Test Definition: LALB

Lysosomal Acid Lipase, Blood

Overview

Useful For

Evaluation of patients with a clinical presentation suggestive of lysosomal acid lipase deficiency using blood specimens

This test is **not useful** to determine carrier status for cholesteryl ester storage disease or Wolman disease.

Genetics Test Information

This test provides diagnostic testing for patients with clinical signs and symptoms suspicious for lysosomal acid lipase deficiency (LALD).

LALD is expressed phenotypically as infantile-onset Wolman disease or later-onset cholesterol ester storage disease.

Special Instructions

- Informed Consent for Genetic Testing
- Biochemical Genetics Patient Information
- Informed Consent for Genetic Testing (Spanish)

Method Name

Fluorometric Enzyme Assay

NY State Available

Yes

Specimen

Specimen Type

Whole blood

Specimen Required

Container/Tube:

Preferred: Lavender top (EDTA)

Acceptable: Yellow top (ACD) or green top (sodium heparin)

Specimen Volume: 2 mL

Forms

1. **New York Clients-Informed consent is required.** Document on the request form or electronic order that a copy is on file. The following documents are available:

-Informed Consent for Genetic Testing (T576)

-Informed Consent for Genetic Testing-Spanish (T826)

2. Biochemical Genetics Patient Information (T602)

3. If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:
-Biochemical Genetics Test Request (T798)
-Gastroenterology and Hepatology Test Request (T728)

Specimen Minimum Volume
0.5 mL

Reject Due To
All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Whole blood	Refrigerated (preferred)	7 days	
	Ambient	7 days	

Clinical & Interpretive

Clinical Information
Deficiency of lysosomal acid lipase (LAL) results in 2 clinically distinct phenotypes, Wolman disease (WD) and cholesteryl ester storage disease (CESD). Both phenotypes follow an autosomal recessive inheritance pattern and are caused by variant in the *LIPA* gene.

WD, the early-onset phenotype of LAL deficiency, is a lipid storage disorder characterized by vomiting, diarrhea, failure to thrive, abdominal distension, hepatosplenomegaly, and liver failure. Enlarged adrenal glands with calcification, a classic finding in WD, can lead to adrenal cortical insufficiency. Unless successfully treated, survival is rare beyond infancy.

CESD, the late-onset phenotype of LAL deficiency, is clinically variable with patients presenting at any age with progressive hepatomegaly and often splenomegaly, serum lipid abnormalities, and elevated liver enzymes. In childhood, patients can also present with failure to thrive and delayed milestones. Common features include premature atherosclerosis leading to coronary artery disease and strokes, liver disease of varying severity, and organomegaly. Lipid deposition in the intestinal tract can lead to diarrhea and weight loss.

CESD is likely underdiagnosed and frequently diagnosed incidentally after liver pathology reveals findings similar to nonalcoholic fatty liver disease or nonalcoholic steatohepatitis. Birefringent cholesteryl ester crystals in hepatocytes or Kupffer cells in fresh-frozen tissues are visualized under polarized light and pathognomonic.

Enzyme replacement therapy (sebelipase alfa) was recently approved for both WD and CESD and is now clinically available.

Reference Values
> or =21.0 nmol/h/mL

Interpretation

Enzyme activity below 1.5 nmol/h/mL in properly submitted samples is consistent with lysosomal acid lipase deficiency: Wolman disease or cholesteryl ester storage disease.

Normal results (> or =21.0 nmol/h/mL) are not consistent with lysosomal acid lipase deficiency.

Cautions
No significant cautionary statements

Clinical Reference
1. Bernstein DL, Hulkova H, Bialer MG, Desnick RJ. Cholesteryl ester storage disease: review of the findings in 135 reported patients with an underdiagnosed disease. J Hepatol. 2013;58(6):1230-1243
2. Reynolds T. Cholesteryl ester storage disease: a rare and possibly treatable cause of premature vascular disease and cirrhosis. J Clin Pathol. 201366(11):918-923
3. Pericleous M, Kelly C, Wang T, Livingstone C, Ala A. Wolman's disease and cholesteryl ester storage disorder: the phenotypic spectrum of lysosomal acid lipase deficiency. Lancet Gastroenterol Hepatol. 2017;2(9):670-679. doi:10.1016/S2468-1253(17)30052-3
4. Pastores GM, Hughes DA: Lysosomal acid lipase deficiency. Therapeutic options. Drug Des Devel Ther. 2020;14:591-601

Performance

Method Description
The whole blood specimen is spotted onto filter paper and dried overnight. A 3-mm (one-eighth inch) disk is punched out of the dried blood spot into a microcentrifuge tube, and water is added as a preincubation extraction that takes place on an orbital shaker. Extraction liquid is combined with either water (total activity well) or Lalistat (inhibited well) in a black 96-well plate. The plate is incubated. The substrate is then added to the same plate. After the incubation period, calibrators are prepared and analyzed on every plate to calculate enzyme activity results based on fluorescence units in patient wells vs calibrators. The calibration is derived from 4-methylumbelliferone (4-MU) that is serially diluted manually in the plate, with the highest calibrator being equivalent to an enzyme activity of 672.0 nmol/hour/mL blood. The plate is then ready to be read using the spectrofluorometer. Enzyme activity is calculated by subtracting the inhibited activity from total activity.(Hamilton J, Jones I, Srivastava R, Galloway P. A new method for the measurement of lysosomal acid lipase in dried blood spots using the inhibitor Lalistat 2. Clin Chim Acta. 2012;413(15-16):1207-1210; Cowan T, Pasquali M: Laboratory investigations of inborn errors of metabolism. In: Sarafoglou K, Hoffman GF, Roth KS, eds. Pediatric Endocrinology and Inborn Errors of Metabolism. 2nd ed. McGraw-Hill; 2017:1139-1158)

PDF Report
No

Day(s) Performed
Friday

Report Available
8 to 15 days

Specimen Retention Time

1 year

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

82657

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
LALB	Lysosomal Acid Lipase, B	73958-1

Result ID	Test Result Name	Result LOINC® Value
62954	Lysosomal Acid Lipase, B	73958-1
36339	Reviewed By	18771-6
36338	Interpretation (LALB)	59462-2