Overview

Useful For
Evaluation of patients with a clinical presentation suggestive of lysosomal acid lipase deficiency in blood specimens

This test is not useful to determine carrier status for cholesteryl ester storage disease (CESD) or Wolman disease (WD).

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 (WD) or later-onset cholesterol ester storage disease (CESD).

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
Collection 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 in Special Instructions:
   - Informed Consent for Genetic Testing (T576)
   - Informed Consent for Genetic Testing-Spanish (T826)
2. Biochemical Genetics Patient Information (T602) in Special Instructions.
3. If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:

- Gastroenterology and Hepatology Client Test Request (T728)
- Inborn Errors of Metabolism Test Request (T798)

**Specimen Minimum Volume**

0.5 mL

**Reject Due To**

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

**Specimen Stability Information**

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole blood</td>
<td>Refrigerated (preferred)</td>
<td>7 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ambient</td>
<td>7 days</td>
<td></td>
</tr>
</tbody>
</table>

**Clinical and 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 (NAFLD) or nonalcoholic steatohepatitis (NASH). 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/hour/mL

**Interpretation**
Enzyme activity below 1.5 nmol/hour/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/hour/mL) are not consistent with lysosomal acid lipase deficiency.

Cautions
No significant cautionary statements

Clinical Reference


Performance

Method Description
The whole blood specimen is spotted onto filter paper. A 3-mm (one-eighth-inch) disk is punched out of the dried blood spot into a microcentrifuge tube and 200 mcL of water is added as a preincubation extraction that takes place on an orbital shaker for 60 minutes at ambient conditions. Forty (40) mcL of the extraction liquid is combined with either 10 mcL of water (total activity well) or 10 mcL of 30 mcM Lalistat (inhibited well) in a black 96-well plate (50 mcL total volume). The plate is incubated for 10 minutes at 37 degrees C. The substrate consists of 150 mcL of 13.6 mM 4-methylumbelliferyl palmitate in 0.15 M acetate buffer, pH 4.0 plus 1.0% Triton and 0.5% cardiolipin and is added to the same plate (200 mcL total volume). After the incubation period (3 hours at 37 degrees C), 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. Clin Chim Acta 2012;413:1207-1210)

PDF Report
No

Day(s) and Time(s) Test Performed
Varies

Analytic Time
8 days

Maximum Laboratory Time
15 days

Specimen Retention Time
1 year
Performing Laboratory Location
Rochester

Fees and 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 Regional Manager. 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. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information
82657

LOINC® Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Test Order Name</th>
<th>Order LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LALB</td>
<td>Lysosomal Acid Lipase, B</td>
<td>73958-1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result ID</th>
<th>Test Result Name</th>
<th>Result LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>62954</td>
<td>Lysosomal Acid Lipase, B</td>
<td>73958-1</td>
</tr>
<tr>
<td>36339</td>
<td>Reviewed By</td>
<td>18771-6</td>
</tr>
<tr>
<td>36338</td>
<td>Interpretation (LALB)</td>
<td>59462-2</td>
</tr>
</tbody>
</table>