bostonheart diagnostics®

FINAL REPORT

Patient
Name:
DOB: Gender: M
Patient ID: Fasting: Yes
ACC/AHA Risk Score: BMI:
Patient Info: HYPERTENSION

Provider
Provider:
Account No:

Specimen
Accession No:
Requisition No:
Report Date & Time:
Received Date & Time:
Collection Date & Time:

CVMap

Lipids and Apolipoproteins

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results
Total Cholesterol		230			
	<200	200-240	>240 mg/dL		
Direct LDL-C		154			
	<100	100-160	>160 mg/dL		
HDL-C	52				
	>50	40-50	<40 mg/dL		
Triglycerides	141				
	<150	150-200	>200 mg/dL		
Non-HDL-C		178			
	<130	130-190	>190 mg/dL		
ApoB			137		
	<80	80-120	>120 mg/dL		
LDL-P[1]			2380	9	
	<1200	1200-1800	>1800 nmol/L		
HDL-P[1]		40.7			
	>44.0	34.0-44.0	<34.0 umol/L		
sdLDL-C			59		
	<25	25-49	>49 mg/dL		
VLDL-C	24				
	<30	30-40	>40 mg/dL		
Lp(a)	<15				
	<30	30-50	>50 mg/dL		

Lipid Ratios

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results
TC/HDL-C		4.4			
	<4	4-6	>6		
VLDL-C/TG	0.17				
	<0.2	0.2-0.3	>0.3		
HDL-C/TG		0.37			
	>0.5	0.25-0.5	<0.25		

Boston Heart Cholesterol Balance® Test[1]

Normalized Value (µmol x 100/mmol of Total Cholesterol)
Absolute Value (mg/L)

	Normalized Value	Absolute Value	Footnotes
Production Markers: LOW			
Lathosterol (85 / 125)	74	1.7	
Desmosterol (65 / 75)	79	1.8	
Absorption Markers: HIGH			
Beta-sitosterol (115 / 155)	186	4.6	
Campesterol (170 / 230)	231	5.5	

Cholesterol Balance Score (Production/Absorption) **0.4**

Over Absorber (0.2 / 0.5 / 1.1) Over Producer

Interpretation: Increased amounts of Beta-sitosterol and Campesterol may indicate an increase in intestinal absorption of cholesterol. Desmosterol accounts for a minor portion (20%) of overall cholesterol production.

Consideration: Consider lifestyle modification and ezetimibe therapy.

NMR Particle Size Analysis

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results
Small LDL-P[1]			>1324		
	<450	450-950	>950 nmol/L		
Large HDL-P[1]			<3.0		
	>11.1	4.8-11.1	<4.8 umol/L		
Large VLDL-P[1]		3.0			
	<2.0	2.0-4.7	>4.7 nmol/L		

Inflammation and Oxidation Tests

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results
hs-CRP		1.2			
	<1.0	1.0-3.0	>3.0 mg/L		
$LpPLA_2$ Activity		214			
	<180	180-224	≥225 nmol/min/mL		

Interpretation: Current studies reveal increased risk of stroke when both $LpPLA_2$ and hs-CRP are elevated. Elevated $LpPLA_2$ and hs-CRP may indicate arterial wall inflammation, plaque instability and reduced endothelial function. BORDERLINE hs-CRP may indicate inflammation and may be associated with increased CVD risk. BORDERLINE $LpPLA_2$ may indicate vascular inflammation, plaque instability and may be associated with increased CVD risk.

Consideration: Consider evaluating potential contributing CVD risk factors. Identify and treat underlying causes such as atherogenic lipoproteins. If indicated, control blood pressure, encourage smoking cessation and weight reduction.

Notes

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Test Name	(Most Recent)
Lipids and Apolipoproteins	
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HDL-C	52
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Non-HDL-C	178
ApoB	137
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HDL-P[1]	40.7
sdLDL-C	59
VLDL-C	24
Lp(a)	<15
Lipid Ratios	
TC/HDL-C	4.4
VLDL-C/TG	0.17
HDL-C/TG	0.37
Boston Heart Cholesterol Balance® Test[1]	
Lathosterol	74
Desmosterol	79
Beta-sitosterol	186
Campesterol	231
NMR Particle Size Analysis	
Small LDL-P[1]	>1324
Large HDL-P[1]	<3.0
Large VLDL-P[1]	3.0
Inflammation and Oxidation Tests	
hs-CRP	1.2
$LpPLA_2$ Activity	214

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Treatment Consideration Summary

The intended use of this report is to provide an aid in the physician's treatment decisions. This report is intended for a physician or other qualified health care provider. Please consult with your physician regarding any questions.

	Lifestyle and Dietary Modification	Statins	Ezetimibe	Fibrates	Omega-3 Fatty Acids	Soluble Fiber Supplements	Bile Acid Sequestrants
Lipids							
LDL-C	•	•	•	•		•	•
Non-HDL-C	•	•	•	•	•		•
ApoB	•	•	•	•			•
LDL-P	•	•	•	•			•
sdLDL-C	•	•	•	•	•	•	
Cholesterol Balance Test							
Absorption Markers	•		•			•	
Inflammation Tests							
hs-CRP	•	•			•		
$LpPLA_2$ Activity	•	•	•	•	•		

Lifestyle and Dietary Modification

Therapeutic lifestyle change is the cornerstone for reducing risk for Cardiovascular Disease (CVD) and diabetes.

The following recommendations are based on the American Heart Association's dietary and lifestyle guidelines. Consume a dietary pattern that achieves ≤6% of calories from saturated fat and emphasizes intake of vegetables, fruits and whole grains; includes low-fat dairy products, poultry, fatty fish, legumes, non-tropical vegetable oils and nuts; and limits intake of refined grains, sweets, sugar-sweetened beverages and red meats. Eliminate foods high in trans fat.

If indicated: control blood pressure, reduce weight, engage in smoking cessation and be physically active — work up to getting at least 30 minutes of a moderate intensity physical activity, at least 5 days per week.

- Increased amounts of sterol absorption markers indicate increased intestinal absorption of cholesterol. Decreasing dietary cholesterol as found in eggs, dairy products and meats and consuming more soluble fiber may reduce LDL-C. Sources of soluble fiber include pectin in apples and pears, psyllium, legumes and oats.
- To decrease ApoB, LDL-P, non-HDL-C, LDL-C levels it is important to reduce saturated fat intake, refined carbohydrates, sugars and eliminate trans fats.
- To lower small dense LDL-C reduce intake of simple carbohydrates and alcohol and if indicated reduce weight and increase physical activity. An elevation in small dense LDL-C is often associated with metabolic syndrome.

Statins

According to studies, statins have been shown to reduce cholesterol production, increase LDL clearance and lower the risk of CVD and its progression. Statins can lower CoQ10 levels.

Statins:
- may lower LDL-C by 30-60%; may lower non-HDL cholesterol.
- may lower ApoB; may lower LDL-P. ApoB is the primary protein on non-HDL lipoproteins and is a direct measure of the number of atherogenic lipoproteins. LDL-P is the LDL particle concentration.
- may lower small dense LDL significantly especially in patients with elevated triglycerides. According to studies, small dense LDL is believed to be more atherogenic than larger, more buoyant LDL particles.
- lowering CRP with statin therapy has been shown to lower CVD events. Elevated CRP may indicate inflammation and CVD risk.
- may lower $LpPLA_2$ up to 30% and stabilize plaque. $LpPLA_2$ is highly expressed in the necrotic core of atherosclerotic plaques and has been associated with atherosclerotic plaque instability. High levels increase risk of CVD.

Ezetimibe (Cholesterol Absorption Inhibitor)

Ezetimibe blocks the intestinal absorption of both biliary and dietary cholesterol, but may also promote a compensatory increase in cholesterol production. Combination therapy with statins may improve clinical outcomes.

Ezetimibe:
- is effective in lowering over absorption of cholesterol in the intestinal wall.
- may lower non-HDL cholesterol; may reduce LDL-C up to 20%.
- may lower ApoB up to 15%; may lower LDL-P; modestly lowers small dense LDL especially in patients with elevated triglycerides.
- may modestly lower $LpPLA_2$.

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Report Interpretation (continued)

Fibrates

For patients unable to tolerate statins consider fibrate therapy.

Fibrates:
- may modestly lower LDL-C by 20-31%; may lower non-HDL cholesterol.
- may lower ApoB; reduce total LDL-P with decreases in small dense LDL-P and increase in large buoyant LDL-P; may modestly reduce small dense LDL.
- have been shown to lower levels of $LpPLA_2$ most effectively in high risk patients with hypertriglyceridemia.

Omega-3 Fatty Acids

Studies have shown that Omega-3 Fatty Acids are essential to heart health. Their benefits may include improved cholesterol balance, improved immune system function, reduced inflammation and reduced rates of heart disease.

Omega-3 Fatty Acids:
- may modestly decrease non-HDL-C.
- may lower small dense LDL-C.

Soluble Fiber Supplements

Soluble fiber works by decreasing cholesterol absorption in the gut by increasing LDL receptor expression in the liver. Consider a soluble fiber supplement such as guar gum, psyllium, pectin and glucomannan.

- Increased amounts of sterol absorption markers indicate an increase in intestinal absorption of cholesterol.

Bile Acid Sequestrants

Bile Acid Sequestrants (BAS), according to studies, bind bile acids in the intestine, causing more liver cholesterol to be converted to bile acids and decreasing availability of cholesterol to build bile acids. This process upregulates LDL receptors and increases LDL clearance.

Bile Acid Sequestrants:
- may lower ApoB up to 12%; may lower LDL-P; may lower LDL-C up to 20%; may lower non-HDL cholesterol.

Notes

Footnotes

The intended use of this report is to provide an aid in the physician's treatment decisions. This report is intended for a physician or other qualified health care provider. Please consult with your physician regarding any questions.

[1]This test was developed and its performance characteristics determined by Boston Heart Diagnostics. It has not been cleared or approved by the U.S. Food and Drug Administration (FDA). The FDA has determined that such clearance is not necessary. This test is used for clinical purposes. It should not be regarded as investigational or for research. Methods: HDL Map: Gel electrophoresis; Cholesterol Balance and Fatty Acid Balance: GC/MS; MPO: Immunoturbidometric; CoQ10: UPLC/UV; Adiponectin: Latex turbidimetric immunoassay; Aldosterone: Chemiluminescent immunoassay; LDL-P, HDL-P, LipoMap and Serum MetaboMap: NMR; TMAO: LC/MS/MS; Dried Blood Spot Testing.

[2]A fasting glucose level of >125 mg/dL indicates the presence of diabetes mellitus, and a fasting glucose level of <70 mg/dL indicates hypoglycemia.

[3]A test result in the low range is normal in a non-diabetic, but low if a patient has diabetes (consistent with diabetes).

[4]Genetic analysis is performed by real time Polymerase Chain Reaction (PCR) using TaqMan® probes. Amplified gene nucleotide sites: APOE - Apolipoprotein E, T471C rs429358, C609T rs7412; F5 - Coagulation Factor V, G1746A rs6025; F2 - Coagulation Factor 2, G20210A rs1799963; CYP2C19 (Clopidogrel response) -Cytochrome P450 2C19, G681A rs4244275, G636A rs4986893, C-806T rs12248560; SLCO1B1 (Statin Myopathy) - Solute Carrier Organic Anion Transporter Family, Member 1B1, T625C rs4149056. MTHFR – Methylenetetrahydrofolate reductase, C677T rs1801133, A1298C rs1801131. Limitations: Other rare mutations not detected by these assays may be present in some individuals. Recommendation: Genetic counseling with discussion of testing for other family members is recommended.

[9]Increased risk is relative to the lowest quartile

* Tests performed with alternative methodologies are not displayed for comparative purposes.

▲ = Critical Value, ⚠ = Alert Value, TNP = Test Not Performed, PEND = Test Result Pending, GSP = Glycated Serum Protein, ADA = American Diabetes Association