MAYO CLINIC LABORATORIES

Test Definition: LDLD

Low-Density Lipoprotein (LDL) Cholesterol, Beta-Quantification, Serum

Overview

Useful For

Evaluation of cardiovascular risk

Verification of estimated low-density lipoprotein cholesterol (LDL-C) in patients with hypertriglyceridemia or extremely low LDL-C

Diagnosis of familial hypobetalipoproteinemia and abetalipoproteinemia

Method Name

Ultracentrifugation/Selective Precipitation/Enzymatic Colorimetric

NY State Available

Yes

Specimen

Specimen Type

Serum

Necessary Information

Indicate patient's age and sex.

Specimen Required

Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 3 mL
Collection Instructions: Centrifuge and aliquot serum into plastic vial. Send refrigerated.

Forms

If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:
-Kidney Transplant Test Request
-Cardiovascular Test Request Form (T724)

Specimen Minimum Volume

2 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK
Gross icterus	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	10 days	
	Frozen	60 days	

Clinical & Interpretive

Clinical Information

Low-density lipoprotein cholesterol (LDL-C) is acknowledged as being causally related with atherosclerotic cardiovascular disease. LDL-C remains the primary focus for cardiovascular risk assessment and effectiveness of risk reduction interventions including diet, physical activity, and pharmacologic therapies.

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 direct quantitative measurement of LDL-C, intermediate-density lipoprotein cholesterol, and lipoprotein(a) cholesterol.

Extremely low concentrations of LDL-C are associated with abetalipoproteinemia and hypobetalipoproteinemia. In both cases, individuals will have very low total cholesterol and diminished or absent LDL-C, apolipoprotein B, and very low-density lipoprotein cholesterol. Patients may exhibit clinical signs and symptoms of polyneuropathy, intestinal fat malabsorption, hepatosteatosis, and fat-soluble vitamin deficiencies.

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):
Acceptable: <110 mg/dL
Borderline high: 110-129 mg/dL
High: > or =130 mg/dL

Interpretation

Mayo Clinic has adopted the National Lipid Association classifications, which are included as reference values on Mayo Clinic and Mayo Clinic Laboratories reports (see Reference Values). Lipids are most commonly measured to assess cardiovascular risk. Maintaining desirable concentrations of lipids lowers the risk of heart attacks or strokes.

Establishing appropriate treatment strategies and lipid goals requires consideration of low-density lipoprotein cholesterol (LDL-C) in context with other risk factors including age, sex, smoking status, family and personal history of heart disease. All guidelines recommend aggressive lipid lowering for patients with LDL cholesterol above 190 mg/dL.

Values below 20 mg/dL in untreated patients may be consistent with 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

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

1. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). JAMA. 2001;285(19):2486-2497
2. Jacobson TA, Ito MK, Maki KC, et al. National Lipid Association recommendations for patient-centered management of dyslipidemia: part 1 - executive summary. J Clin Lipidol. 2014;8(5):473-488
3. Expert panel on integrated guidelines for cardiovascular health and risk reduction in children and adolescents: summary report. Pediatrics. 2011;128(Suppl 5):S213-S256
4. Grundy SM, Stone NJ, Bailey AL, et al: 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation. 2019;139(25):e1046-e1081. doi:10.1161/CIR.0000000000000624

Performance

Method Description

Serum is combined with dextran sulfate and magnesium, ions precipitate the low-density lipoprotein and very low-density lipoprotein fractions, leaving the high-density lipoprotein (HDL) fraction in solution. The HDL cholesterol is then determined using an enzymatic cholesterol assay.(Package insert: HDL Cholesterol Precipitating Reagent Set [Dextran Sulfate]; Pointe Scientific, Inc; 12/2009)

Cholesterol esters are cleaved by the action of cholesterol esterase to yield free cholesterol and fatty acids. Cholesterol oxidase then catalyzes the oxidation of cholesterol to cholest-4-en-3-one and hydrogen peroxide. In the presence of

peroxidase, the hydrogen peroxide formed effects the oxidative coupling of phenol and 4-aminophenazone to form a red quinone-imine dye. The color intensity of the dye formed is directly proportional to the cholesterol concentration. It is determined by measuring the increase in absorbance.(Package insert: Cholesterol Gen2 Reagent. Roche Diagnostics; V 16.0, 10/2023)

PDF Report
No

Day(s) Performed
Monday through Thursday; Saturday, Sunday

Report Available
2 to 4 days

Specimen Retention Time
7 days

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 has been modified from the manufacturer's instructions. Its performance characteristics were determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information
83701

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
LDLD	LDL Cholesterol (Beta-Quant), S	18261-8

Result ID	Test Result Name	Result LOINC® Value
LDLC	LDL Chol (Beta-Quantification), S	18261-8