Test Definition: LPALD

Lp(a) and LDL Cholesterol, S

Overview

Useful For

Evaluation of the contribution of lipoprotein (a) (Lp[a])-cholesterol within measured low-density lipoprotein cholesterol

Evaluation of increased risk for cardiovascular disease and events:

-Most appropriately measured in individuals at intermediate risk for cardiovascular disease

-Patients with early atherosclerosis or strong family history of early atherosclerosis without explanation by traditional risk factors should also be considered for testing

-Follow-up evaluation of patients with elevations in Lp(a) mass

Method Name

Lipoprotein (a) Cholesterol: Electrophoresis/Enzyme Staining/Densitometry

Low-Density Lipoprotein Cholesterol: Ultracentrifugation/Selective Precipitation/Enzymatic Colorimetric (Beta-Quantification)

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Patient Preparation:

1. Fasting: 8 hours

2. Patient must abstain from alcohol for 24 hours before collection.

Collection Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Submission Container/Tube: Plastic vial

Specimen Volume: 4 mL

Collection Instructions: Centrifuge and aliquot serum into plastic vial. Send refrigerated.

Forms

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

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK
Gross icterus	Reject

Specimen Minimum Volume

2 mL

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	7 days	
	Frozen	60 days	

Clinical & Interpretive

Clinical Information

The cholesterol within lipoprotein(a) (Lp[a]) is included in every method that measures low-density lipoprotein cholesterol (LDL-C). Therefore, in patients that express high concentrations of Lp(a) the interpretation of LDL-C and the resulting clinical diagnoses and treatment strategies may be inaccurate. This panel reports 3 values: 1) the cholesterol measured within LDL by beta quantitation (this result contains both LDL-C and Lp[a]), 2) the cholesterol within Lp(a), and 3) a calculated "true" LDL-C where Lp(a)-C is subtracted from the beta quantitation LDL-C.

The abnormal lipoprotein-X (LpX) is visible on lipoprotein electrophoresis. If LpX is present, the measurement of LDL-C is inaccurate and will not be reported.

Reference Values

Lipoprotein (a) CHOLESTEROL: Normal: <5 mg/dL

Lipoprotein-X: Undetectable

Low-Density Lipoprotein Cholesterol (LDL-C):

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

Results of this panel can be used to determine the cholesterol content of low-density lipoprotein (LDL) and lipoprotein (a) (Lp[a]) separately. Interpretations of lipoprotein disorders can be made within the other clinical context.

Lipoprotein-X (LpX) is an abnormal lipoprotein that appears in the sera of patients with obstructive jaundice and is an indicator of cholestasis. The presence of LpX will be reported if noted during Lp(a) cholesterol analysis. The other values (LDL-C and Lp(a)-C) will not be reported if LpX is present.

Cautions

Lipoprotein (a) (Lp[a]) cholesterol values should not be confused with Lp(a) mass values, although they may be correlated in some individual cases. Lp(a) cholesterol values will be approximately 10 times lower than Lp(a) mass values, but the difference between the measures is not uniform. Lp(a) mass values are considered elevated when greater than 30 mg/dL. Lp(a) cholesterol is increased if greater or equal to 5 mg/dL.

Intravenous administration of heparin causes activation of lipoprotein lipase, which tends to increase the relative migration rate of the fractions, especially beta lipoproteins.

Supportive Data

Interpretation of low-density lipoprotein cholesterol (LDL-C) can be confounded in cases with elevated lipoprotein (a) (Lp[a]) expression because the cholesterol within Lp(a) is usually indistinguishable from the cholesterol within LDL. Accurate LDL-C measurements are critical for identifying genetic dyslipidemias such as familial hypercholesterolemia (FH). The interpretation of LDL-C, particularly in FH diagnostic algorithms may be affected by Lp(a)-C content.(1). Therefore, this panel reports the total measured LDL-C, the Lp(a)-C, and the LDL-C corrected for Lp(a)-C content.

Clinical Reference

1. Fatica EM, Meeusen JW, Vasile VC, Jaffe AS, Donato LJ. Measuring the contribution of Lp(a) cholesterol towards LDL-C interpretation. Clin Biochem. 2020 Dec;86:45-51. doi: 10.1016/j.clinbiochem.2020.09.007. Erratum in: Clin Biochem. 2021 Feb;88:56-57

2. Willeit P, Yeang C, Moriarty P, et al: Low-density lipoprotein cholesterol corrected for lipoprotein (a) cholesterol, risk thresholds, and cardiovascular events. J Am Heart Assoc. 2020 Dec;9(23):e016318

3. Yeang C, Witztum JL, Tsimikas S: 'LDL-C'?=?LDL-C?+?Lp(a)-C: implications of achieved ultra-low LDL-C levels in the proprotein convertase subtilisin/kexin type 9 era of potent LDL-C lowering. Curr Opin Lipidol. 2015 Jun;26(3):169-178. doi: 10.1097/MOL.0000000000000171

4. Kinpara K, Okada H, Yoneyama A, Okubo M, Murase T: Lipoprotein(a)-cholesterol: a significant component of serum cholesterol. Clin Chim Acta. 2011 Sep 18;412(19-20):1783-1787. doi: 10.1016/j.cca.2011.05.036

5. Yeang C, Willeit P, Tsimikas S: The interconnection between lipoprotein(a), lipoprotein(a) cholesterol and true LDL-cholesterol in the diagnosis of familial hypercholesterolemia. Curr Opin Lipidol. 2020 Dec;31(6):305-312. doi: 10.1097/MOL.0000000000000713

Performance

Method Description

Lipoprotein (a) Cholesterol:

Electrophoretic separation of lipoproteins followed by lipid staining and densitometry measurement.(Package insert: SPIFE Vis Cholesterol Reagent. Helena Laboratories; 09/2015)

Low-Density Lipoprotein Cholesterol:

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: Roche Cholesterol Gen 2 Reagent. Roche Diagnostics; V 13.0, 02/2019)

PDF Report
No

Specimen Retention Time
7 days

Performing Laboratory Location
Rochester

Fees & Codes

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
83700

83701

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
LPALD	Lp(a) and LDL Cholesterol, S	In Process

Test Definition: LPALD

Lp(a) and LDL Cholesterol, S

Result ID	Reporting Name	LOINC®
2849	Lp(a) Cholesterol	35388-8
23924	LpX	42178-4
614917	LDL Chol (Beta-Quantification), S	18261-8
610767	LDL-C Corrected for Lp(a)-C	In Process