Overview

Useful For
Evaluation of cardiovascular risk
Assessment of low-density lipoprotein C (LDL-C) in patients with hypertriglyceridemia, type III hyperlipoproteinemia/dysbeta-lipoproteinemia, or when an accurate gold standard determination of LDL-C is required
Diagnosis of familial hypobetalipoproteinemia and abetalipoproteinemia

Method Name
Ultracentrifugation/Selective Precipitation/Enzymatic Colorimetry (Beta-Quantification)

NY State Available
Yes

Specimen

Specimen Type
Serum

Specimen Required
Patient Preparation: Patient must not consume any alcohol for 24 hours before the specimen is drawn.

Container/Tube:
Preferred: Red top
Acceptable: Serum gel

Specimen Volume: 3 mL

Additional Information: Indicate patient's age and sex.

Forms
If not ordering electronically, complete, print, and send a Cardiovascular Test Request Form (T724) with the specimen.

Specimen Minimum Volume
<2 years: 1 mL; > or =2 years: 2 mL

Reject Due To

<table>
<thead>
<tr>
<th>Gross hemolysis</th>
<th>Reject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross lipemia</td>
<td>OK</td>
</tr>
<tr>
<td>Gross icterus</td>
<td>Reject</td>
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</table>

Specimen Stability Information
Test Definition: LDLD
LDL Cholesterol (Beta-Quant), S

### Clinical and Interpretive

#### Clinical Information
Low-density lipoprotein cholesterol (LDL-C) is widely recognized as an established cardiovascular risk marker predicated on results from numerous clinical trials that demonstrate the ability of LDL-C to independently predict development and progression of coronary heart disease. In the United States, LDL-C remains the primary focus for cardiovascular risk assessment and evaluation of pharmacologic effectiveness. There have been considerable educational efforts invested and directed towards physicians, laboratorians, allied health staff, and the general public regarding LDL-C and strategies to lower LDL-C for reduction of cardiovascular risk.

Low-density lipoproteins are a heterogeneous population of lipid particles classically defined as having a density of 1.006 to 1.063 kg/L obtained by preparative ultracentrifugation. The gold standard beta-quantification (beta-quant or BQ) method combines ultracentrifugation with precipitation and yields a collective quantitative measurement of LDL-C, intermediate-density lipoprotein cholesterol (IDL-C), and lipoprotein(a) (Lp[a]) cholesterol. In practice, LDL-C is most commonly reported using the Friedewald equation (LDL-C=TC-HDL-TG/5).

Importantly, there are significant shortcomings and limitations to the Friedewald equation. Calculated LDL-C is not accurate in patients who are nonfasting, have triglycerides greater than 400 mg/dL, or have type III hyperlipoproteinemia. The equation is particularly inaccurate once the triglycerides are above 200 mg/dL or when LDL-C is <70 mg/dL.

Extremely low concentrations of LDL-C are associated with 2 genetic disorders: abetalipoproteinemia and hypobetalipoproteinemia. In both cases individuals will have very low total cholesterol and diminished or absent LDL-C, apolipoprotein B (apoB) (APLB / Apolipoprotein B, Plasma) and very low-density lipoprotein cholesterol (VLDL-C). Patients may exhibit clinical signs and symptoms of polyneuropathy, intestinal fat malabsorption, hepatosteatosis, and fat soluble vitamin deficiencies (VAE / Vitamin A and Vitamin E, Serum).

#### Reference Values
The National Lipid Association and the National Cholesterol Education Program (NCEP) have set the following guidelines for LDL-C in adults (ages 18 years and up):

- **Desirable:** <100 mg/dL
- **Above Desirable:** 100-129 mg/dL
- **Borderline high:** 130-159 mg/dL
- **High:** 160-189 mg/dL
- **Very high:** > or =190 mg/dL

The Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents has set the following guidelines for LDL-C in children and adolescents (ages 2-17 years):

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<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
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<tbody>
<tr>
<td>Serum</td>
<td>Refrigerated (preferred)</td>
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<tr>
<td></td>
<td>Frozen</td>
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</table>
Acceptable: <110 mg/dL

Borderline high: 110-129 mg/dL

High: > or =130 mg/dL

**Interpretation**

The optimal concentration for LDL cholesterol in primary prevention depends on individual patient risk. Risk factors include: family history of coronary heart disease (CHD), hypertension, cigarette smoking, obesity, diabetes mellitus, and low HDL cholesterol, among others. Consideration of drug treatment is recommended for patients with LDL cholesterol >190 mg/dL.

Values <80 mg/dL indicate hypobetalipoproteinemia. Complications due to fat malabsorption may be present in affected individuals.

Undetectable LDL-C is highly suggestive of abetalipoproteinemia. Related polyneuropathy may exist in affected individuals.

**Cautions**

It is preferable but not required that the patients fast for 12 to 14 hours before the blood is drawn. The patient can take water and prescription drugs if necessary. Alcohol should be avoided for at least 24 hours before specimen draw.

Result can be falsely decreased in patients with elevated levels of N-acetyl-p-benzoquinone imine (NAPQI)-a metabolite of acetaminophen), N-acetylcysteine (NAC), and metamizole.

**Clinical Reference**


**Performance**

**Method Description**


**PDF Report**

No

**Day(s) and Time(s) Test Performed**
Test Definition: LDLD
LDL Cholesterol (Beta-Quant), S

Monday through Thursday, Saturday; 3 p.m.

Analytic Time
2 days

Maximum Laboratory Time
4 days

Specimen Retention Time
7 days

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
83701-Lipoprotein, blood; high resolution fractionation and quantitation of lipoproteins including lipoprotein subclasses when performed (eg, electrophoresis, ultracentrifugation)

LOINC® Information

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<th>Test Order Name</th>
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<td>LDLD</td>
<td>LDL Cholesterol (Beta-Quant), S</td>
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<td>LDL Chol (Beta-Quantification), S</td>
<td>18261-8</td>
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