

nt	Patient Info:	Gender: M	d	Specimen	Accession No: C0276939
		Fasting: Yes			Requisition No:
		BMI: 31.7			Report Date & Time: 10.20.2020 1:23 PM
					Received Date & Time: 10.14.2020 12:33 PM
					Collection Date & Time: NOT GIVEN

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results 10.12.20
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Inflammation and Oxidation Tests

hs-CRP		1.4			4.2
	<1.0	1.0-3.0	>3.0 mg/L		
OxPL-apoB ¹	3.8				1.4
	<5.0	5.0-7.5	>7.5 nmol/L		

Interpretation: BORDERLINE hs-CRP may indicate inflammation 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.

Test Name	Optimal	Borderline	Increased Risk	HDL Particles	Footnotes	Previous Results 10.12.20
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Boston Heart HDL Map® Test^{1,6}

α-1		28.7			28.1
	>35	25-35	<25 mg/dL		
α-2	61.8				61.9
	>55	45-55	<45 mg/dL		
α-3		20.4			18.9
	<20	20-25	>25 mg/dL		
α-4	14.2				15.8
	<20	20-25	>25 mg/dL		
preβ-1	7.4				11.4
	<20	20-25	>25 mg/dL		

Interpretation: This HDL map is **BORDERLINE**. Alpha-1 levels are low, a pattern associated with abnormal HDL metabolism and an increased CVD risk.

Consideration: Non-selective beta blockers, anabolic steroids, progesterone, and secondary causes of dyslipidemia such as thyroid, kidney or liver disorders may lower alpha-1. Optimize LDL-C, Triglycerides, sdLDL, ApoB, HbA1c, HOMA-IR, Omega-3 Index, reduce refined carbohydrates, increase physical activity; avoid excess body fat and smoking to increase alpha-1.

Boston Heart Cholesterol Balance® Test¹

Normalized Value (μmol x 100/mmol of Total Cholesterol)	Absolute Value (mg/L)	Normalized Value	Absolute Value	Footnotes
Production Markers: BORDERLINE				
Lathosterol		108	2.1	11
Desmosterol		98	1.9	11
Absorption Markers: LOW				
Beta-sitosterol		62	1.3	11
Campesterol		55	1.1	11
Cholesterol Balance Score (Production/Absorption) 1.8				
Over Absorber			Over Producer	

Interpretation: Elevated levels of Lathosterol and Desmosterol indicate an increased cellular production of cholesterol. Desmosterol accounts for a minor portion (20%) of overall cholesterol production.

Consideration: Consider lifestyle modification and statin therapy if cholesterol lowering is indicated.

Metabolic Tests

Glucose ²	74			93
	70-99	100-125	<70 or >125 mg/dL	
Adiponectin ¹	13.4			14.0
	>10	7-10	<7 μg/mL	

Notes Specimen: Acceptable

Patient	Patient ID:	Gender: M	P	Specimen	Accession No: C0276939
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Test Name	Optimal	Borderline	Increased Risk	Interpretation	Footnotes	Previous Results 10.12.20
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♥ Boston Heart Fatty Acid Balance™ Test¹

Saturated Fatty Acid Index		30.1		Saturated FA Index is BORDERLINE. Higher levels of plasma saturated fatty acids are associated with an increased risk of CVD. Consider restricting dietary intake of saturated fat by choosing poultry without skin, fish, low fat dairy products, and lean cuts of meat, and replacing butter with plant based oils. Consider reducing endogenous (internal) production of saturated fat by losing weight if appropriate, limiting added sugars, refined starches, and alcohol.	27.6
	<30.0	30.0-33.0	>33.0 %		
Trans Fatty Acid Index	0.31			Trans FA Index is OPTIMAL.	0.55
	<0.50	0.50-0.70	>0.70 %		
Unsaturated/Saturated Ratio	2.29			Unsaturated/Saturated Ratio is OPTIMAL.	2.55
	>2.25	2.00-2.25	<2.00		
Omega-3 Fatty Acid Index		3.54		Omega-3 FA Index is BORDERLINE. A lower Omega-3 FA index is associated with an increased risk for CVD. Eicosapentaenoic Acid (EPA) level is BORDERLINE. Increased EPA levels have been associated with lower risk of heart disease. Docosahexaenoic Acid (DHA) level is BORDERLINE. Increased DHA levels have been associated with a lower risk of heart disease. Consider recommending consumption of at least 2-3 meals of oily fish such as salmon, sardines, herring, tuna, and mackerel weekly or a fish oil or EPA supplement.	1.73
	>4.50	2.50-4.50	<2.50 %		
EPA		28.4			
DHA	>50.0	20.0-50.0	<20.0 µg/mL		
ALA	>100.0	60.0-100.0	<60.0 µg/mL		
EPA/AA Ratio			8.0	Alpha Linolenic Acid (ALA) level is LOW. High levels of ALA have been associated with a lower risk of CVD. Consider recommending increasing intake of walnuts, chia seeds, ground flaxseeds, or flaxseed oil.	8.4
	>30.0	14.0-30.0	<14.0 µg/mL		
AA/EPA Ratio		0.09		EPA/AA Ratio is BORDERLINE. Some authorities indicate that an EPA/AA ratio of >0.75 is optimal, usually only achieved with supplementation.	0.03
	>0.17	0.07-0.17	<0.07		
AA/EPA Ratio		11.64		AA/EPA Ratio is BORDERLINE. Some authorities indicate that an AA/EPA ratio of <1.33 is optimal, usually only achieved with supplementation.	30.79
	<5.88	5.88-14.29	>14.29		
	Low	Mid	High		
Monounsaturated Fatty Acid Index			31.2	Values are reported according to the lowest, middle and highest thirds of our reference population. Dietary monounsaturated fats from plant sources reduce heart disease risk; however, blood levels of monounsaturated fats do not necessarily correlate closely with dietary intake. More data are needed on the complex effects of omega-6 fatty acids on cardiovascular risk.	24.0
	<20.0	20.0-23.0	>23.0 %		
Omega-6 Fatty Acid Index	34.3				45.5
	<39.0	39.0-43.0	>43.0 %		
Linoleic Acid (LA)	874.6				964.2
	<930.0	930.0-1150.0	>1150.0 µg/mL		
Arachidonic Acid (AA)			331.1		340.2
	<250.0	250.0-320.0	>320.0 µg/mL		
Omega-3/Omega-6 Ratio			0.11		0.04
	<0.07	0.07-0.10	>0.10		

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Test Name	Low	Normal	High	Footnotes	Previous Results 10.12.20
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Chemistry Tests

BUN		16.9			18.4
	<3.0	3.0-25.0	>25.0 mg/dL		
Creatinine		1.17			1.14
	<0.67	0.67-1.17	>1.17 mg/dL		
Sodium		140			142
	<135	135-146	>146 mmol/L		
Potassium		4.5			4.3
	<3.5	3.5-5.3	>5.3 mmol/L		
Chloride		102			106
	<98	98-110	>110 mmol/L		
CO₂		23			24
	<20	20-31	>31 mmol/L		
Anion Gap		15			12
	<3	3-16	>16 mmol/L		
Total Protein		7.3			7.0
	<6.3	6.3-7.7	>7.7 g/dL		
Albumin		4.8			4.5
	<3.5	3.5-5.2	>5.2 g/dL		
Calcium		9.8			9.3
	<8.6	8.6-10.4	>10.4 mg/dL		
Total Bilirubin		0.7			0.5
		0.0-1.2	>1.2 mg/dL		
Direct Bilirubin		0.2			0.1
		0.0-0.3	>0.3 mg/dL		

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results 10.12.20
Glucose²	74				93
	70-99	100-125	<70 or >125 mg/dL		
AST	22				23
	<40	40-120	>120 U/L		
ALT	22				24
	<40	40-120	>120 U/L		
Alkaline Phosphatase	56				53
	<130	130-200	>200 U/L		

Test Name	Low	Normal	High	Footnotes	Previous Results 10.12.20
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Other Kidney Tests

Phosphorus		3.4			3.4
	<2.5	2.5-4.5	>4.5 mg/dL		
Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results 10.12.20
BUN/Creatinine	14.4				16.1
	<=23		>23		
eGFR / Non-African American	76				78
	>60	30-60	<30 mL/min/1.73 m ²		
eGFR / African American	88				91
	>60	30-60	<30 mL/min/1.73 m ²		

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Test Name	Low	Optimal	High	Footnotes	Previous Results
					10.12.20

Thyroid Tests

TSH		2.44		9	2.04
	<0.27	0.27-4.2	>4.2 µIU/mL		
Total T4		6.5		10	6.4
	<4.5	4.5-11.7	>11.7 ug/dL		
Free T4		1.39		10	1.57
	<0.93	0.93-1.70	>1.70 ng/dL		
Total T3		0.9		10	1.1
	<0.8	0.8-2.0	>2.0 ng/mL		
Free T3		2.6		10	3.4
	<2.0	2.0-4.4	>4.4 pg/mL		

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For comparison purposes only. Refer to the previous reports for complete results.*

Test Name	10.12.2020	10.20.2020 (Current)
Boston Heart HDL Map® Test^{1,6}		
α-1	28.1	28.7
α-2	61.9	61.8
α-3	18.9	20.4
α-4	15.8	14.2
preβ-1	11.4	7.4

Boston Heart Cholesterol Balance® Test¹		
Lathosterol	86	108
Desmosterol	87	98
Beta-sitosterol	70	62
Campesterol	122	55

Inflammation and Oxidation Tests		
hs-CRP	4.2	1.4
OxPL-apoB ¹	1.4	3.8

Metabolic Tests		
Glucose ²	93	74
Adiponectin ¹	14.0	13.4

Boston Heart Fatty Acid Balance™ Test¹		
Saturated Fatty Acid Index	27.6	30.1
Trans Fatty Acid Index	0.55	0.31
Unsaturated/Saturated Ratio	2.55	2.29
Omega-3 Fatty Acid Index	1.73	3.54
EPA	<15.6	28.4
DHA	39.8	98.3
ALA	8.4	8.0
EPA/AA Ratio	0.03	0.09
AA/EPA Ratio	30.79	11.64
Monounsaturated Fatty Acid Index	24.0	31.2
Omega-6 Fatty Acid Index	45.5	34.3
Linoleic Acid (LA)	964.2	874.6
Arachidonic Acid (AA)	340.2	331.1
Omega-3/Omega-6 Ratio	0.04	0.11

Test Name	10.12.2020	10.20.2020 (Current)
Chemistry Tests		
BUN	18.4	16.9
Creatinine	1.14	1.17
Sodium	142	140
Potassium	4.3	4.5
Chloride	106	102
CO ₂	24	23
Anion Gap	12	15
Total Protein	7.0	7.3
Albumin	4.5	4.8
Calcium	9.3	9.8
Total Bilirubin	0.5	0.7
Direct Bilirubin	0.1	0.2
Glucose ²	93	74
AST	23	22
ALT	24	22
Alkaline Phosphatase	53	56

Other Kidney Tests		
Phosphorus	3.4	3.4
BUN/Creatinine	16.1	14.4
eGFR / Non-African American	78	76
eGFR / African American	91	88

Thyroid Tests		
TSH	2.04	2.44
Total T4	6.4	6.5
Free T4	1.57	1.39
Total T3	1.1	0.9
Free T3	3.4	2.6

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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	Niacin	Omega-3 Fatty Acids
HDL Map Test				
Alpha-1	●	●	●	
Inflammation Tests				
hs-CRP	●	●	●	●
Fatty Acid Balance Test				
Omega-3 FA Index	●			●
EPA	●			●
DHA	●			●

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.

- To increase alpha-1 levels it is important to reduce weight, reduce refined carbohydrate intake, eliminate trans fats and increase physical activity.
- To improve Fatty Acid Balance results refer to the dietary changes provided in the Fatty Acid Balance interpretation section of this report.

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 raise alpha-1 by 10-25%. Statins promote the production of HDL into large particles, such as alpha-1 and alpha-2. Alpha-1 HDL is a large protective form of HDL.
- lowering CRP with statin therapy has been shown to lower CVD events. Elevated CRP may indicate inflammation and CVD risk.

Niacin

Consensus guidelines recommend monitoring glycemic control after initiating niacin (nicotinic acid) treatment or increasing its dosage.

Niacin:

- may promote the maturation of HDL into large particles, such as alpha-1 and alpha-2 and their corresponding pre-alpha particles.
- may decrease CRP by 15-24% in patients with stable coronary artery disease and metabolic syndrome.

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:

- Omega-3 fatty acids may lower CRP.

To improve Fatty Acid Balance results focus on the dietary changes provided in the Fatty Acid Balance interpretation section of this report. Consuming 1-2 grams of concentrated fish oil daily or 1800 mg of EPA per day has been shown to decrease heart disease morbidity and mortality.

Notes

The following testing was not completed as it is not performed at BHDx: Tests 1137 Leptin and 98450 Interleukin-6 are not orderable for tis client

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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; Adiponectin: Latex turbidimetric immunoassay; OxPL-apoB: Chemiluminescent immunoassay; LDL-P: NMR. TMAO, Cortisol, DHEA-S, DHT, Estradiol, Estrone, Progesterone, Total Testosterone, Estriol, 17OH Progesterone, Androstenedione: LC/MS/MS.

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, T471 C 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; SLC01B1 (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.

⁶ Test performed at 200 Crossing Boulevard, Framingham, MA 01702. CLIA#: 22D2100622. NYSDOH: 9021.

⁹ Biotin concentrations of up to 1200 ng/mL in patient serum have been shown to have no impact on assay results.

¹⁰ High doses of biotin (>5mg/day) may interfere with assay results. Patient assumed to be refraining from biotin supplementation for at least 3 days prior to blood draw.

¹¹ Our Cholesterol Balance Test was modified on April 1, 2019. This modification has resulted in new reference ranges. Results reported prior to April 1, 2019 should not be compared with results from this date forward.

* 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

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