

Overview

Useful For

- Measuring tauro- and glycol-conjugated and unconjugated bile acid constituents in serum specimens
- Monitoring patients receiving bile acid therapy, such as cholic acid, deoxycholic acid, or ursodeoxycholic acid
- Aiding in the evaluation of liver function; evaluation of liver function changes before the formation of more advanced clinical signs of illness such as icterus
- Determining hepatic dysfunction as a result of chemical and environmental injury
- Indicating hepatic histological improvement in chronic hepatitis C patients responding to interferon treatment
- Indicating intrahepatic cholestasis of pregnancy
- This assay is **not useful for** the diagnosis of peroxisomal biogenesis disorders or inborn errors of bile acid metabolism.

Testing Algorithm

For information see [Bile Acid-Associated Tests Ordering Guide](#)

Special Instructions

- [Bile Acid-Associated Tests Ordering Guide](#)

Highlights

- Bile acids are elevated in individuals with liver dysfunction.
- This bile acid test can be used in the diagnosis of intrahepatic cholestasis of pregnancy.
- Fractionated bile acids, including tauro- and glycol-conjugates of cholic acid, chenodeoxycholic acid, deoxycholic acid, and ursodeoxycholic acid are individually summed and reported.

Method Name

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

NY State Available

Yes

Specimen

Specimen Type

Serum

Ordering Guidance

This test is useful in diagnosing intrahepatic cholestasis of pregnancy and does not support the assessment of either peroxisomal biogenesis disorders or inborn errors of bile acid metabolism.

For diagnostic testing for peroxisomal biogenesis disorders, order BAIPD / Bile Acids for Peroxisomal Disorders, Serum.

Specimen Required

Patient Preparation:

Fasting: 12 to 14 hours, required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)

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.

Forms

If not ordering electronically, complete, print, and send a [Gastroenterology and Hepatology Test Request](#) (T728) with the specimen.

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 to 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 of bile acids 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 they are markedly elevated 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.

**Reference Values**

Total cholic acid: < or =5.00 nmol/mL

Total chenodeoxycholic acid: < or =6.00 nmol/mL

Total deoxycholic acid: < or =6.00 nmol/mL

Total ursodeoxycholic acid: < or =2.00 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 bile acids are seen in patients with acute hepatitis, chronic hepatitis, liver sclerosis, liver cancer, and intrahepatic cholestasis of pregnancy.

**Cautions**

This test does not measure sulfated bile acids.

**Clinical Reference**

1. Marschall HU. Management of intrahepatic cholestasis of pregnancy. Expert Rev Gastroenterol Hepatol. 2015;9(10):1273-1279
2. 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
3. Piechota J, Jelski W. Intrahepatic cholestasis in pregnancy: Review of the literature. J Clin Med. 2020;9(5):1361. doi:10.3390/jcm9051361
4. 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 semi-automated using a liquid handler. Reverse-phase liquid chromatography is performed using mobile phases 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

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

82542

LOINC® Information

| Test ID | Test Order Name                     | Order LOINC® Value |
|---------|-------------------------------------|--------------------|
| BAFS    | Bile Acids, Fractionated and Tot, S | 43130-4            |

| Result ID | Test Result Name            | Result LOINC® Value |
|-----------|-----------------------------|---------------------|
| 35796     | Total Cholic acid           | 30518-5             |
| 35797     | Total Chenodeoxycholic acid | 30519-3             |
| 35798     | Total Deoxycholic acid      | 30520-1             |
| 35799     | Total Ursodeoxycholic acid  | 55159-8             |
| 35800     | Total bile acids            | 14628-2             |