MAYO CLINIC LABORATORIES

Test Definition: NMRLP

Nuclear Magnetic Resonance Lipoprotein Profile, Serum

Overview

Useful For

Assessment and management of a patient's risk for atherosclerotic cardiovascular disease

Identifying residual risk that may be present in some patients on cholesterol targeting treatment

Method Name

Nuclear Magnetic Resonance (NMR)

NY State Available

Yes

Specimen

Specimen Type

Serum Red

Specimen Required

Patient Preparation:

1. **Fasting overnight** (12-14 hours) **is required**. On night before examination, evening meal should be eaten before 6 p.m. and should contain no fatty foods.
2. Patient must not consume any alcohol for 24 hours before the specimen is collected.

Collection Container/Tube: Red top (serum gel/SST are **not acceptable**)

Submission Container/Tube: Plastic vial

Specimen Volume: 1.5 mL

Collection Instructions:

1. Allow isopropyl alcohol (from phlebotomy site prep) to dry thoroughly before venipuncture.
2. Centrifuge and aliquot serum into a plastic vial.

Forms

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

Specimen Minimum Volume

1 mL

Reject Due To

Gross hemolysis	Reject

Gross lipemia	Reject
Gross icterus	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum Red	Refrigerated (preferred)	7 days	
	Frozen	14 days	
	Ambient	8 hours	

Clinical & Interpretive

Clinical Information

Low-density lipoprotein particle (LDL-P) concentration is positively associated with increased risk of atherosclerotic cardiovascular disease (ASCVD). LDL-P is heterogeneous and contains many lipids and proteins, including phospholipids, triglycerides, and cholesterol. LDL cholesterol is a surrogate biomarker of LDL-P.

LDL cholesterol is the historical measure of atherogenic lipid burden. There is a large variance in the relative amount of cholesterol carried by each LDL-P. Consequently, subjects with similar LDL cholesterol values can have markedly different serum concentrations of LDL-P. Multiple studies have shown that serum concentrations of LDL-P more accurately reflect actual risk of ASCVD when LDL cholesterol values are discrepant.

High-density lipoprotein particle (HDL-P) concentration is inversely associated with risk of ASCVD. HDL cholesterol is also inversely associated with ASCVD, since it is a surrogate marker for HDL-P. Like other lipoproteins, HDL-P is heterogeneous, and particles contain highly variable proportions of proteins and lipids, including phospholipids, sphingolipids, and cholesterol.

Several large clinical studies have shown that HDL-P is more significantly associated with ASCVD risk than HDL cholesterol. Furthermore, HDL-P remains significantly associated with ASCVD even among subjects taking cholesterol-lowering medications. HDL-P more accurately reflects actual risk of ASCVD when HDL cholesterol values are discrepant.

Reference Values

> or =18 years:

LDL Particles:
Desirable: <1,000 nmol/L
Above Desirable: 1,000-1,299 nmol/L
Borderline high: 1,300-1,599 nmol/L
High: 1,600-2,000 nmol/L
Very high: > or =2,000 nmol/L

HDL Particles:
Male: >30 mcmol/L
Female: >35 mcmol/L

LDL Cholesterol (NMR):
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

Reference values have not been established for patients younger than 18 years of age.

Interpretation

Elevated concentrations of low-density lipoprotein particle (LDL-P) are associated with increased risk of atherosclerotic cardiovascular disease.

LDL-P is a more accurate indicator of risk when LDL cholesterol is discordantly low.

Lower concentrations of high-density lipoprotein particle are associated with increased risk of atherosclerotic cardiovascular disease.

Cautions

Failure to follow specimen collection requirements may prevent measurable results.

Clinical Reference

1. Mora S, Glynn RJ, Ridker PM. High-density lipoprotein cholesterol, size, particle number, and residual vascular risk after potent statin therapy. Circulation. 2013;128(11):1189-1197. doi:10.1161/CIRCULATIONAHA.113.002671
2. Lawler PR, Akinkuolie AO, Ridker PM, et al. Discordance between circulating atherogenic cholesterol mass and lipoprotein particle concentration in relation to future coronary events in women. Clin Chem. 2017;63(4):870-879. doi:10.1373/clinchem.2016.264515
3. Akinkuolie AO, Paynter NP, Padmanabhan L, Mora S: High-density lipoprotein particle subclass heterogeneity and incident coronary heart disease. Circ Cardiovasc Qual Outcomes. 2014;Jan;7(1):55-63. doi:10.1161/CIRCOUTCOMES.113.000675
4. Tehrani DM, Zhao Y, Blaha MJ, et al. Discordance of ow-density lipoprotein and high-density lipoprotein cholesterol particle versus cholesterol concentration for the prediction of cardiovascular disease in patients with metabolic syndrome and diabetes mellitus. Am J Cardiol. 2016;117(12):1921-1927. doi:10.1016/j.amjcard.2016.03.040
5. Mackey RH, Greenland P, Goff DC, Lloyd-Jones D, Sibley CT, Mora S. High-density lipoprotein cholesterol and particle concentrations, carotid atherosclerosis, and coronary events. J Am Coll Cardiol. 2012;60(6):508-516. doi:10.1016/j.jacc.2012.03.060
6. Otvos JD, Shalaurova I, Freedman DS, Rosenson RS. Effects of pravastatin treatment on lipoprotein subclass profiles and particle size in the PLAC-I trial. Atherosclerosis. 2002;160:41-48
7. Khera AV, Demler OV, Adelman SJ, et al. Cholesterol efflux capacity, high-density lipoprotein particle number, and incident cardiovascular events: an analysis from the JUPITER trial (Justification for the use of statins in prevention: An intervention trial evaluating rosuvastatin). Circulation. 2017;135(25):2494-2504.

doi:10.1161/CIRCULATIONAHA.116.025678

Performance

Method Description
Lipoprotein particles are quantified in serum by nuclear magnetic resonance (NMR). The deconvoluting algorithm used is the AXINON Mayo LP Profiler software.(Instruction manual: AXINON System User Manual Version 1.3.2, 03/2018)

PDF Report
No

Day(s) Performed
Tuesday,Friday

Report Available
2 to 7 days

Specimen Retention Time
7 days

Performing Laboratory Location
Rochester

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
83704

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
NMRLP	NMR Lipoprotein Profile, S	In Process

Result ID	Test Result Name	Result LOINC® Value
606167	LDL Particles, S	54434-6
606168	HDL Particles, S	49748-7
606169	LDL Cholesterol (NMR), S	2089-1