MAYO CLINIC LABORATORIES

Test Definition: BAPS

Bile Acid Profile, Serum

Overview

Useful For

Evaluating the enterohepatic cycle consisting of the biliary system, intestine, portal circulation, and hepatocytes

Supporting researchers in need of free and conjugated values of all 20 bile acid species as well as total bile acid

Highlights

This is a serum test that measures all free and conjugated bile acids, including 20 individual species and total bile acids.

No interpretation is provided for this test that quantitates all free and conjugated bile acid species.

Method Name

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

NY State Available

Yes

Specimen

Specimen Type

Serum

Ordering Guidance

This test is intended for use by research scientists. **Approval must be obtained before ordering.**

Specimen Required

Patient Preparation: Patient must be fasting for 12 to 14 hours.
Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 0.5 mL
Collection Instructions: Centrifuge and aliquot serum into a plastic vial.

Specimen Minimum Volume

0.3 mL

Reject Due To

Gross hemolysis	OK

Gross lipemia	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	90 days	
	Ambient	90 days	
	Frozen	90 days	

Clinical & Interpretive

Clinical Information

Bile acids are formed in the liver from cholesterol, conjugated primarily to glycine and taurine, stored and concentrated in the gallbladder, and secreted into the intestine after the ingestion of a meal. In the intestinal lumen, the bile acids serve to emulsify ingested fats and thereby promote digestion. During the absorptive phase of digestion, approximately 90% of the bile acids are reabsorbed.

The efficiency of the hepatic clearance of bile acids from portal blood maintains serum concentrations at low levels in normal persons. An elevated fasting level, due to impaired hepatic clearance, is a sensitive indicator of liver disease. Following meals, serum bile acid levels have been shown to increase only slightly in normal persons, but markedly in patients with various liver diseases, including cirrhosis, hepatitis, cholestasis, portal-vein thrombosis, Budd-Chiari syndrome, cholangitis, Wilson disease, and hemochromatosis. No increase in bile acids will be noted in patients with intestinal malabsorption. Metabolic hepatic disorders involving organic anions (eg, Gilbert disease, Crigler-Najjar syndrome, and Dubin-Johnson syndrome) do not cause abnormal serum bile acid concentrations.

The concentration of bile acids in serum is influenced by many different liver diseases due to the inability of the liver to efficiently extract circulating bile acids from portal blood.

In addition, bile acid levels are altered in several biochemical genetic conditions, such as peroxisomal biogenesis disorders (eg, Zellweger spectrum disorder) and disorders of bile acid synthesis (eg, D-bifunctional protein deficiency and alpha methyl-CoA racemase deficiency), due to the loss of specific enzymes important for bile acid metabolism.

This analysis includes a quantitative characterization of primary and secondary bile acids as well as 2 bile acid precursor species for the assessment of bile acid metabolism.

Reference Values

Chenodeoxycholic acid: < or =2.26 nmol/mL
Cholic acid: < or =2.74 nmol/mL
Deoxycholic acid: < or =2.84 nmol/mL
Dihydroxycholestanoic acid: < or =0.07 nmol/mL
Glycochenodeoxycholic acid: < or =5.14 nmol/mL
Glycocholic acid: < or =2.17 nmol/mL
Glycodeoxycholic acid: < or =3.88 nmol/mL
Glycohyodeoxycholic acid: < or =0.01 nmol/mL

Glycolithocholic acid: < or =0.11 nmol/mL
Glycoursodeoxycholic acid: < or =1.00 nmol/mL
Hyodeoxycholic acid: < or =0.12 nmol/mL
Lithocholic acid: < or =0.09 nmol/mL
Taurochenodeoxycholic acid: < or =0.80 nmol/mL
Taurocholic acid: < or =0.31 nmol/mL
Taurodeoxycholic acid: < or =0.78 nmol/mL
Taurohyodeoxycholic acid: < or =0.02 nmol/mL
Taurolithocholic acid: < or =0.04 nmol/mL
Tauroursodeoxycholic acid: < or =0.05 nmol/mL
Trihydroxycholestanoic acid: < or =1.73 nmol/mL
Ursodeoxycholic acid: < or =0.64 nmol/mL
Total bile acids: < or =19.00 nmol/mL

Interpretation

Total bile acids are metabolized in the liver and can serve as a marker for normal liver function. Increases in serum C27 bile acids are seen in patients with peroxisomal biogenesis disorders (eg, as Zellweger spectrum disorder) or single enzyme defects of bile acid synthesis (eg, D-bifunctional protein deficiency and alpha methyl CoA racemases).

Totals of the free and conjugated bile acid species for all 20 bile acids in addition to total bile acids will be reported. No interpretive report will be provided.

Cautions

Bile acid concentrations in serum may be elevated post meal or due to bile acid therapy, such as cholic acid, deoxycholic acid, or ursodeoxycholic acid.

Do not use for assessment of general liver dysfunction in adults or diagnosis or monitoring of intrahepatic cholestasis of pregnancy.

Clinical Reference

1. Sundaram SS, Bove KE, Lovell MA, Sokol RJ. Mechanisms of disease: inborn errors of bile acid synthesis. Nat Clin Pract Gastroenterol Hepatol. 2008;5(8):456-468
2. Wanders RJA, Rizzo WB. Inborn errors of peroxisome biogenesis and function. In: Sarafoglou K, Hoffmann GF, Roth KS, eds. Pediatric Endocrinology and Inborn Errors of Metabolism. McGraw-Hill Medical Division. 2nd ed. 2017:427-446
3. Ducroq DH, Morton MS, Shadi N, et al. Analysis of serum bile acids by isotope dilution-mass spectrometry to assess the performance of routine total bile acid methods. Ann Clin Biochem. 2010;47(Pt 6):535-540
4. Fischler B, Eggersten G, Bjorkhem I. Genetic defects in synthesis and transport of bile acids. In: Sarafoglou K, Hoffmann GF, Roth KS, eds. Pediatric Endocrinology and Inborn Errors of Metabolism. McGraw-Hill Medical Division; 2017:447-460
5. Society for Maternal-Fetal Medicine (SMFM). Lee RH, Mara Greenberg, Metz TD, Pettker CM. Society for Maternal-Fetal Medicine Consult Series #53: Intrahepatic cholestasis of pregnancy: replaces consult #13, April 2011. Am J Obstet Gynecol. 2021;224(2):B2-B9. doi:10.1016/j.ajog.2020.11.002

Performance

Method Description

Bile acid concentrations in serum are measured by liquid chromatography tandem mass spectrometry stable isotope dilution analysis. Serum is mixed with isotopically labeled internal standards of selected bile acids and then subjected to protein precipitation. Sample preparation is semiautomated using a liquid handler. Reverse-phase liquid chromatography is performed to separate free bile acids, their respective tauro- and glyco-conjugates, and 2 bile acid precursors.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

3 to 5 days

Specimen Retention Time

1 month

Performing Laboratory Location

Rochester

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

82542

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
BAPS	Bile Acid Profile, S	43130-4

Result ID	Test Result Name	Result LOINC® Value
35802	Chenodeoxycholic acid	30519-3

35801	Cholic acid	30518-5
35803	Deoxycholic acid	30520-1
35819	Dihydroxycholestanoic acid	53479-2
35808	Glycochenodeoxycholic acid	93335-8
35807	Glycocholic acid	93334-1
35809	Glycodeoxycholic acid	93333-3
35811	Glycohyodeoxycholic acid	93332-5
35812	Glycolithocholic acid	93331-7
35810	Glycoursodeoxycholic acid	93330-9
35805	Hyodeoxycholic acid	93329-1
35806	Lithocholic acid	74897-0
35814	Taurochenodeoxycholic acid	93328-3
35813	Taurocholic acid	93327-5
35815	Taurodeoxycholic acid	93326-7
35817	Taurohyodeoxycholic acid	93325-9
35818	Taurolithocholic acid	93324-2
35816	Tauroursodeoxycholic acid	93323-4
35820	Trihydroxycholestanoic acid	38188-9
35804	Ursodeoxycholic acid	55159-8
35821	Total bile acids	14628-2