bostonheart diagnostics®

AMENDED REPORT 09.15.2017

Patient

Provider

Provider: TONY BOGGESS DO
1310 S Main St
Ann Arbor, MI 48104

Account No: 7724

Specimen

Lipid Tests

Test Name	Optimal	Borderline	High Risk	Notes	Previous Results
Total Cholesterol		211			
	<200	200-240	>240 mg/dL		

Inflammation Tests

Test Name	Optimal	Borderline	High Risk	Notes	Previous Results
hs-CRP			5.5		
	<1.0	1.0-3.0	>3.0 mg/L		
$LpPLA_2$ Activity	150				
	<180	180-224	≥225 nmol/min/mL		
MPO[1]	372				
	<450	450-650	>650 pmol/L		

Interpretation: HIGH hs-CRP may indicate inflammation and may be associated with increased CVD risk.

Consideration: Consider evaluating potential contributing CVD risk factors. If indicated, control blood pressure, encourage smoking cessation, and weight reduction.

Metabolic Tests

Test Name	Optimal	Borderline	High Risk	Notes	Previous Results
HbA1c	5.5				
	<5.7	5.7-6.4	>6.4 %		
HOMA-IR	1.6				
	<2	2-3	>3		
Glucose[2]	81				
	70-99	100-125	<70 or >125 mg/dL		
GSP	177				
	<200	200-250	>250 µmol/L		
Adiponectin[1]	15.6				
	>13	9-13	<9 µg/mL		

Test Name	Low	Optimal	High	Notes	Previous Results
Insulin[3]		8			
	<5	5-15	>15 µU/mL		

Boston Heart Cholesterol Balance® Test[1]

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

	Normalized Value	Absolute Value	Notes
Production Markers: BORDERLINE			
Lathosterol (90 – 160)	114	2.4	
Desmosterol (70 – 90)	62	1.3	
Absorption Markers: BORDERLINE			
Beta-sitosterol (100 – 180)	137	3.1	
Campesterol (150 – 260)	215	4.7	

Cholesterol Balance Score (Production/Absorption) **0.6**

Over Absorber (0.2 – 0.5 – 1.1) Over Producer

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

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

Notes

Specimen: Acceptable

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Boston Heart Fatty Acid Balance™ Test[1]

Test Name	Optimal	Borderline	High	Interpretation	Notes	Previous Results
Saturated Fatty Acid Index		**30.6**		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, lean cuts of meat, and replacing butter with plant based oils.		
	<30.0	**30.0-33.0**	>33.0 %			
Trans Fatty Acid Index	**0.45**			Trans FA Index is OPTIMAL.		
	<0.50	0.50–0.80	>0.80 %			
	Optimal	Borderline	Low			
Monounsaturated Fatty Acid Index	**22.1**			Monounsaturated FA Index is OPTIMAL.		
	>22.0	19.0–22.0	<19.0 %			
Unsaturated/Saturated Ratio Index		**2.22**		Unsaturated/Saturated Ratio Index is BORDERLINE. A lower Unsaturated/Saturated Ratio Index is associated with a higher LDL-C and increased risk of CVD. Consider increasing intake of plant based fats from nuts, seeds, and their oils along with fatty fish and restricting intake of animal fats like red meat, fatty processed meats, and full fat dairy.		
	>2.25	**2.00–2.25**	<2.00			
Omega-3 Fatty Acid Index		**2.01**		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.		
	>4.50	**2.00–4.50**	<2.00 %			
EPA		**22.9**				
	>50.0	**15.6-50.0**	<15.6 µg/mL			
DHA		**54.1**				
	>100.0	**45.0–100.0**	<45.0 µg/mL			
ALA		**18.4**		Alpha Linolenic Acid (ALA) level is BORDERLINE. Higher levels of ALA have been associated with a lower risk of CVD. Consider recommending increasing intake of walnuts, chia seeds, ground flaxseeds, and canola or flaxseed oil.		
	>30.0	**14.0–30.0**	<14.0 µg/mL			
	Low	Mid	High			
Omega-6 Fatty Acid Index		**43.8**		Values are reported according to the lowest, middle and highest thirds of our reference population. Some authorities have recommended a goal below the 10th percentile for the Omega-6/Omega-3 Ratio Index (a value of 9.0) and the AA/EPA Ratio Index (a value of 5.0).		
	<41.0	41.0–46.0	>46.0 %			
Linoleic Acid (LA)			**1227.8**			
	<825.0	825.0–1040.0	>1040.0 µg/mL			
Arachidonic Acid (AA)			**391.5**			
	<220.0	220.0–290.0	>290.0 µg/mL			
AA/EPA Ratio Index		**17.1**				
	<13.0	13.0–25.0	>25.0			
Omega-6/Omega-3 Ratio Index		**17.59**				
	<15.0	15.0–24.0	>24.0			

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Chemistry Tests

Test Name	Low	Normal	High	Notes	Previous Results
BUN		13.2			
	<3.0	3.0-25.0	>25.0 mg/dL		
Creatinine		0.82			
	<0.51	0.51-0.95	>.95 mg/dL		
Sodium		141			
	<135	135-146	>146 mmol/L		
Potassium		4.4			
	<3.5	3.5-5.3	>5.3 mmol/L		
Chloride		102			
	<98	98-110	>110 mmol/L		
CO_2		25			
	<20	20-31	>31 mmol/L		
Anion Gap		14			
	<3	3-16	>16 mmol/L		
Total Protein		7.2			
	<6.6	6.6-8.7	>8.7 g/dL		
Albumin		4.4			
	<3.5	3.5-5.2	>5.2 g/dL		
Calcium		9.3			
	<8.6	8.6-10.4	>10.4 mg/dL		
Uric Acid	4.9				
	<6	6-10	>10 mg/dL		
Total Bilirubin			1.8		
		0.0–1.2	>1.2 mg/dL		
Direct Bilirubin		0.2			
		0.0-0.3	>0.3 mg/dL		

Test Name	Optimal	Borderline	High Risk	Notes	Previous Results
Glucose[2]	81				
	70-99	100-125	<70 or >125 mg/dL		
AST	18				
	<40	40-120	>120 U/L		
ALT	12				
	<40	40-120	>120 U/L		
Alkaline Phosphatase	69				
	<130	130-200	>200 U/L		

Other Kidney Tests

Test Name	Low	Normal	High	Notes	Previous Results
Magnesium		2.3			
	<1.6	1.6-2.6	>2.6 mg/dL		
Phosphorus		3.1			
	<2.5	2.5-4.5	>4.5 mg/dL		

Test Name	Optimal	Borderline	High	Notes	Previous Results
BUN/Creatinine	16.1				
	<=23		>23		
eGFR / Non-African American	85				
	>60	30-60	<30 mL/min/1.73 m²		
eGFR / African American	98				
	>60	30-60	<30 mL/min/1.73 m²		

Test Name	Low	Normal	High	Notes	Previous Results

Iron Tests

Iron			167		
	<37	37-145	>145 µg/dL		
UIBC		132			
	<112	112-347	>347 µg/dL		
TIBC		299			
	<250	250-370	>370 µg/dL		
Ferritin		119			
	<15	15-150	>150 ng/mL		

Test Name	Low	Mid	High	Notes	Previous Results

Other Tests

B12	419				
	300-450	451-946	<300 or >946 pg/mL		
Vitamin D, 25-OH		32			
	<30	30-100	>100 ng/mL		

Test Name	Optimal	Borderline	High	Notes	Previous Results
Folate	14.6				
	>14.0	10.0-14.0	<10.0 ng/mL		
CoQ10[1]		1.13		6	
	>1.40	0.70-1.40	<0.70 mg/L		
Homocysteine	8.7				
	<10	10-14	>14 µmol/L		

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Thyroid Tests

Test Name	Low	Optimal	High	Notes	Previous Results
TSH		1.79			
	<0.27	0.27-4.2	>4.2 µIU/mL		
TPO		31			
		<40	≥40 IU/mL		

Female Hormone Tests

Test Name	Test Results	Range	Notes	Previous Results
Estradiol	<25.0	See below		
Progesterone	0.33	See below		
LH	41.8	See below		
FSH	58.7	See below		
SHBG	26.8	24.6-122.0 nmol/L		

Female Hormone Reference Ranges by Phase

	Follicular	Ovulation	Luteal	Postmenopausal
Estradiol	12.4-233.0	41.0-398.0	22.3-341.0	<=138.0 pg/mL
Progesterone	0.06-0.89	0.12-12.0	1.83-23.9	<0.05-0.13 ng/mL
LH	2.4-12.6	14.0-95.6	1.0-11.4	7.7-58.5 mIU/mL
FSH	3.5-12.5	4.7-21.5	1.7-7.7	25.8-134.8 mIU/mL

Test Name	Test Results	Range	Notes	Previous Results
Total Testosterone	21.8	8.4-48.1 ng/dL		
Free Testosterone	4.3	1.0-8.5 pg/mL		
DHEA-S	220.0	35.4-256.0 µg/dL		

Test Name	Low	Optimal	High	Notes	Previous Results
Parathyroid Hormone		42			
	<15	15-65	>65 pg/mL		

Test Name	Test Results	Range	Notes	Previous Results
Cortisol	9	See below		

Cortisol Reference Ranges by Collection Time

	Low	Optimal	High
Cortisol (7-10AM)	<6	6-19	>19 µg/dL
Cortisol (4-8PM)	<2	2-12	>12 µg/dL

Complete Blood Count (CBC)

Test Name	Low	Normal	High	Notes	Previous Results
WBC		5.27			
	<3.50	3.50-10.50	>10.50 x10E3/µL		
RBC		4.79			
	<3.80	3.80-5.10	>5.10 x10E6/µL		
Hemoglobin		14.4			
	<11.7	11.7-15.5	>15.5 g/dL		
Hematocrit		43.4			
	<35.0	35.0-45.0	>45.0 %		

Test Name	Low	Normal	High	Notes	Previous Results
MCV		90.6			
	<80.0	80.0-100.0	>100.0 fL		
MCH		30.1			
	<27.0	27.0-33.0	>33.0 pg		
MCHC		33.2			
	<32.0	32.0-36.0	>36.0 g/dL		
RDW		13.2			
	<11.0	11.0-15.0	>15.0 %		
Platelet		198			
	<150	150-450	>450 x10E3/µL		
MPV			12.8		
	<7.5	7.5-12.5	>12.5 fL		

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White Blood Cell Differential

Test Name	Value			Absolute Value			
	Test Results	Notes	Previous Results	Test Results	Range	Notes	Previous Results
Neutrophils	63.4%			3.34	1.50-7.80 x10E3/µL		
Lymphocytes	27.1%			1.43	0.85-3.90 x10E3/µL		
Monocytes	6.8%			0.36	0.20-0.95 x10E3/µL		
Eosinophils	1.7%			0.09	0.00-0.50 x10E3/µL		
Basophils	0.6%			0.03	0.00-0.20 x10E3/µL		
Immature Granulocytes	0.4%			<0.03	0.00-0.10 x10E3/µL		

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Total Cholesterol	211
Boston Heart Cholesterol Balance® Test[1]	
Lathosterol	114
Desmosterol	62
Beta-sitosterol	137
Campesterol	215
Inflammation Tests	
hs-CRP	5.5
$LpPLA_2$ Activity	150
MPO[1]	372
Metabolic Tests	
HbA1c	5.5
HOMA-IR	1.6
Glucose[2]	81
GSP	177
Adiponectin[1]	15.6
Insulin[3]	8
Boston Heart Fatty Acid Balance™ Test[1]	
Saturated Fatty Acid Index	30.6
Trans Fatty Acid Index	0.45
Monounsaturated Fatty Acid Index	22.1
Unsaturated/Saturated Ratio Index	2.22
Omega-3 Fatty Acid Index	2.01
EPA	22.9
DHA	54.1
ALA	18.4
Omega-6 Fatty Acid Index	43.8
Linoleic Acid (LA)	1227.8
Arachidonic Acid (AA)	391.5
AA/EPA Ratio Index	17.1
Omega-6/Omega-3 Ratio Index	17.59

Test Name	09.13.2017 (Current)
Chemistry Tests	
BUN	13.2
Creatinine	0.82
Sodium	141
Potassium	4.4
Chloride	102
CO_2	25
Anion Gap	14
Total Protein	7.2
Albumin	4.4
Calcium	9.3
Uric Acid	4.9
Total Bilirubin	1.8
Direct Bilirubin	0.2
Glucose[2]	81
AST	18
ALT	12
Alkaline Phosphatase	69
Other Kidney Tests	
Magnesium	2.3
Phosphorus	3.1
BUN/Creatinine	16.1
eGFR / Non-African American	85
eGFR / African American	98
Iron Tests	
Iron	167
UIBC	132
TIBC	299
Ferritin	119
Thyroid Tests	
TSH	1.79
TPO	31

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Test Name	09.13.2017 (Current)
Other Tests	
B12	419
Folate	14.6
Vitamin D, 25-OH	32
Homocysteine	8.7
CoQ10[1]	1.13
Female Hormone Tests	
Estradiol	<25.0
Progesterone	0.33
LH	41.8
FSH	58.7
SHBG	26.8
Total Testosterone	21.8
Free Testosterone	4.3
DHEA-S	220.0
Parathyroid Hormone	42
Cortisol	9
Complete Blood Count (CBC)	
WBC	5.27
RBC	4.79
Hemoglobin	14.4
Hematocrit	43.4
MCV	90.6
MCH	30.1
MCHC	33.2
RDW	13.2
Platelet	198
MPV	12.8
White Blood Cell Differential	
Neutrophils	63.4
Lymphocytes	27.1
Monocytes	6.8
Eosinophils	1.7
Basophils	0.6
Immature Granulocytes	0.4

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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	CoQ10
Inflammation Tests					
hs-CRP	•	•	•	•	
Fatty Acid Balance Test					
Unsat/Sat Ratio Index	•			•	
Omega-3 FA Index	•			•	
EPA	•			•	
DHA	•			•	
Other Tests					
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.

• 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:
• 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 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.

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.

Notes

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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; sdLDL-C: Enzymatic colorimetric; Adiponectin: Latex turbidimetric immunoassay.

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.

6 Test performed at 175 Crossing Boulevard, Framingham, MA 01702. CLIA#: 22D1083041. NYSDOH: 8729.

* 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