



# 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: 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 [Cardiovascular Test Request Form](#) (T724) with the specimen.

### Specimen Minimum Volume

1 mL

### Reject Due To

Gross hemolysis	Reject
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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: &gt;30 mcmol/L

Female: &gt;35 mcmol/L

**LDL Cholesterol (NMR):**

Desirable: &lt;100 mg/dL

Above Desirable: 100-129 mg/dL

Borderline high: 130-159 mg/dL

High: 160-189 mg/dL

Very high: &gt; 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 low-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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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

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 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

## Test Definition: NMRLP

Nuclear Magnetic Resonance Lipoprotein  
Profile, Serum

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