Comprehensive Cardiovascular Profile 2.0

Great Smokies Diagnostic Laboratory[SM]

63 Zillicoa Street · Asheville, NC 28801-1074
www.gsdl.com

Patient:

Age:
Sex:
MRN:

Order Number:
Completed:
Received:
Collected:

Lipid Markers

Measured Values	Result		Reference Range
Total Cholesterol	168.0		<=200.0 mg/dl
Total HDL (HDL2, 3)	29.0	L	>=40.0 mg/dl
Total LDL (LDL, Lp(a), IDL)	123.0		<=130.0 mg/dl
Total Triglycerides	110.0		<=150.0 mg/dl
Total VLDL (VLDL1, 2, 3)	16.0		<=30.0 mg/dl
Calculated Values			
Non-HDL Cholesterol (LDL+VLDL)	139.0		<=160.0 mg/dl
Total Cholesterol : HDL Ratio	5.8	H	<=4.8

Lipid Fractionation / VAP™ Technology

HDL Fractions	Result		Reference Range
HDL2 (most protective)	4.0	L	>=10.0 mg/dl
HDL3 (less protective)	25.0	L	>=30.0 mg/dl
LDL Fractions			
LDL	111.0	H	<=100.0 mg/dl
IDL	9.0		<=20.0 mg/dl
Lp(a)	3.0		<=10.0 mg/dl

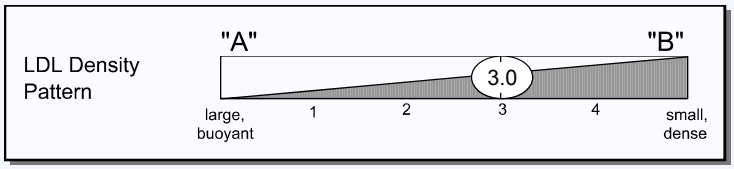
	Large, Bouyant LDL	Small, Dense LDL
LDL Density Pattern		B

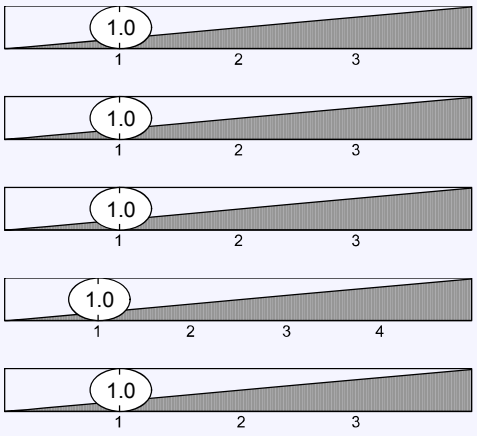
Triglyceride-rich Fractions	Result		Reference Range
VLDL1,2 (buoyant)	9.0		<=20.0 mg/dl
VLDL3 (dense, remnant)	7.0		<=10.0 mg/dl

Lipid-Independent Risk Factors

	Result	Reference Range
hs-CRP	0.59	<=1.69 mg/L
Homocysteine		
Fibrinogen		

Relative Risk for Cardiovascular Disease





Metabolic Syndrome Alerts

	Result	Reference Range
Fasting Glucose	91	70-105 mg/dL

Elevated Tri-glycerides	Low HDL2	Elevated Fasting Glucose	Small Dense LDL	Elevated IDL	Elevated VLDL3	Elevated Waist:Hip Ratio	Hyper-Tension
	✔		✔				

Physician's Assessment

Patient: ID:

Commentary

Lab Comments

Whole blood received in plasma vial. Only serum portion of test could be performed. 02/05/03 mh

This test has been developed and its performance characteristics determined by GSDL, Inc. It has not been cleared or approved by the U.S. Food and Drug Administration.

Commentary is provided to the practitioner for educational purposes, and should not be interpreted as diagnostic or treatment recommendations. Diagnosis and treatment decisions are the responsibility of the practitioner.

Comprehensive Cardiovascular Profile 2.0 provides a state-of-the-art assessment of cardiovascular risk and response to treatment. Utilizing the VAP(TM) lipid fractionation technology, physicians can increase their detection of cardiovascular disease risk from ~55% identified via the standard lipid panel to ~85%. Inclusion of independent factors such as homocysteine, hs-CRP and fibrinogen provides effective means to assess methylation impairments, inflammation and hemostatic factors that relate strongly to cardiovascular disease risk and prevention.

Total Cholesterol is within the reference range. This represents a beneficial, cardioprotective situation and should be maintained through diet, exercise and other means. Cholesterol has important functions as an antioxidant, a structural component of cell membranes and a hormone precursor.

Total HDL cholesterol is below the reference range. As there is an inverse relationship between the level of HDL and cardiovascular disease risk, low levels represents an area of concern. HDL appears to act as a cholesterol "scavenger,". Therefore, lower levels are associated with risk of atherogenesis. The relative amounts of HDL 2 vs. HDL 3 may provide further delineation as to the overall risk of a low total HDL. Genetic polymorphisms such as ApoE and CETP may contribute to low HDL levels.

Total Triglycerides are within the reference range. Since triglycerides are a moderate risk factor, normal levels are associated with less risk of cardiovascular disease and reflect a protective status of this patient's lipid and biochemical composition.

Non-HDL cholesterol is within the reference range. Non-HDL cholesterol is the sum of all the LDL fractions (LDL, Lp(a), IDL) and the VLDL fractions (VLDL 1,2 & 3). As a composite value used in risk assessment, results within or below the reference range are generally beneficial.

Total Cholesterol: HDL ratio is above the reference range. This elevated ratio is indicative of imbalanced metabolic and dietary factors. This is one factor comprising increased cardiovascular risk, and warrants follow-up in the context of the independent and lipid-fractionation risk factors.

HDL2 cholesterol is below the reference range. HDL2 appears to be the most protective HDL subclass. Low levels of HDL2 may indicate a low total HDL and possibly a tendency towards insulin resistance. This result may be of clinical importance in the context of all the test results, family and lifestyle factors.

HDL3 cholesterol is below the reference range. Although it is among the HDL class of lipoproteins, HDL3 appears to be less protective than the HDL2 subfraction. Sub-normal levels may be an indication of overall low HDL or a shift towards the more protective HDL2.

Commentary

IDL cholesterol is within the reference range. IDL is a triglyceride-rich particle and is becoming more strongly linked with atherosclerosis, insulin resistance and diabetes. Normal or low levels may be associated with an environment that may slow progression of arterial lesions.

LDL density pattern is of the small-dense variety, Pattern B. Aside from cardiovascular risk, the small-dense LDL pattern is strongly associated with diabetes, insulin resistance and polycystic ovary disease. The prevalence of the small-dense LDL pattern has a genetic component. Small-dense LDL patterns can be modified to the large-buoyant form that are associated with cardio-protection and regression of arterial disease.

VLDL cholesterol 1, 2 is within the reference range. VLDL is the main triglyceride-carrying lipid fraction. The VLDL1, 2 subfractions are the least dense, less atherogenic subfraction of VLDL. The buoyant VLDL1,2 is not directly atherogenic but does contain apo-B which relates to increased cardiovascular risk.

VLDL3 cholesterol is within the reference range. VLDL is the main triglyceride-carrying lipid fraction. The VLDL3 subfraction is the dense, cholesterol-laden portion that comprises the greatest risk for cardiovascular disease. In general, lower VLDL3 levels correlate to decreased cardiovascular risk.

hs C-Reactive Protein (CRP) is within the reference range. hs-CRP has been shown to be a useful predictor of cardiovascular disease, indicating the presence of chronic inflammation. Normal levels of hs-CRP therefore indicate normal inflammatory processes which may otherwise influence cardiovascular risk.

Glucose is within the reference range. Fasting glucose levels are an important indicator of normal metabolism. Normal fasting levels between 70-105 mg/dl indicate a balance of insulin, glucagon, adipose metabolism and hepatic glycogenolysis. These processes are associated with good diet and fiber intake, nutrient supplies (B-vitamins, chromium, magnesium, zinc) and exercise.

"Relative Risk for Cardiovascular disease" is meant to provide clinical, literature-based representations for use by practitioners. Studies concerning relative risk vary in their assignment of risk, these scales are a combination from the references listed below. The possible additive effect of these different risk factors is not generally known; therefore it is not necessarily appropriate to arrive at a cumulative "sum" of relative risk. Where interactions are known (i.e. high Lp(a) and high LDL) these are included in one of the individual relative risk values. Most of the studies upon which these scales are based are derived from comparing the highest and lowest data groups (tertiles, quintiles).

"Metabolic Syndrome Alerts" section provides the practitioner with a quick link to potential markers indicative of the metabolic syndrome (Syndrome X) that may affect their overall assessment of cardiovascular risk for the individual. NCEP guidelines consider the metabolic syndrome as a secondary target of therapy. The checks are generated by values that are out of reference range. These markers are not fully diagnostic of the syndrome, but lead the practitioner to consider other assessments such as: waist circumference, family history, BP and insulin resistance.

References:

Relative Risk for Cardiovascular Disease:

Commentary

LDL density pattern:

1.) Lamarche B, et al. A prospective, population-based study of low density lipoptrotein particle size as a risk factor for ischemic heart disease in men. Can J Cardiol 2001 Aug 17(8): 859-65

2.) St-Pierre AC, et al. Comparison of Various Electrophoretic Characteristics of LDL Particles and Their Relationship to the Risk of Ischemic Heart Disease. Circulation 2001; 104: 2295-99

3.)Austin MA, et al. Atherogenic Lipoprotein Phenotype A proposed genetic marker for coronary Heart Disease Risk. Circulation 1990;82: 495-506

hs-CRP

1.) Rost NS,et al. Plasma concentration of C-reactive protein and risk of ischemic stroke and transient ischemic attack: the Framingham study. Stroke 2001 Nov;32(11): 2575-9

2.) Ridker PM, et al. Novel risk factors for systemic atherosclerosis: a comparison of C-reactive protein, fibrinogen, homocysteine, lipoprotein (a) and standard cholesterol screening as predictors of peripheral arterial disease. JAMA 2001 May 16;285(19): 2481-5

3.) Ridker PM. Role of inflammatory biomarkers in prediction of coronary heart disease. Lancet 2001, Sept 358: 946-947

Homocysteine

1.) Ford ES et al. Homocyst(e)ine and cardiovascular disease: a systematic review of the evidence with special emphasis on case-control studies and nested case-control studies. Int J Epidemiol 2002 Feb;31(1): 59-70

2.) Ueland PM, et al. The Hordaland Homocysteine Studies. Lipids 2001;36 Suppl: S33-9

3.) van den Brandhof WE, et al. The relation between plasma cysteine, plasma homocysteine and coronary atherosclerosis. Atherosclerosis 2001 Aug;157(2): 403-9

4.) Clarke R,et al Underestimation of the importance of homocysteine as a risk factor for cardiovascular disease in epidemiological studies. J Cardiovasc Risk 2001 Dec;8(6): 363-9

Fibrinogen

1.) Cantin B, et al. Association of fibrinogen and lipoprotein(a) as a coronary heart disease risk factor in men (The Quebec Cardiovascular Study). Am J Cardiol 2002 Mar 15;89(6): 662-6

2.) Palmieri V, et al. Fibrinogen and preclinical echocardiographic target organ damage: the strong heart study. Hypertension 2001 Nov;38(5):1068-74

3.) Levenson J, et al. Fibrinogen and Its Relations to Subclinical Extracoronary and Coronary Atherosclerosis in Hypercholesterolemic Men. Arterioscler Thromb Vasc Biol 1997; 17:45-50

4.) Jousilahti P, et al. The association of c-reactive protein, serum amyloid a and fibrinogen with prevalent coronary heart disease-baseline findings of the PAIS project. Atherosclerosis 2001 Jun;156(2): 451-6

Lp(a)

1.) vonEckardstein A, et al. Lipoprotein(a) further increases the risk of coronary events in men with high global cardiovascular risk. J Am Coll Cardiol. 2001 Feb;37(2):434-9.

2.) Bostom AG, et al. Elevated plasma lipoprotein(a) and coronary disease in men aged 55 years and younger. A prospective study. JAMA 1996 Aug 21, 276(7): 544-8

3.) Hopkins PN, et al. Lipoprotein (a) interactions with lipid and nonlipid risk factors in early familial coronary artery

Commentary

disease. Arterioscler Thromb Vasc Biol 1997 Nov; 17(11): 2783-92
4.) Matsumoto Y, et al. High level of lipoprotein(a) is a strong predictor for progression of coronary artery disease. J Atheroscler Thromb 1998;5(2): 47-53

Triglycerides

1.) Austin MA. Plasma triglycerides as a risk factor for cardiovascular disease. Can J Cardiol 1998 May; Suppl B: 14B-17B
2.) Ballantyne CM. Current thinking in lipid lowering. Am J Med. 1998 Jun 22;104(6A):33S-41S.
3.)Frost PH and Havel RJ. Rationale for use of Non-High-Density Lipoprotein Cholesterol Rather Than Low-Density lipoprotein Cholesterol as a Tool for Lipoprotein Cholesterol Screening and Assessment of Risk and Therapy. Am J Cardiol 1998;81(4A): 26B-31B

Metabolic Syndrome Alerts:

1.) Ford ES et al. Prevalence of the metabolic syndrome among US adults: findings from the third National Health and Nutrition Examination Survey. JAMA 2002 Jan 16;287(3): 356-9
2.)Despres JP. Health consequences of visceral obesity. Ann Med 2001 Nov;33(8): 534-41
3.) Selby JV, et al. LDL subclass phenotypes and the insulin resistance syndrome in women. Circulation 1993 Aug;88(2):381-7
4.) Bavenholm P, et al. Association of insulin and insulin propeptides with an atherogenic lipoprotein phenotype. Metabolism 1995 Nov;44(11): 1481-8
5.) Grundy SM. Hypertriglyceridemia, atherogenic dyslipidemia, and the metabolic syndrome. Am J Cardiol 1998 Feb 26;81(4A): 18B-25B
6.) Ostlund RE Jr, et al. The ratio of waist-to-hip circumference, plasma insulin level, and glucose intolerance as independent predictors of the HDL2 cholesterol level in older adults. NEJM 1990 Jan 25;322(4): 229-34

The lipid markers and the lipid fractionation portions of the Comprehensive Cardiovascular Profile 2.0 were performed at Atherotech, Inc., 400 Vestavia Parkway, Birmingham, AL 35216. Total triglycerides are currently calculated values. Total triglycerides will be directly measured in the near future.