

NMR LipoProfile® Test

PROVIDES THE NUMBER OF LDL PARTICLES (LDL-P) ALONG WITH TRADITIONAL LIPID VALUES FOR MANAGEMENT OF PATIENTS AT RISK FOR CORONARY HEART DISEASE

Test Highlights

- LDL particles cause atherosclerosis and the higher the number of particles (LDL-P), the greater the risk for coronary heart disease (CHD).^{1,2}
- Due to the variable size and cholesterol content of LDL particles, LDL-P adds prognostic information that is independent of LDL-C.²
- LDL-P particle goals are <1000 nmol/L for high-risk patients and <1300 nmol/L for moderately high-risk patients.³
- The NMR LipoProfile® report provides a traditional lipid panel (TC, LDL-C, HDL-C, TG), as well as LDL particle number (LDL-P), the number of small LDL particles, HDL subclasses, and VLDL subclasses.

Clinical Background

- Heart disease is the leading cause of death in the United States.
- The National Cholesterol Education Program (ATP-III) currently recommends lipid screening, including total cholesterol, LDL-C, and HDL-C, in all adults over the age of 20. ATP-III treatment guidelines are currently based on LDL-C.
- The U.S. Preventive Services Task Force (USPSTF) recommends lipid screening, including HDL-C and total cholesterol, in men age 35 years and older and women age 45 years and older, and in younger adults if they have additional risk factors.
- Pathophysiology
 - LDL particles carry varying amounts of cholesterol.¹ Traditionally, LDL has been assessed by measuring the amount of cholesterol contained in these particles. However, because LDL particles vary in size and composition, the amount of cholesterol they carry (LDL-C) is not a reliable measure of the number of LDL particles (LDL-P) and a patient's risk for CHD. Direct measurement of the number of LDL particles (i.e., LDL-P) provides prognostic information that is independent of LDL-C.
 - The NMR LipoProfile test has been used to study over 11,000 subjects in seven diagnostic outcome trials using LDL-P and other lipoprotein particle concentrations as predictors of risk (Table 1). In all of these clinical trials, LDL-P has proven to be a better predictor of CHD events than LDL-C. HDL subclasses and VLDL subclasses are currently of research interest and may provide additional prognostic information.

Indications for Ordering

Patients suspected of being at risk for lipid-related CHD.

Limitations

This test does not include direct measurement of lipoprotein(a).

Methodology

Using Nuclear Magnetic Resonance (NMR) Spectroscopy, the NMR LipoProfile test directly measures individual lipoprotein particle subfractions (VLDL, LDL [including IDL], and HDL) in addition

to the cholesterol contained within lipoproteins. It is possible to "count" the number of particles in various subclasses (without separating the subclasses first) due to a magnetic property specific to lipoproteins that causes the lipids to broadcast characteristic signals for each of the 15 lipoprotein subclasses.⁴

Related Tests

- LDL Subclasses (0050021)
- Lipid Panel, Extended (0020468)
- Lipoprotein (a) (0099174)

Table 1: Predictive Power of Lipoproteins

CHD Outcome Trials	LDL-P More Predictive Than LDL-C Alone	CHD Endpoints	Patient Type	Citation
Cardiovascular Health Study (CHS)	Yes	Incident MI or Angina	Elderly <i>n</i> =683	Kuller L, et al. Arterioscler Thromb Vasc Biol 2002.
Womens Health Study (WHS)	Yes	Incident MI, CHD Death, Stroke	Healthy Women <i>n</i> =260	Blake GJ, et al. Circulation 2002.
Veterans Affairs HDL Intervention Trial (VA-HIT)	Yes	Nonfatal MI or CHD Death	Men with Known CHD And Low HDL-C <i>n</i> =1056	Otvos JD, et al. Circulation 2006.
Pravastatin Limitation Of Atherosclerosis in Coronary Arteries (PLAC-I)	Yes	Angiographic Minimum Lumen Diameter	Patients with Known CHD <i>n</i> =286	Rosenson, et al. Amer J Cardiol 2002.
Health Women Study (HWS)	Yes	EBCT Coronary Calcification Score	Post Menopausal Women <i>n</i> =286	Mackey RH, et al. Amer J Cardiol 2002.
Framingham Offspring Study	Yes	Incident MI, Stroke, Claudication, Angina	Healthy Men and Women <i>n</i> =3,237	Schaefer E, et al. Circulation 2004.
Multi-Ethnic Study of Atherosclerosis (MESA)	Yes	Carotid Intima-Media Thickness (IMT)	Healthy Men and Women <i>n</i> =5,538	Mora, et al. Atherosclerosis 2006.

References

1. Cromwell WC, Otvos JD. Low density lipoprotein particle number and risk for cardiovascular disease. *Curr Athero Reports* 2004;6:381-387.
2. Otvos JD, et al. Measurement issues related to lipoprotein heterogeneity. *Amer J Cardiol* 2002;90(8A):22i-29i.
3. Cromwell WC, Otvos JD. Heterogeneity of low-density lipoprotein particle number in patients with type 2 diabetes mellitus and low-density lipoprotein cholesterol <100 mg/dL. *Am J Cardiol* 2006;98:1599-602.
4. Otvos JD. Measurement of lipoprotein subclass profiles by nuclear magnetic resonance spectroscopy. *Handbook of Lipoprotein Testing* (Rifai N, Warnick GR, Dominiczak MH. Eds). AACC Press, Washington DC, 2000, pp 609-623.

Test Information

0095167

NMR LipoProfile®

For specific collection, transport, and testing information, refer to the ARUP Web site at www.aruplab.com.

For information on test selection, ordering, and interpretation, refer to ARUP Consult® at www.arupconsult.com.