

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: 12 hours**, **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 <u>Cardiovascular Test Request Form</u> (T724) with the specimen.

### Specimen Minimum Volume

1 mL

#### **Reject Due To**

Gross	Reject
hemolysis	



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Gross lipemia	Reject
Gross icterus	Reject

### **Specimen Stability Information**

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

### **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



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**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.



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#### **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**

Mayo Clinic Laboratories - Rochester Main Campus

#### **Fees & Codes**

#### **Fees**

- Authorized users can sign in to <u>Test Prices</u> for detailed fee information.
- Clients without access to Test Prices can contact <u>Customer Service</u> 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact <u>Customer Service</u>.

#### **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	92722-8



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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