bostonheart diagnostics®

Patient
Name: SAMPLE, PATIENT
DOB: 01.01.1969
Patient ID:
ACC/AHA Risk Score:
Patient Info: FAMILY HIST CVD, HYPERTENSION, PARENTAL DIAB
Gender: F
Fasting: Yes
BMI:

Provider
Provider: Ordering Provider
123 Main Street
Anytown, ST 01234
Account No:

Specimen
Accession No:
Requisition No:
Report Date & Time: 08.01.2017 10:12 AM
Received Date & Time: 07.20.2017 9:35 AM
Collection Date & Time: 07.19.2017 09:34 AM

Test Name	Optimal	Borderline	High Risk	Notes	Previous Results
Lipid Tests					
Total Cholesterol	**184**				
	<200	200-240	>240 mg/dL		
Direct LDL-C	**93**				
	<100	100-160	>160 mg/dL		
HDL-C			**32**		
	>60	50-60	**<50 mg/dL**		
Triglycerides			**441**		
	<150	150-200	**>200 mg/dL**		
Non-HDL-C		**152**			
	<130	**130-190**	>190 mg/dL		
ApoB		**101**			
	<80	**80-120**	>120 mg/dL		
LDL-P[1]	**930**				
	<1200	1200-1800	>1800 nmol/L		
sdLDL-C[1]			**48**		
	<20	20-40	**>40 mg/dL**		
%sdLDL-C			**52**		
	<20	20-30	**>30 %**		
VLDL-C			**59**		
	<30	30-40	**>40 mg/dL**		
Lp(a)	**<15**				
	<30	30-50	>50 mg/dL		
ApoA-1		**152.9**			
	>180	**140-180**	<140 mg/dL		
Lipid Ratios					
TC/HDL-C		**5.8**			
	<4	**4-6**	>6		
VLDL-C/TG	**0.13**				
	<0.2	0.2-0.3	>0.3		
ApoB/ApoA-1		**0.7**			
	<0.6	**0.6-0.9**	>0.9		
HDL-C/TG			**0.07**		
	>0.5	0.25-0.5	**<0.25**		

Test Name	Optimal	Borderline	High Risk	HDL Particles	Notes	Previous Results
♡ Boston Heart HDL Map® Test[1,6]						
α-1			**16.9**			
	>45	35-45	**<35 mg/dL**			
α-2		**56.0**				
	>65	**55-65**	<55 mg/dL			
α-3			**29.0**			
	<20	20-25	**>25 mg/dL**			
α-4			**27.1**			
	<20	20-25	**>25 mg/dL**			
preβ–1		**22.3**				
	<20	**20-25**	>25 mg/dL			

Interpretation: This HDL map is **ABNORMAL**. ApoA-1 levels are reduced in the very large alpha-1 particle and increased in the very small preBeta-1 particle, a pattern which is associated with abnormal HDL metabolism and an increased CVD risk.

Consideration: Rule out therapies that may lower alpha-1 levels such as some non-select beta blockers, anabolic steroids, or progestational agents. Rule out secondary causes of dyslipidemia such as thyroid, kidney, or liver disorders. Optimize Triglycerides, sdLDL, ApoB, Glucose, HOMA-IR, Omega-3 Index, consider encouraging increased activity, restriction of refined carbohydrates and if indicated, weight reduction and smoking cessation.

♡ 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: HIGH				
Lathosterol	90 / 160	210	3.6	
Desmosterol	70 / 90	76	1.4	
Absorption Markers: LOW				
Beta-sitosterol	100 / 180	96	1.9	
Campesterol	150 / 260	126	2.4	

Cholesterol Balance Score (Production/Absorption) **1.7**

Over Absorber 0.2 / 0.5 / 1.1 Over Producer

Interpretation: Elevated levels of Lathosterol and Desmosterol may 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.

CLIA# 22D2100622   NYSDOH: 9021   200 Crossing Blvd.   Framingham, MA 01702, 508.877.8711

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Chief Medical Officer

BHD-REP-003.02

Page 1 of 9

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Patient		Provider		Specimen	
Name: SAMPLE, PATIENT		Provider: Ordering Provider		Accession No:	
Patient ID:	Gender: F	Account No:		Report Date & Time: 08.01.2017 10:12 AM	

Test Name	Optimal	Borderline	High Risk	Notes	Previous Results

Inflammation Tests

Test Name	Optimal	Borderline	High Risk	Notes	Previous Results
Fibrinogen		**375**			
	<370	**370-470**	>470 mg/dL		
hs-CRP		**1.9**			
	<1.0	**1.0-3.0**	>3.0 mg/L		
$LpPLA_2$ Activity		**201**			
	<180	**180-224**	≥225 nmol/min/mL		
MPO[1]	**169**				
	<470	470-539	≥540 pmol/L		

Interpretation: 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. 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.

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

Metabolic Tests

Test Name	Optimal	Borderline	High Risk	Notes	Previous Results
HbA1c	**5.6**				
	<5.7	5.7-6.4	>6.4 %		
HOMA-IR			**9.4**		
	<2	2-3	**>3**		
Glucose[2]		**114**			
	70-99	**100-125**	<70 or >125 mg/dL		
GSP	**196**				
	<200	200-250	>250 µmol/L		
Adiponectin[1]			**2.9**		
	>13	9-13	**<9 µg/mL**		

Test Name	Low	Optimal	High	Notes	Previous Results
Insulin[3]			**33**		
	<5	5-15	**>15 µU/mL**		
C-Peptide[3]		**1.60**			
	<1.40	**1.40-3.30**	>3.30 ng/mL		

Interpretation: BORDERLINE glucose indicates prediabetes as established by the ADA. Prediabetes is a major risk factor for metabolic syndrome and has been associated with increased risk of developing diabetes, hyperlipidemia, hypertension and CVD. HIGH fasting insulin may indicate insulin resistance, obesity or renal insufficiency. Long term elevated levels may lead to diabetes.

Consideration: Consider encouraging dietary modification supported by education and consider glucose lowering and/or insulin sensitizing medications. If indicated encourage weight reduction, smoking cessation, increased activity and control blood pressure.

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Report Date & Time: 08.01.2017 10:12 AM	

Test Name	Test Result	Interpretation	Notes
Genetic Tests by Genotyping[1,4]			
Reported Date: 08.01.17			
♥ **Statin Induced Myopathy (SLCO1B1)[7]**	**T/C**	Decreased statin transporter. Patients with a T/C genotype have a decreased ability to transport statins; associated with reduced statin efficacy and up to a 4.5-fold increased risk of developing muscle pain on statin therapy. Consider recommending moderate to low doses of water soluble statins (in order of solubility: pravastatin, pitavastatin, rosuvastatin or fluvastatin).	
Reported Date: 08.01.17			
ApoE	**E3/E3**	Most common genotype. Consider recommending lifestyle modification and statin therapy.	
Reported Date: 08.01.17			
Clopidogrel Response (CYP2C19)	***1/*1**	Normal clopidogrel metabolizer.	

Test Name	Test Result	Interpretation	Notes
Reported Date: 08.01.17			
Factor II	**-/-**	Normal risk of clot formation.	
Reported Date: 08.01.17			
Factor V Leiden	**-/-**	Normal risk of clot formation.	
Reported Date: 08.01.17			
MTHFR	**677 C/C** **1298 A/A**	677(C/C) genotype – normal folate metabolism. 1298(A/A) genotype – no variant.	

Sample

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♡ Boston Heart Fatty Acid Balance™ Test[1]

Test Name	Optimal	Borderline	High	Interpretation	Notes	Previous Results
Saturated Fatty Acid Index			**35.7**	Saturated FA Index is HIGH. 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	**0.46**			Trans FA Index is OPTIMAL.		
	<0.50	0.50–0.80	>0.80 %			

Test Name	Optimal	Borderline	Low	Interpretation	Notes	Previous Results
Monounsaturated Fatty Acid Index	**27.9**			Monounsaturated FA Index is OPTIMAL.		
	>22.0	19.0–22.0	<19.0 %			
Unsaturated/Saturated Ratio Index			**1.95**	Unsaturated/Saturated Ratio Index is LOW. 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 restrict 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		**3.82**		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 OPTIMAL. Docosahexaenoic Acid (DHA) level is OPTIMAL. The Omega-3 FA Index is the amount of EPA and DHA divided by total fatty acids. 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 supplement.		
	>4.50	2.00–4.50	<2.00 %			
EPA	**63.7**					
	>50.0	15.6-50.0	<15.6 µg/mL			
DHA	**164.4**					
	>100.0	45.0–100.0	<45.0 µg/mL			
ALA	**58.2**			Alpha Linolenic Acid (ALA) level is OPTIMAL. Maintain current level of dietary and/or supplemental intake of Omega-3 fatty acids.		
	>30.0	14.0–30.0	<14.0 µg/mL			

Test Name	Low	Mid	High	Interpretation	Notes	Previous Results
Omega-6 Fatty Acid Index	**30.5**			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)			**1568.1**			
	<825.0	825.0–1040.0	>1040.0 µg/mL			
Arachidonic Acid (AA)	**193.9**					
	<220.0	220.0–290.0	>290.0 µg/mL			
AA/EPA Ratio Index	**3.1**					
	<13.0	13.0–25.0	>25.0			
Omega-6/Omega-3 Ratio Index	**6.36**					
	<15.0	15.0–24.0	>24.0			

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Test Name	Low	Normal	High	Notes	Previous Results
Chemistry Tests					
BUN		**18.6**			
	<3.0	**3.0-25.0**	>25.0 mg/dL		
Creatinine		**0.89**			
	<0.51	**0.51-0.95**	>.95 mg/dL		
Albumin		**5.1**			
	<3.5	**3.5-5.2**	>5.2 g/dL		
Uric Acid		**7.8**			
	<6	**6-10**	>10 mg/dL		

Test Name	Optimal	Borderline	High Risk	Notes	Previous Results
Glucose²		**114**			
	70-99	**100-125**	<70 or >125 mg/dL		
AST	**19**				
	<40	40-120	>120 U/L		
ALT	**33**				
	<40	40-120	>120 U/L		
Alkaline Phosphatase	**38**				
	<130	130-200	>200 U/L		

Test Name	Low	Optimal	High	Notes	Previous Results
Thyroid Tests					
TSH		**0.89**			
	<0.27	**0.27-4.2**	>4.2 µIU/mL		
Total T4		**7.7**			
	<4.5	**4.5-11.7**	>11.7 µg/dL		
Free T4			**2.50**		
	<0.93	0.93-1.70	**>1.70 ng/dL**		
Total T3		**1.0**			
	<0.8	**0.8-2.0**	>2.0 ng/mL		
Free T3		**2.8**			
	<2.0	**2.0-4.4**	>4.4 pg/mL		

Test Name	Low	Normal	High	Notes	Previous Results
Other Kidney Tests					
Cystatin C	**1.10**				
	<=1.20		>1.20 mg/L		

Test Name	Optimal	Borderline	High	Notes	Previous Results
BUN/Creatinine	**20.9**				
	<=23		>23		
eGFR / Non-African American	**77**			8	
	>60	30-60	<30 mL/min/1.73 m²		
eGFR / African American	**89**			8	
	>60	30-60	<30 mL/min/1.73 m²		
eGFR / Cystatin C	**67.00**			8	
	>60	30-60	<30 mL/min /1.73m²		
Muscle Tests					
Creatine Kinase (CK)	**155**				
	<200	200-1000	>1000 U/L		
NT-proBNP	**24**				
	<125	125-450	>450 pg/mL		

Test Name	Low	Mid	High	Notes	Previous Results
Other Tests					
Vitamin D, 25-OH	**18**				
	<30	30-100	>100 ng/mL		

Test Name	Optimal	Borderline	High	Notes	Previous Results
Homocysteine	**7.0**				
	<10	10-14	>14 µmol/L		
CoQ10¹			**0.68**	6	
	>1.40	0.70-1.40	**<0.70 mg/L**		

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Report Date & Time: 08.01.2017 10:12 AM	

Test Name	Test Results	Range	Notes	Previous Results
Female Hormone Tests				
Estradiol	**<25.0**	See below		
Progesterone	**0.20**	See below		
LH	**13.1**	See below		
FSH	**21.6**	See below		
SHBG	**24.3**	24.6-122.0 nmol/L		

Test Name	Test Results	Range	Notes	Previous Results
Total Testosterone	**11.3**	8.4-48.1 ng/dL		
Free Testosterone	**2.2**	1.0-8.5 pg/mL		
DHEA-S	**159.9**	35.4-256.0 µg/dL		

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

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Test Name	08.01.2017 (Current)
Lipid Tests	
Total Cholesterol	184
Direct LDL-C	93
HDL-C	32
Triglycerides	441
Non-HDL-C	152
ApoB	101
LDL-P[1]	930
sdLDL-C[1]	48
%sdLDL-C	52
VLDL-C	59
Lp(a)	<15
ApoA-1	152.9
Lipid Ratios	
TC/HDL-C	5.8
VLDL-C/TG	0.13
ApoB/ApoA-1	0.7
HDL-C/TG	0.07
♡ Boston Heart HDL Map® Test[1,6]	
α-1	16.9
α-2	56.0
α-3	29.0
α-4	27.1
preβ–1	22.3
♡ Boston Heart Cholesterol Balance® Test[1]	
Lathosterol	210
Desmosterol	76
Beta-sitosterol	96
Campesterol	126
Inflammation Tests	
Fibrinogen	375
hs-CRP	1.9
LpPLA$_2$ Activity	201
MPO[1]	169

Test Name	08.01.2017 (Current)
Metabolic Tests	
HbA1c	5.6
HOMA-IR	9.4
Glucose[2]	114
GSP	196
Adiponectin[1]	2.9
Insulin[3]	33
C-Peptide[3]	1.60
♡ Boston Heart Fatty Acid Balance™ Test[1]	
Saturated Fatty Acid Index	35.7
Trans Fatty Acid Index	0.46
Monounsaturated Fatty Acid Index	27.9
Unsaturated/Saturated Ratio Index	1.95
Omega-3 Fatty Acid Index	3.82
EPA	63.7
DHA	164.4
ALA	58.2
Omega-6 Fatty Acid Index	30.5
Linoleic Acid (LA)	1568.1
Arachidonic Acid (AA)	193.9
AA/EPA Ratio Index	3.1
Omega-6/Omega-3 Ratio Index	6.36
Chemistry Tests	
BUN	18.6
Creatinine	0.89
Albumin	5.1
Uric Acid	7.8
Glucose[2]	114
AST	19
ALT	33
Alkaline Phosphatase	38

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Page 7 of 9

BHD-REP-003.02

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Test Name	08.01.2017 (Current)
Other Kidney Tests	
Cystatin C	1.10
BUN/Creatinine	20.9
eGFR / Non-African American	77
eGFR / African American	89
eGFR / Cystatin C	67.00
Muscle Tests	
Creatine Kinase (CK)	155
NT-proBNP	24
Thyroid Tests	
TSH	0.89
Total T4	7.7
Free T4	2.50
Total T3	1.0
Free T3	2.8
Other Tests	
Vitamin D, 25-OH	18
Homocysteine	7.0
CoQ10[1]	0.68
Female Hormone Tests	
Estradiol	<25.0
Progesterone	0.20
LH	13.1
FSH	21.6
SHBG	24.3
Total Testosterone	11.3
Free Testosterone	2.2
DHEA-S	159.9

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

[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.

[7] Other significant risk factors for statin induced myopathy include age > 65 years, female gender, diabetes, physical activity, creatinine levels > 1.0 mg/dL, hypothyroidism, and use of calcium channel blockers and amiodarone.

[8] When there is substantial disagreement between eGFR values calculated from Creatinine versus Cystatin C, we recommend use of the eGFR calculated from Cystatin C as the most accurate measure of kidney function.

* 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

CLIA# 22D2100622 BHD-REP-003.02	NYSDOH: 9021	200 Crossing Blvd. Framingham, MA 01702, 508.877.8711	Hari Nair, PhD, DABCC, FACB Laboratory Director	Ernst J. Schaefer, MD Chief Medical Officer	Page 9 of 9