מעבדה מטבולית
טלפון: 03-5302553 פקס: 03-5302552
מייל: Clinicalbiochemistrylab@sheba.gov.il

Porphyrins quantitative test in random urine, High-Pressure Liquid Chromatography

Useful for: Evaluate porphyrias, including those involving deficiencies of enzymes that are needed for heme synthesis and chemical porphyrias. This is a preferred test to begin assessment for congenital erythropoietic porphyria and porphyria cutanea tarda. The test may be used especially during symptomatic periods for acute intermittent porphyria, hereditary coproporphyria, and variegate porphyria. Evaluation of neurologic and psychiatric symptoms associated with acute porphyrias, such as acute intermittent porphyria (AIP), requires complimentary urine porphobilinogen (PBG) and δ-aminolevulinic acid (ALA) testing. Only slightly abnormal or normal values may be seen in asymptomatic patients.
Methodology: High-Performance Liquid Chromatography (HPLC) with Fluorometric Detection
Necessary Information: Reason for referral and relevant clinical presentation description are required. To increase diagnostic reliability, avoid factors that lead to elevated porphyrin levels (e.g. alcohol consumption, intake of enzyme-inducing drugs, stressful situation).
Specimen Required: Collect urine in an appropriate container, preferably amber. The specimens can be refrigerated for up to 24 hours protected from light. For longer storage and transport, the samples must be frozen at – 18° C or lower and protected from light.
Specimen Stability Information: Frozen samples are stable for 14 days.
Specimen Volume: 5 ml
Necessary information:
Test order form, clinical background of patient, including a list of medications the patient is currently taking.
The sample should be delivered preferably frozen to the Mega-Lab, laboratory division, ground floor, on week days between the hours 08:00-15:00.
Turnaround Time: 20 working days

Clinical Information: In a healthy person's urine, porphyrins are present in very low concentrations. Metabolic disorders in heme biosynthesis, however, lead to the elevated appearance of some heme precursors in the urine. The resulting diseases are called porphyrias.

Of note, porphyrins are markers that are not particularly specific to the different forms of porphyrias but are relevant in other clinical settings as well. Consequently, similar symptoms can also be acquired by several external

influences, e.g. lead poisoning, alcohol or pollutants, heavy metals, halogenated solvents, various drugs, insecticides, and herbicides can interfere with heme production and cause "intoxication porphyria". Chemically, the intoxication porphyrias are characterized by increased excretion of uroporphyrin and/or coproporphyrin in urine. Excess urinary porphyrin excretion, or porphyrinuria, results from inhibition of key enzymatic steps in such clinical conditions as genetic deficiencies (e.g hereditary tyrosinemia type I), deficiencies in heme production enzymes, hepatitis, renal disease, and erythroid disease, as well as by heavy metal inhibition of heme enzyme synthesis.

In the case of borderline-increased urinary results, further appropriate confirmatory tests like porphyrins in faeces, porphyrins in blood, plasma, genetic family counselling, mutational analysis etc. are recommended.

The conclusive diagnosis of a porphyria should be based on a systematic approach incorporating medical history, physical examination, and biochemical data, including genetic evaluation if necessary. Certain symptom patterns, physical findings, and elements of the exposure history may raise the degree of suspicion for porphyria; however, the lack of supporting information from these sources cannot exclude a diagnosis of porphyria.

Reference Values:

Name	nmol/mmol creatinine
Uroporphyrin	<10
Heptacarboxyporphyrin	0-1.3
Hexacarboxyporphyrin	0-0.7
Pentacarboxyporphyrin	0-1.0
Coproporphyrin I	0.3-8.5
Coproporphyrin III	1.7-26

Only clearly increased values of porphyrins in urine (> 2-times the upper limit of normal) have clinical significance for porphyrias.

Pattern of the different Porphyrias:

Disease	U	7	6	5	C I	C III
Porphyria cutanea tarda (PCT)	↑↑	↑↑	↑	↑	↑*	↑*
Acute intermittent porphyria (AIP)	↑↑	↑	↑	↑↑	↑*	↑↑*
Porphyria variegate (VP)	↑↑	↑	↑	↑↑	↑*	↑↑*
Hereditary coproporphyria (HCP)	↑	↑	↑	↑↑	n*	↑↑*
Protoporphyria (EPP, XLEPP)	v	n	n	v	↑*	↑*
Congenital erythropoietic porphyria (CEP, Morbus Günther)	↑↑	↑	↑	↑	↑↑**	
Porphobilinogensynthase deficiency (ADP, ALAD porphyria)	↑	↑	↑	↑↑		↑↑**

U = Uroporphyrin; 7, 6, 5 = Hepta-, Hexa- and Pentacarboxyporphyrin;
C I and III = Coproporphyrin I and III. ↑ = increased; ↑↑ = strongly increased;
n = normal; v = varies.

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