolevulinic acid (ALA) are elevated during the symptomatic phase of the acute porphyrias: acute intermittent porphyria, hereditary coproporphyria, and variegate porphyria

An isolated elevation of ALA may be due to the very rare aminolevulinic acid dehydratase deficiency porphyria (ADP) or more commonly, a secondary inhibition of ALA.

This test can be used as part of the diagnostic assessment and monitoring of patients with acute intermittent porphyria (AIP) and other acute porphyrias.

Results are most informative when the specimen is obtained while the patient is having symptoms.

Additional testing must be performed to distinguish among the acute porphyrias.

### Highlights

When a urine specimen cannot be obtained during a symptomatic episode, this test provides an alternative specimen collection for the evaluation of a suspected acute porphyria.

### Testing Algorithm

The following algorithms are available in Special Instructions:

-Porphyria (Acute) Testing Algorithm

-Porphyria (Cutaneous) Testing Algorithm

### Special Instructions

- Porphyria (Acute) Testing Algorithm
- Porphyria (Cutaneous) Testing Algorithm

### Method Name

Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)

### NY State Available

Yes

## Specimen

### Specimen Type

Plasma

### Shipping Instructions

Ship specimens refrigerated or frozen and in amber vial to protect from light.

## Necessary Information

Include a list of medications the patient is currently taking.

## Specimen Required

**Patient Preparation:** Patient should abstain from alcohol for at least 24 hours prior to specimen collection.

**Supplies:** Amber Frosted Tube, 5 mL (T192)

**Collection Container/Tube:**

**Preferred:** Green top (heparin)

**Acceptable:** Green top (lithium heparin), lavender top (EDTA), yellow top (ACD A or B)

**Submission Container/Tube:** Amber vial

**Specimen Volume:** 1 mL

**Collection Instructions:** It is recommended that specimen collection occur during the acute phase. Porphobilinogen (PBG) and aminolevulinic acid (ALA) may be normal when the patient is not exhibiting symptoms.

## Specimen Minimum Volume

0.3 mL

## Reject Due To

| | |
|---|---|
| Gross hemolysis | OK |
| Gross lipemia | OK |
| Gross icterus | OK |

## Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Plasma | Frozen (preferred) | 21 days | LIGHT PROTECTED |
| | Refrigerated | 7 days | LIGHT PROTECTED |

## Clinical and Interpretive

## Clinical Information

The porphyrias are a group of inherited disorders resulting from enzyme defects in the heme biosynthetic pathway. Depending on the specific enzyme involved, various porphyrins and their precursors accumulate in different specimen types. The patterns of porphyrin accumulation in erythrocytes and plasma, and the excretion of the heme precursors in urine and feces allow for the detection and differentiation of the porphyrias.

The porphyrias are typically classified as erythropoietic or hepatic based upon the primary site of the enzyme defect. In addition, of the 5 hepatic porphyrias, 4 typically present with acute neurological manifestations and are designated

the acute porphyrias. Clinically, however, these attacks can be prolonged and chronic.

Three primary acute hepatic porphyrias: acute intermittent porphyria (AIP), hereditary coproporphyria (HCP), and variegate porphyria (VP), are associated with neurovisceral symptoms that typically onset during puberty or later. Common symptoms include severe abdominal pain, peripheral neuropathy, and psychiatric symptoms. A broad range of medications (including barbiturates and sulfa drugs), alcohol, infection, starvation, heavy metals, and hormonal changes may precipitate crises. Photosensitivity is not associated with AIP but may be present in HCP and VP.

Plasma porphobilinogen (PBG) and aminolevulinic acid (ALA) are elevated during the acute phase of these neurologic porphyrias. Urine and fecal porphyrin analysis should be performed to confirm the diagnosis and to distinguish among AIP, HCP, and VP. A biochemical diagnosis of AIP can be confirmed by measurement of PBG deaminase activity (PBGD_ / Porphobilinogen Deaminase, Whole Blood). VP and HCP can be confirmed by measurement of fecal porphyrins (FQPPS / Porphyrins, Feces). Once the biochemical diagnosis of an acute porphyria is established, molecular genetic testing is available for AIP (HMBSZ / *HMBS* Gene, Full Gene Analysis, Varies), HCP (CPOXZ / *CPOX* Gene, Full Gene Analysis, Varies), or VP (PPOXZ / *PPOX* Gene, Full Gene Analysis, Varies), which allows for diagnosis of at-risk family members.

The very rare (<10 cases described) autosomal recessive aminolevulinic acid dehydratase deficiency porphyria (ADP) is also a primary acute porphyria causing neurovisceral symptoms with variable age of onset. Biochemically, ADP is characterized by an isolated significant elevation of aminolevulinic acid (ALA). More commonly, however, isolated elevations of ALA are due to secondary inhibition of ALA dehydratase with acute lead intoxication results in the highest degree of aminolevulinic aciduria. Less significant elevations are seen in chronic lead intoxication and tyrosinemia type I.

The workup of patients with a suspected porphyria is most effective when following a stepwise approach.

The following algorithms are available in Special Instructions or call 800-533-1710 to discuss testing strategies:

-Porphyria (Acute) Testing Algorithm

-Porphyria (Cutaneous) Testing Algorithm

## Reference Values

Porphobilinogen: < or =0.5 nmol/mL

Aminolevulinic Acid: < or =0.5 nmol/mL

## 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, and a phone number to reach one of the laboratory directors in case the referring physician has additional questions.

## Cautions

Additional testing must be performed to distinguish among the acute porphyrias.

The specimen should be collected prior to treatment as therapy may decrease the amount of porphobilinogen (PBG) and aminolevulinic acid (ALA) excreted.

Specimens should be protected from light and frozen immediately following collection. PBG is susceptible to degradation at high temperatures, at a pH of less than 5.0, and on prolonged exposure to light.

## Clinical Reference

1. Tortorelli S, Kloke K, Raymond K: Disorders of porphyrin metabolism. In: Dietzen DJ, Bennett MJ, Wong ECC, eds. Biochemical and Molecular Basis of Pediatric Disease. 4th ed. AACC Press; 2010, chap 15.

2. Sardh E, Harper P, Andersson DEH, Floderus Y: Plasma porphobilinogen as a sensitive biomarker to monitor the clinical and therapeutic course of acute intermittent porphyria attacks. Eur J Intern Med. 2009 Mar;20(2):201-207

3. Floderus Y, Sardh E, Moller C, et al: Variations in porphobilinogen and 5-aminolevulinic acid concentrations in plasma and urine from asymptomatic carriers of acute intermittent porphyria gene with increased porphyrin precursor excretion. Clin Chem. 2006 Apr;52(4):701-707

4. Nuttall KL, Klee GG: Analytes of hemoglobin metabolism-porphyrins, iron, and bilirubin. In: Burtis CA, Ashwood ER, eds. Tietz Textbook of Clinical Chemistry. 5th ed. WB Saunders Company; 2001:584-607

5. Anderson KE, Sassa S, Bishop DF, Desnick RJ: Disorders of heme biosynthesis: X-linked sideroblastic anemia and the porphyrias. In: Valle DL, Antonarakis S, Ballabio A, Beaudet AL, Mitchell GA. eds. The Online Metabolic and Molecular Bases of Inherited Disease. McGraw-Hill; Accessed September 04, 2020. Available at https://ommbid.mhmedical.com/content.aspx?bookid=2709&sectionid=225540906

## Performance

### Method Description

In a microcentrifuge tube, internal standard and plasma are combined, centrifuged, and then subjected to solid phase extraction (SPE). The SPE eluate is evaporated and the residue is then reconstituted and subjected to liquid chromatography-tandem mass spectrometry analysis (LC-MS/MS).(Unpublished Mayo method)

### PDF Report

No

### Day(s) and Time(s) Test Performed

Wednesday; 2 p.m.

### Analytic Time

2 days (not reported on Saturday or Sunday)

### Maximum Laboratory Time

6 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

82542

82135

## LOINC® Information

| Test ID | Test Order Name | Order LOINC Value |
|---|---|---|
| PBALP | PBG and ALA, P | 96911-3 |

| Result ID | Test Result Name | Result LOINC Value |
|---|---|---|
| 38029 | Porphobilinogen, P | 17474-8 |
| 38028 | Aminolevulinic Acid, P | 79646-6 |
| 38030 | Interpretation (PBALP) | 59462-2 |
| 38031 | Reviewed By | 18771-6 |