

Your Guide to Lowering Heart Disease and Stroke Risk

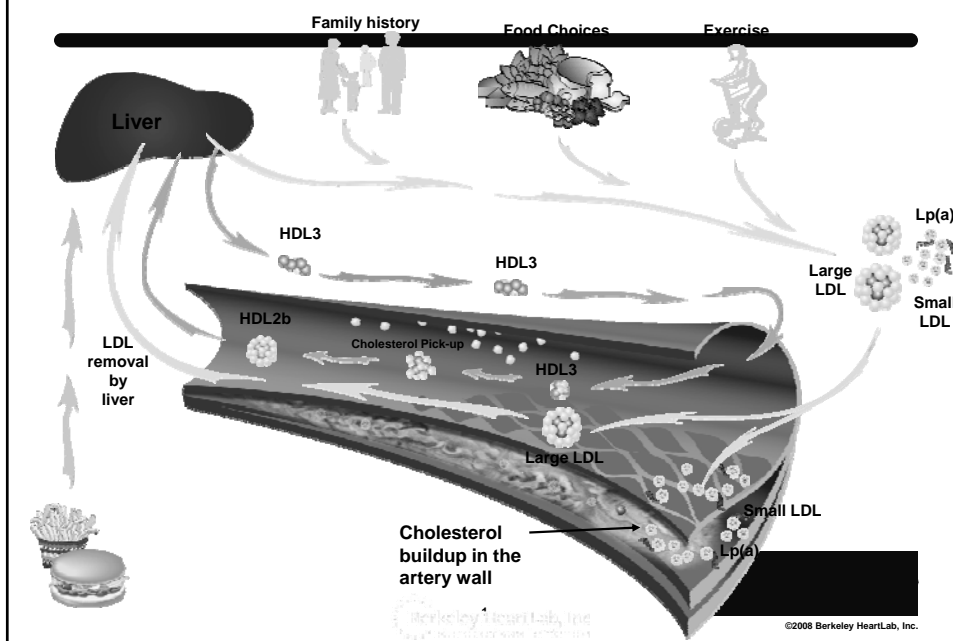
An Introduction to Berkeley HeartLab's Test Results

Bunny Foxhoven, RD, CE
303-973-6132
Susan Buckley, RD
South Denver Cardiology



©2008 Berkeley HeartLab, Inc.

Plaque Formation



What Do Those Numbers Mean? — Small LDL

* LDL III a + b and LDL IVb

- Berkeley does special tests to find the smaller more dangerous LDL cholesterol particles
- Small LDL particles cause heart disease (plaque) to progress much more quickly because they enter the artery wall much faster than large particles
- Often, the presence of small particles, signal the risk for diabetes
- It is better to have large puffy particles that can't fit through the cracks in the artery



Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business
©2008 Berkeley HeartLab, Inc.

4

How to Change Small LDL to Large LDL

- * Exercise – Get doctor's OK!
 - Regular exercise - 4-5 days per week for at least 30 minutes
 - 2 days per week, do strength training - Start slowly and build up!
 - Exercise 2 times per day for 10-15 minutes at a time if this works better for you
- * Nutrition
 - Increase fish intake to 2-3 times per week
 - Plant Sterols (2,000 mg/day)
 - Depending on ApoE genotype, a low fat or moderate fat diet can help improve this lab value. Your clinical educator can help determine how much fat you need in your diet
- * Take medications as prescribed



Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business
©2008 Berkeley HeartLab, Inc.

5

What Do Those Numbers Mean? — HDL2b

* HDL 2b – What is it?

- HDL 2b is the best of the “good” cholesterol particles
- Remember “Bigger is Better” HDL 2b is the biggest HDL particle; it does the best job removing cholesterol

* Treatment:

- **Body fat loss**
- **Regular exercise - Get Doctor’s approval!**
 - ◆ 4-5 days per week for at least 30 minutes
 - ◆ 2 days per week strength training
 - ◆ Start slowly and build up
- **Improved nutrition**
 - ◆ Increase fish intake to 2-3 times per week
 - ◆ Fish Oils (2,000-4,000 mg/day)
 - ◆ Purple-skinned fruits and juices
- **Take medication as prescribed – also Niacin, Fish oils**
- **Quit smoking**



6

What Do Those Numbers Mean? — Apo B

* Apo B – What is it?

- Apo B is a true measurement of the number of “bad cholesterol” (direct measurement of amount of LDL) particles
- A high number of Apo Bs increase your risk of heart disease
- Apo B is measured; LDL is a calculated number, so Apo B is a better marker for disease risk

* Treatment for Apo B:

- **Improve eating habits**
 - ◆ Increase foods with plant sterols- such as Smart Balance Heart Right Light, Benecol spread (see list of products)
 - ◆ Decrease foods high in saturated and eliminate trans fat
 - ◆ Soluble Fiber
- **Exercise with Doctor’s approval**
 - ◆ Strive for 4-5 days per week for at least 30 minutes
 - ◆ 2 days per week strength training. Start slowly and build up
 - ◆ Exercise 2 times per day for 10 - 15 minutes at a time if that works better for you
- **Take medication as prescribed**



7

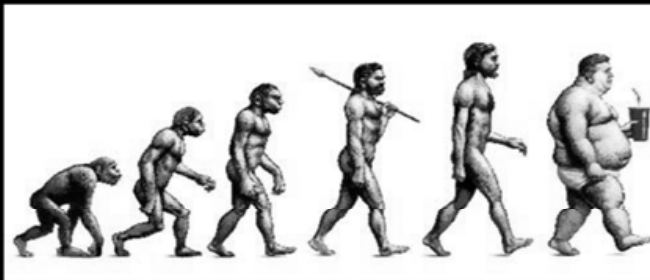
Plant Sterols

- * Occur naturally in parts of all plants
- * Shown to lower cholesterol by up to 14%
- * Block absorption of cholesterol in the intestine, leading to reduced levels in the blood
- * Double the cholesterol-lowering power of statins – can take WITH statins
- * Intake of 2 grams – 3 grams (or 2,000-3,000 mg) per day with meals
- * Twin Labs Cholesterol Success
- * ModuChol by Wakunaga
- * Nature Made Cholest-off
- * Can also be taken *with* statin drugs for a synergistic effect
- * Smart Balance Heart Right Light
- * Kroger Active Lifestyles FF Milk
- * Yoplait Healthy Heart Yogurt
- * Orowheat Whole Grain and Oat bread
- * www.corowise.com/wheretobuy

8

 Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business
©2008 Berkeley HeartLab, Inc.

A Further View of Evolution...



9

 Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business
©2008 Berkeley HeartLab, Inc.

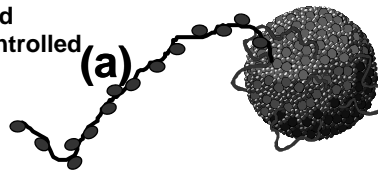
What Do Those Numbers Mean? — Lp(a)

* Lp(a) Extended Range – What is it

- Lp(a) is an LDL particle with a “corkscrew” protein attached
- High levels can increase your risk for heart attacks and strokes
- Diet and exercise have no significant affect on lowering abnormal values
- Specific medications can lower Lp(a) levels in some patients
- A high level of Lp(a) can be genetic -- Family members may consider testing to see if they are at risk

* Treatment:

- Take medication as prescribed
- Keep other risks very well controlled



Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business

10

©2008 Berkeley HeartLab, Inc.

What Do Those Numbers Mean? — Homocysteine

* Homocysteine – What is it?

- Elevated levels of homocysteine can cause injury to the blood vessel walls, increasing risk for heart disease
- High homocysteine levels can increase risk for high blood pressure
- Foods high in folate (B Vitamins) can reduce high levels
- Supplemental B vitamins

* Treatment:

- Increase foods with folate- examples: beans, fortified whole grain cereals like Cheerios, Wheaties, asparagus, spinach, Brussels sprouts (see handout - Homocysteine and Folate)
- Talk to your Clinical Educator about your protein foods

* Medication – Follow your doctor’s advice!

Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business

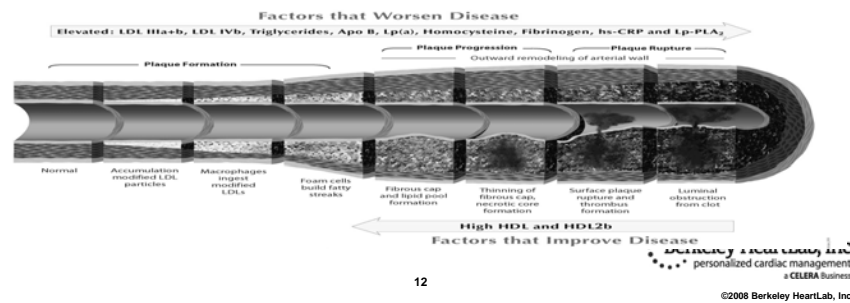
11

©2008 Berkeley HeartLab, Inc.

What Do Those Numbers Mean? — Lp-PLA₂

* Lp-PLA₂ – What is it?

- Elevated levels of Lp-PLA₂ are associated with inflammation in the artery wall
- High levels (greater than 223 ng/ml) can be predictive of heart attack and stroke
- More inflammation – narrowing of lumen
- It can be lowered with proper medications
- Anti-inflammatory diet: Lots of vegetables/fruits, omega-3 fatty fish, nuts, olive oil; reduce animal products, omega 6 fats



12

What Do Those Numbers Mean? — Fibrinogen

* Fibrinogen – What is it?

- Fibrinogen is a type of protein involved in blood clotting
- It is not good if blood clots too easily because blood clot formation in the artery can block blood flow
- High levels (value greater than 350 mg/dl) are associated with inflammation and increased risk for heart disease
- Persons with tendencies toward diabetes have increased levels
- Tobacco use can increase level
- Carrying too much body fat around the waist can increase fibrinogen

* Treatment:

- Proper medications
- Stop tobacco use
- Lose body fat

13

What Do Those Numbers Mean? — CRP-hs

* CRP (C-Reactive Protein) – What is it

- Elevated CRP is associated with inflammation any where in the body – a systemic inflammatory marker (heart disease, arthritis, sinus infection, etc.)
- High levels can be predictive of heart disease, especially if it is elevated along with Lp-PLA2
- If BOTH CRP-hs and Lp-PLA2 levels are elevated, your risk for heart disease and stroke can be 2-4 times higher
- High levels of CRP and fibrinogen are predictive of heart disease risk
- Stress can cause CRP to go up

* Treatment:

- Take medications as prescribed
- Anti-inflammatory diet: Lots of vegetables/fruits (salicylic acid found in berries, broccoli, spinach, peppers, legumes, walnuts, whole grains, spices, etc. have ability to act as COX inhibitors much like aspirin and ibuprofen. Lower saturated fat and sugar intake)
- Spices like ginger, turmeric are anti-inflammatory
- Omega 3 fatty acids in fish, fish oil are anti-inflammatory

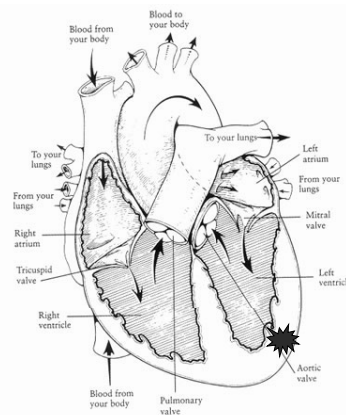
Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business

14

©2008 Berkeley HeartLab, Inc.

What Do Those Numbers Mean? — NT-proBNP

- * A warning signal (or red light) that the heart muscle is undergoing duress or are being stressed
- * Chemical created only by cardiac muscle
- * Physician will determine what additional tests are needed to identify cause
- * The early identification of abnormal values will help the physician with treatment considerations (possibly meds) to lower event risk before clinical symptoms develop



Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business

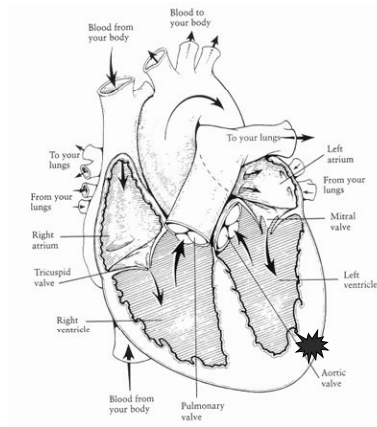
15

©2008 Berkeley HeartLab, Inc.

NT-proBNP Treatment

* Treatment:

- Reduce stress in your life
- Practice stress reduction techniques
- Take medications as prescribed
- Weight loss, if needed
- Control blood pressure—follow a low sodium diet (see handout - Low Sodium 4myheart)
- Exercise if doctor permits



Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business
©2008 Berkeley HeartLab, Inc.

16

What Do Those Numbers Mean? — Insulin

* Insulin – What is it?

- Insulin is a hormone that regulates blood sugar levels
- High insulin levels increase your risk for diabetes and heart disease
- When both insulin and TG are elevated – headed toward diabetes

* Treatment:

- Improve eating habits
 - ◆ Eat small portions 5-6 times per day, every 3-4 hours
 - ◆ Control intake of carbohydrate, protein, and fat
 - ◆ Decrease sugary foods and “white” starchy carbohydrates such as rice, potato and pasta. (see handout - Getting Carb Conscious)
- Lose body fat
 - ◆ Exercise with doctor’s permission
 - ◆ Decrease calorie intake
- Keep stress levels controlled – excess stress produces glucose which increases insulin levels
- Can be lowered with proper medication

Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business
©2008 Berkeley HeartLab, Inc.

17

What Do Those Numbers Mean? — Apo E

* Apo E Genotype – What is it?

* Gene found on DNA

- Apo E is an inherited trait
 - ◆ Like blue eyes, it never changes
 - ◆ You inherit 1 Apo E protein from Mom and 1 from Dad
- There are 3 types of Apo E genotypes
- Apo E partially influences how you respond to dietary fat
- Your Apo E type helps determine the right nutrition plan for you

* Treatment - see next slide



18

©2008 Berkeley HeartLab, Inc.

Apo E Review of Literature[†]

It is necessary to monitor your patients' therapeutic responses and modify your treatments accordingly.

		Apo E2		Apo E3		Apo E4	
Genotype		2/2	2/3	3/3	2/4	3/4	4/4
Population Frequency		1%	10%	62%	2%	20%	5%
Dietary Contribution	Soluble Fiber ¹	↓↓ LDL		↓ LDL		↓ LDL	
	Fish Oil ²	↓ TG ↓ small dense LDL ↑ HDL		↓ TG ↓ small dense LDL ↑ HDL		↓ TG ↓ ↓ small dense LDL ↓ HDL may ↑ LDL	
	Plant Sterols ³	↓ LDL ↓ Apo B		↓ LDL ↓ Apo B		↓ LDL ↓ Apo B	
	Soy Protein ⁴	↓ Apo B		↓ Apo B		↓ Apo B	
Dietary Fat and Alcohol Effects	Low Fat Diet ^{5,6}	↓ LDL ↑ small dense LDL		↔ small dense LDL		↓ ↓ ↓ LDL ↓ small dense LDL	
	Moderate Fat Diet ⁶	↔ LDL ↔ small dense LDL		↓ LDL ↓ small dense LDL		↓ LDL ↑ ↑ small dense LDL	
	Moderate Alcohol ⁷	↑ HDL ↓ LDL		↑ HDL		↓ HDL ↑ LDL	

Legend: ↓ decreases ↑ increases ↔ no change ↓↓ significantly decreases ↑↑ significantly increases

- References:
1. a) Am J Clin Nutr. 1997 Sep;66(3):584-90 b) Metabolism 1993;42:585-93
 2. Arterioscler Thromb Vasc Biol. 2000 Aug;20(8):1399-7
 3. Nutrition 2002 Jul-Aug;18(7-8):561-5
 4. Nutr Metab Cardiovasc Dis. 2000 Dec;10(6):315-77
 5. Am J Clin Nutr. 2003;77:1098-111
 6. J. Nutr. 2004 134:2517-2522
 7. a) Am J Clin Nutr. 2001 Apr;73(4):736-45 b) Oresa Res 2003 Oct;11(10):200-6
 - c) Atherosclerosis 2004 Mar;173(1):79-87 d) J Neural Trans 2003 Apr;110(4):401-11
 - e) Proc Nutr Soc. 2004;63(5):10E Arterioscler Thromb Vasc Biol. 2007 May 17;27(5):824-31

19

a CELERA Business
©2008 Berkeley HeartLab, Inc.

What do those numbers mean?- KIF6 Genotype

- * KIF6 is a genetic test that provides information about a person's risk for cardiac events or other heart disease risks
- * Patients who are KIF6 carriers are at a higher risk (up to 55% increased risk) for cardiac events and heart disease: Trp/Arg or Arg/Arg
- * Knowing your KIF6 genotype may help your doctor decide which medications to use for you – carriers are associated with coronary heart disease risk reduction from atorvastatin and pravastatin
- * Appropriate lifestyle is important in KIF6 carriers and noncarriers



20

©2008 Berkeley HeartLab, Inc.

What do those numbers mean?- Risk Reduction Strategies in 9p21 Carriers

- * • Knowing that 9p21 carriers are at increased risk of early MI or AAA events may allow health care providers to take steps to help you treat and prevent future heart disease.
- * Further evaluation of 9p21 carriers may be necessary to assess appropriate lifestyle goals and treatment. This evaluation may include follow-up strategies such as blood work-up to understand which treatment may be best for you.
- * Knowledge of 9p21 carrier status and associated increased risk for early MI or AAA may also be a valuable tool to help your health care providers keep you motivated to stick to your heart health goals.
- * Non-carriers are not immune to early MI, AAA, or MI/CHD



21

©2008 Berkeley HeartLab, Inc.

What do those numbers mean?- LPA

- * People who have the MET/ILE or MET/MET genotype (highlighted in red on your BHL test) for LPA are at higher risk for heart disease and may benefit from Aspirin therapy to reduce this risk.
- * Those who do not carry the MET genotype (are listed as ILE/ILE and are highlighted in green) will not have lowered heart disease risk from aspirin therapy. Also these folks may have increased risk of abdominal bleeds and aortic aneurism.
- * Your MD may still have you on aspirin therapy for other health reasons, so be sure to discuss this with your provider before starting or stopping aspirin therapy!



Vitamin D

- * Current research has implicated vitamin D deficiency as a major factor in the pathology of at least 17 varieties of cancer as well as heart disease, stroke, hypertension, autoimmune diseases, diabetes, depression, obesity, chronic pain, osteoarthritis, osteoporosis, muscle weakness, muscle wasting, birth defects, periodontal disease, and more.
- * Technically not a "vitamin," vitamin D is in a class by itself. Its metabolic product, calcitriol, is actually a hormone that targets over 2000 genes (about 10% of the human genome) in the human body.
- * If levels are low – take supplements. 1,000 – 5,000 or more IU. Vitamin D is a fat-soluble vitamin. Be sure to take it with a meal containing fat.
- * Food sources of Vitamin D: Very few foods in nature contain vitamin D. The flesh of fish (such as salmon, tuna, and mackerel) and fish liver oils are among the best sources. Small amounts of vitamin D are found in beef liver, cheese, and egg yolks. Milk is fortified.

What do those numbers mean?-Vitamin D

Definition of vitamin D levels

Vitamin D (25-OH D)		Vitamin D (25-OH D)	
Serum level ng/ml	Vit D Classification	Serum level ng/ml	Vit D Classification
< 10	Severe Deficiency	< 40	Deficiency
10 – 20	Deficiency	> 40 – 70	Ideal
21 – 29	Insufficiency	> 100	Excessive
30 - 150	Sufficiency	> 150	Toxic
> 150	Toxicity		

Lee, J.H. et al. *J Am Coll Cardiol* Dec 2008

Cannell JJ & Hollis BW *Alt Med Rev* 2008

	Normal Risk	Intermediate Risk	At Risk	Reference Range
Vitamin D 25 OH ng/mL	30 – 100 ng/mL	10 - 29 ng/mL	<10 ng/mL > 100 ng/mL	30 – 100 ng/mL


Berkeley HeartLab, Inc.

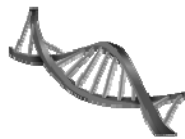
heartLab, Inc.
personalized cardiac management
a CELERA Business
Bye Chris, Garza, Inc.

24

What do those numbers mean? CYP2C19 test

The Plavix test

- * Plavix® May Help Reduce Heart Attack and Stroke Risk 
- * Your doctor may have prescribed, or is considering prescribing, Plavix (clopidogrel) for you. As your doctor may have explained or will explain, Plavix helps keep platelets in your blood from sticking together, making them less likely to form blood clots.
- * The CYP2C19 Genotype Test May Help Your Doctor Predict the Effectiveness of Plavix.



Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business

©2008 Berkeley HeartLab, Inc.

25

Plavix test cont.

The Metabolism of Plavix:

Poor Metabolizers may not be able to convert Plavix to its active form as well as Normal Metabolizers. Therefore, Plavix may have less of an effect on platelets and less ability to prevent heart attack and stroke.

An **Ultra-rapid Metabolizer's** ability to convert Plavix into its active form may be enhanced or exaggerated. However, this may also increase the risk of a bleeding problem.

Intermediate Metabolizer have moderate ability to convert Plavix into active form.

Normal Metabolizer's have good ability to convert Plavix into active form.

Doctor will decide upon dose of Plavix needed.



Potential Impact of Exercise and Weight Loss on BHL Test Report and Other Risk Factors

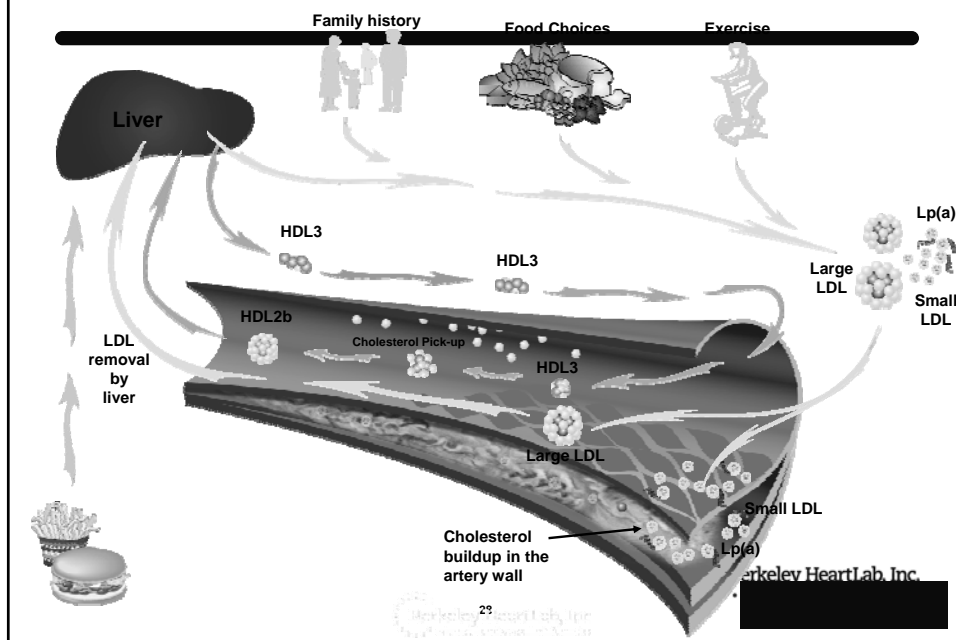
	Normal	Inter-mediate	At Risk	Last Visit	Alert Value	ATP III Goal	Reference Range*
NCEP ATP III Lipid Tests	Total Cholesterol (mg/dl)				>=200	<200	129 - 221
	LDL-C (mg/dl)				>=100	<100	59 - 145
	HDL-C (mg/dl)				<40	>=40	32 - 60
	Triglycerides (mg/dl)				>=150	<150	63 - 268

	Normal	Inter-mediate	At Risk	Last Visit	Alert Value	BHL Goal†	Reference Range**
Advanced Cardiovascular Risk Markers	IIIa+b (%)				>=20	<=15	13.6 - 43.0
	LDL IVb (%)				>=10	<=5	1.7 - 9.8
	HDL2b (%)				<10	>20	7 - 30
	Apo B (mg/dl)				>120	<60	60 - 140
	Extended Range Lp(a) (mg/dl)				>=30	<30	0 - 30
	Homocysteine (µmol/L)				>=14	<10	5.0 - 12.0
	Apo E Genotype					3/4, 4/4	#
	C-Reactive Protein hs (mg/L)				>=3.0	<1.0	0.0 - 1.69
	Fibrinogen (mg/dl)				>=350	<350	180 - 350
	Insulin (µU/ml)				>=12	<10	6 - 27
	Weight						

ley HeartLab, Inc.
personalized cardiac management
a CELERA Business

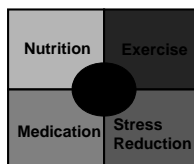
©2008 Berkeley HeartLab, Inc.

Plaque Formation



What Can You Do To Improve Your Lab Values?

- * Schedule an individual follow up appointment with your Clinical Educator for personalized education
- * Log on to our website www.4myheart.com to track your progress and see more education benefits
- * Participate in group classes over the phone and in the office
- * Continue to get re-tested to show your progress!
- * Remember - the program is of no additional cost to you when you have had a Berkeley!



Berkeley HeartLab, Inc.
personalized cardiac management
a CELERA Business

©2008 Berkeley HeartLab, Inc.