Test Definition: FQPPS

Porphyrins, Feces

Overview

Useful For

Evaluation of patients who present with signs or symptoms suggestive of porphyria cutanea tarda, hereditary coproporphyria, variegate porphyria, congenital erythropoietic porphyria, erythropoietic protoporphyria, or X-linked dominant protoporphyria

Testing Algorithm

The following algorithms are available:

-Porphyria (Acute) Testing Algorithm

-Porphyria (Cutaneous) Testing Algorithm

Special Instructions

- The Heme Biosynthetic Pathway
- Porphyria (Acute) Testing Algorithm
- Porphyria (Cutaneous) Testing Algorithm

Method Name

High-Performance Liquid Chromatography (HPLC)

NY State Available

Yes

Specimen

Specimen Type

Fecal

Necessary Information

1. Weight of the non-homogenized sample

2. Collection duration

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

4. Indicate if patient was compliant with the patient preparation requirements.

Specimen Required

Patient Preparation:

1. For 3 days before collection and during the entire specimen collection period, patient **must refrain from eating red meat and or taking any aspirin-containing medications.**

2. Patient **should not** use barium, laxatives, or enemas for 24 hours before starting, as well as during, specimen collection.

Collection Container/Tube: Stool Containers - 24, 48, 72 Hour Kit (T291). No preservative.

Specimen Volume: Entire collection (48, 72, or 96 hour). 24-Hour collection is adequate if the collection volume is at least 100 g

Collection Instructions:

1. Collect all stool specimens within a 24, 48, 72, or 96 hour timeframe.
2. Do not add preservative.
3. Send entire collection.

Additional Information:

1. Length of collection period is required.

2. Specimens smaller than 100 g may not provide accurate results.
3. Include a list of medications the patient is currently taking.

Forms

If not ordering electronically, complete, print, and send a Biochemical Genetics Test Request (T798) with the specimen.

Specimen Minimum Volume

See Specimen Required

Reject Due To

Specimens in preservative	Reject

Specimen Stability Information

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

Clinical & 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 excretion of the heme precursors in urine and feces allow for the detection and differentiation of the porphyrias. For more information see The Heme Biosynthetic Pathway.

The porphyrias are typically classified as erythropoietic or hepatic based upon the primary site of the enzyme defect. In addition, hepatic porphyrias can be further classified as chronic or acute, based on their clinical presentation.

The primary acute hepatic porphyrias: acute intermittent porphyria (AIP), hereditary coproporphyria (HCP), and variegate porphyria (VP), are associated with neurovisceral symptoms, which typically onset during puberty or later. 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. Photosensitivity is not associated with AIP but may be present in HCP and VP.

Cutaneous photosensitivity is associated with the chronic hepatic porphyrias: porphyria cutanea tarda (PCT) and the erythropoietic porphyrias; erythropoietic protoporphyria (EPP), X-linked dominant protoporphyria (XLDPP), and congenital erythropoietic porphyria (CEP). Although genetic in nature, environmental factors may exacerbate symptoms, significantly impacting the severity and course of disease.

CEP is an erythropoietic porphyria caused by uroporphyrinogen III synthase deficiency. Symptoms typically present in early infancy with red-brown staining of diapers, severe cutaneous photosensitivity with fluid-filled bullae and vesicles. Other common symptoms may include thickening of the skin, hypo- and hyperpigmentation, hypertrichosis, cutaneous scarring, and deformities of the fingers, eyelids, lips, nose, and ears. A few milder adult-onset cases have been documented as well as cases that are secondary to myeloid malignancies.

PCT is the most common form of porphyria and caused by hepatic inhibition of the enzyme uroporphyrinogen decarboxylase (UROD). It is most often sporadic (acquired), but in about 20% of cases, a heterozygous variant in *UROD* increases the susceptibility to disease. The most prominent clinical characteristics are cutaneous photosensitivity and scarring on sun-exposed surfaces. Patients experience chronic blistering lesions resulting from mild trauma to sun-exposed areas. These fluid-filled vesicles rupture easily, become crusted, and heal slowly. Secondary infections can cause areas of hypo- or hyperpigmentation or sclerodermatous changes and may result in the development of alopecia at sites of repeated skin damage. Liver disease is common in patients with PCT as evidenced by abnormal liver function tests and 30% to 40% of patients developing cirrhosis. In addition, there is an increased risk of hepatocellular carcinoma.

Hepatoerythropoietic porphyria (HEP) is a rare autosomal recessive form of porphyria caused by homozygous or compound heterozygous variants in *UROD.* It typically presents in early childhood with both erythropoietic and cutaneous manifestations and is similar to what is seen in CEP.

Clinical presentation of EPP and XLDPP is identical with onset of symptoms typically occurring in childhood. Cutaneous photosensitivity in sun-exposed areas of the skin generally worsens in the spring and summer months. Common symptoms may include itching, edema, erythema, stinging or burning sensations, and occasionally scarring of the skin in sun-exposed areas.

Increased fecal porphyrin excretions are observed most commonly in symptomatic patients with CEP, PCT, HCP, and VP. In quiescent phases, as well as prior to puberty, fecal porphyrin excretion may be within normal limits. Patients with AIP may have elevated fecal porphyrin levels during severe attacks. EPP and XLDPP patients may have elevated protoporphyrin levels, however, these disorders cannot be diagnosed by fecal analysis alone.

The workup of patients with a suspected porphyria is most effective when following a stepwise approach. See Porphyria (Acute) Testing Algorithm and Porphyria (Cutaneous) Testing Algorithm or call 800-533-1710 to discuss testing strategies.

Reference Values

UroporphyrinI:
<120 mcg/24 h

Uroporphyrin III:

<50 mcg/24 h

Heptacarboxyl porphyrin I:
<40 mcg/24 h

Heptacarboxyl porphyrin III:
<40 mcg/24 hours

Isoheptacarboxyl porphyrins:
<30 mcg/24 h

Hexacarboxnyl porphyrin:
<10 mcg/24 h

Hexacarboxnyl porphyrin III:
<10 mcg/24 h

Isohexacarboxnyl porphyrins :
<10 mcg/24 h

Pentacarboxyl porphyrin I:
<20 mcg/24 hours

Pentacarboxyl porphyrin II:
<20 mcg/24 h

Isopentacarboxyl porphyrins:
<80 mcg/24 hours

Coproporphyrin I:
<500 mcg/24 h

Coproporphyrin III:
<400 mcg/24 h

Isocoproporphyrin:
<200 mcg/24 h

Protoporphyrins:
<1,500 mcg/24 h

Coproporphyrin III/Coproporphyrin I RATIO:
<1.20

See The Heme Biosynthetic Pathway

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

Heme from red meat can contribute to fecal protoporphyrin concentrations and cause a misleading indication of erythropoietic protoporphyria, X-linked dominant protoporphyria, or variegate porphyria.

Aspirin ingestion may cause minimal gastrointestinal bleeding, leading to false elevations of protoporphyrin.

Specimen submitted should contain at least 100 g of feces. Specimens smaller than 100 g may not provide interpretable results. Specimens weighing less than 10 grams will be rejected.

Clinical Reference

1. Tortorelli S, Kloke K, Raymond K: Disorders of porphyrin metabolism. In: Dietzen DJ, Bennett MJ, Wong EDD, eds. Biochemical and Molecular Basis of Pediatric Disease. 4th ed. AACC Press; 2010:307-324
2. 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
3. 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; 2019. Accessed September 6, 2024. Available at https://ommbid.mhmedical.com/content.aspx?sectionid=225540906&bookid=2709
4. Weiss Y, Chen B, Yasuda M, Nazarenko I, Anderson KE, Desnick RJ. Porphyria cutanea tarda and hepatoerythropoietic porphyria: Identification of 19 novel uroporphyrinogen III decarboxylase mutations. Mol Genet Metab. 2019 Nov;128(3):363-366. doi:10.1016/j.ymgme.2018.11.013

Performance

Method Description

The porphyrins are separated according to numbers of carboxyl units and isomer status. Analytic specificity is based on the combination of chromatographic behavior and the uniqueness of the porphyrins among substances in human specimens in terms of fluorescence spectra. Components quantified are 10 specific porphyrins of isomer series I and III, 4 groups of "isoporphyrins" (isomers other than of series I and III), and protoporphyrin.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday, Thursday

Report Available

3 to 6 days

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 was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

84126

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
FQPPS	Porphyrins, F	94548-5

Result ID	Test Result Name	Result LOINC® Value
TM70	Collection Duration	13363-7
15517	Uroporphyrin I	26691-6
15518	Uroporphyrin III	33585-1
15519	Heptacarboxyl I	49900-4
15520	Heptacarboxyl III	49901-2
15521	Isoheptacarboxyl	94549-3
15522	Hexacarboxyl I	94550-1
15523	Hexacarboxyl III	94551-9
15524	Isohexacarboxyl	94552-7
15525	Pentacarboxyl I	33623-0
15526	Pentacarboxyl III	33624-8
15527	Isopentacarboxyl	94553-5
15528	Coproporphyrin I	23845-1
15529	Coproporphyrin III	23846-9
15530	Isocoproporphyrin	33625-5

15534	Protoporphyrin	2891-0
15545	CoproIII/CoproI ratio	33618-0
W6	Total weight	30078-0
81652	Interpretation (FQPPS)	59462-2
35013	Reviewed By	18771-6