

<b>Patient</b>	Name:		<b>Provider</b>	Provider:		<b>Specimen</b>	Accession No:		
	DOB:			Gender: F	Account No:			Requisition No:	
	Patient ID:			Fasting: Yes				Report Date & Time:	
	ACC/AHA Risk Score:			BMI:				Received Date & Time:	
	Patient Info:							Collection Date & Time:	

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results
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**Lipid Tests**

Total Cholesterol			<b>257</b>		
	<200	200-240	>240 mg/dL		
Direct LDL-C			<b>166</b>		
	<100	100-160	>160 mg/dL		
HDL-C		<b>60</b>			
	>60	<b>50-60</b>	<50 mg/dL		
Triglycerides	<b>123</b>				
	<150	150-200	>200 mg/dL		
Non-HDL-C			<b>197</b>		
	<130	130-190	>190 mg/dL		
ApoB			<b>131</b>		
	<80	80-120	>120 mg/dL		
sdLDL-C		<b>30</b>			
	<20	<b>20-40</b>	>40 mg/dL		
%sdLDL-C	<b>18</b>				
	<20	20-30	>30 %		
VLDL-C		<b>31</b>			
	<30	<b>30-40</b>	>40 mg/dL		
Lp(a)	<b>&lt;15</b>				
	<30	30-50	>50 mg/dL		

**Lipid Ratios**

TC/HDL-C		<b>4.3</b>			
	<4	<b>4-6</b>	>6		
VLDL-C/TG		<b>0.25</b>			
	<0.2	<b>0.2-0.3</b>	>0.3		
HDL-C/TG		<b>0.49</b>			
	>0.5	<b>0.25-0.5</b>	<0.25		

**Inflammation and Oxidation Tests**

hs-CRP		<b>1.0</b>			
	<1.0	<b>1.0-3.0</b>	>3.0 mg/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.

**Boston Heart Cholesterol Balance® Test<sup>1</sup>**

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

Production Markers	Normalized Value	Absolute Value	Footnotes
<b>Lathosterol</b>	<b>101</b>	<b>2.6</b>	<b>9</b>
<b>Desmosterol</b>	<b>63</b>	<b>1.6</b>	<b>9</b>
<b>Absorption Markers: LOW</b>			
<b>Beta-sitosterol</b>	<b>109</b>	<b>3.0</b>	<b>9</b>
<b>Campesterol</b>	<b>135</b>	<b>3.6</b>	<b>9</b>
<b>Cholesterol Balance Score (Production/Absorption)</b>	<b>0.8</b>		<b>9</b>

Over Absorber Over Producer

**Interpretation:** Elevated levels of Lathosterol 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.

**Notes** Specimen: Acceptable



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**Boston Heart Fatty Acid Balance™ Test<sup>1</sup>**

<b>Saturated Fatty Acid Index</b>		<b>30.2</b>		Saturated FA Index is <b>BORDERLINE</b> . 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.		
	<30.0	<b>30.0-33.0</b>	>33.0 %			
<b>Trans Fatty Acid Index</b>	<b>0.48</b>			Trans FA Index is <b>OPTIMAL</b> .		
	<0.50	0.50-0.70	>0.70 %			
<b>Unsaturated/Saturated Ratio</b>	<b>2.26</b>			Unsaturated/Saturated Ratio is <b>OPTIMAL</b> .		
	>2.25	2.00-2.25	<2.00			
<b>Omega-3 Fatty Acid Index</b>		<b>2.98</b>		Omega-3 FA Index is <b>BORDERLINE</b> . A lower Omega-3 FA index is associated with an increased risk for CVD. Eicosapentaenoic Acid (EPA) level is <b>BORDERLINE</b> . Increased EPA levels have been associated with lower risk of heart disease. Docosahexaenoic Acid (DHA) level is <b>BORDERLINE</b> . 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.		
	>4.50	<b>2.50-4.50</b>	<2.50 %			
<b>EPA</b>		<b>38.9</b>				
<b>DHA</b>	>50.0	<b>20.0-50.0</b>	<20.0 µg/mL			
<b>ALA</b>	>100.0	<b>60.0-100.0</b>	<60.0 µg/mL			
<b>EPA/AA Ratio</b>	>30.0	<b>14.0-30.0</b>	<14.0 µg/mL	Alpha Linolenic Acid (ALA) level is <b>BORDERLINE</b> . Higher 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.		
	>0.17	<b>0.07-0.17</b>	<0.07			
<b>AA/EPA Ratio</b>	<5.88	<b>5.88-14.29</b>	>14.29	AA/EPA Ratio is <b>BORDERLINE</b> . Some authorities indicate that an AA/EPA ratio of <1.33 is optimal, usually only achieved with supplementation.		
	Low	Mid	High			
<b>Monounsaturated Fatty Acid Index</b>			<b>23.5</b>	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.		
	<20.0	20.0-23.0	>23.0 %			
<b>Omega-6 Fatty Acid Index</b>		<b>41.4</b>				
	<39.0	39.0-43.0	>43.0 %			
<b>Linoleic Acid (LA)</b>			<b>1245.5</b>			
<b>Arachidonic Acid (AA)</b>	<930.0	930.0-1150.0	>1150.0 µg/mL			
	<250.0	250.0-320.0	>320.0 µg/mL			
<b>Omega-3/Omega-6 Ratio</b>		<b>0.09</b>				
	<0.07	0.07-0.10	>0.10			

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Test Name	Low	Normal	High	Footnotes	Previous Results
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**Chemistry Tests**

BUN	17.0				
	<3.0	3.0-25.0	>25.0 mg/dL		
Creatinine	0.83				
	<0.51	0.51-0.95	>.95 mg/dL		
Sodium	137				
	<135	135-146	>146 mmol/L		
Potassium	4.1				
	<3.5	3.5-5.3	>5.3 mmol/L		
Chloride	101				
	<98	98-110	>110 mmol/L		
CO <sub>2</sub>	25				
	<20	20-31	>31 mmol/L		
Anion Gap	11				
	<3	3-16	>16 mmol/L		
Total Protein	7.2				
	<6.3	6.3-7.7	>7.7 g/dL		
Albumin	4.9				
	<3.5	3.5-5.2	>5.2 g/dL		
Calcium	9.7				
	<8.6	8.6-10.4	>10.4 mg/dL		
Total Bilirubin	0.6				
		0.0-1.2	>1.2 mg/dL		

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results
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Glucose <sup>2</sup>	80				
	70-99	100-125	<70 or >125 mg/dL		
AST	22				
	<40	40-120	>120 U/L		
ALT	21				
	<40	40-120	>120 U/L		
Alkaline Phosphatase	82				
	<130	130-200	>200 U/L		

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results
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**Other Kidney Tests**

BUN/Creatinine	20.5				
	<=23		>23		
eGFR	82				
	>60	30-60	<30 mL/min/1.73 m <sup>2</sup>		

Test Name	Optimal	Borderline	Increased Risk	Footnotes	Previous Results
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CoQ10 <sup>1</sup>		1.02			
	>1.40	0.70-1.40	<0.70 mg/L		



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<b>Provider</b>	Provider:	
	Account No:	
<b>Specimen</b>	Accession No:	
	Report Date & Time:	

Test Name	(Most Recent)
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**Other Tests**

	CoQ10 <sup>1</sup>	1.02
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<b>Patient</b>	Name:		<b>Provider</b>	Provider:		<b>Specimen</b>	Accession No:	
	Patient ID:	Gender: F		Account No:			Report Date & Time:	

**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	Fibrates	Omega-3 Fatty Acids	CoQ10	Soluble Fiber Supplements	Bile Acid Sequestrants
<b>Lipids</b>							
LDL-C	●	●	●			●	●
HDL-C	●	●	●	●			●
Non-HDL-C	●	●	●	●			●
ApoB	●	●	●				●
sdLDL-C	●	●	●	●		●	
<b>Cholesterol Balance Test</b>							
Production Markers	●	●					
<b>Inflammation Tests</b>							
hs-CRP	●	●		●			
<b>Fatty Acid Balance Test</b>							
Omega-3 FA Index	●			●			
EPA	●			●			
DHA	●			●			
<b>Other Tests</b>							
CoQ10					●		

**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.

- Elevated production markers indicate an increased cellular production of cholesterol which may be associated with obesity and metabolic syndrome. Therapeutic lifestyle changes focus on LDL-C reduction through weight loss and decreased intake of animal fat, refined carbohydrates, sweets and sugar-sweetened beverages.
- To increase HDL-C and to decrease ApoB, 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.
- 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 be effective in reducing cholesterol production and LDL cholesterol levels but also may increase absorption of cholesterol.
  - may raise HDL-C by 5-10%; may lower LDL-C by 30-60%; may lower non-HDL cholesterol.
  - may lower ApoB; ApoB is the primary protein on non-HDL lipoproteins and is a direct measure of the number of atherogenic lipoproteins.
  - 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.

**Fibrates**

For patients unable to tolerate statins consider fibrate therapy.

Fibrates:

<b>Patient</b>	Name:	<b>Provider</b>	Provider:	<b>Specimen</b>	Accession No:
	Patient ID:		Gender: F		Account No:

**Report Interpretation (continued)**

**Fibrates (continued)**

- may modestly lower LDL-C by 20-31%; provide a modest increase in HDL-C by 5-15%; may lower non-HDL cholesterol.
- may lower ApoB; may modestly reduce small dense LDL.

**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 increase HDL-C; may modestly decrease non-HDL-C.
- may lower small dense LDL-C.

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.

**CoQ10**

CoQ10 is a fat soluble, vitamin-like substance produced by the body that assists in the production of energy-producing ATP within cells and is important for muscle function. Statins and other medications may lower CoQ10 levels which has been associated with muscle pain. CoQ10 supplementation along with standard heart failure therapy is associated with a reduction of symptoms and major adverse cardiovascular events in patients with congestive heart failure.

**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.

**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 increase HDL 3-5%; 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.

<sup>1</sup>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; OxPL-apoB and Aldosterone: Chemiluminescent immunoassay; LDL-P, HDL-P and LipoMap: NMR; TMAO: LC/MS/MS; Dried Blood Spot Testing.

<sup>2</sup>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.

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

<sup>4</sup>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; SLC01B1 (Statin Myopathy) - Solute Carrier Organic Anion Transporter Family, Member 1B1, T625C rs4149056. MTHFR – Methylene tetrahydrofolate 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.

<sup>9</sup>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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