



# Sustainable Paths Family Health Care LLC

[www.sustainablepathsNP.com](http://www.sustainablepathsNP.com)

Presented By:



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Natural Family Planning Instructor*

Many Slides by:



An Expanded Approach to Dyslipidemia

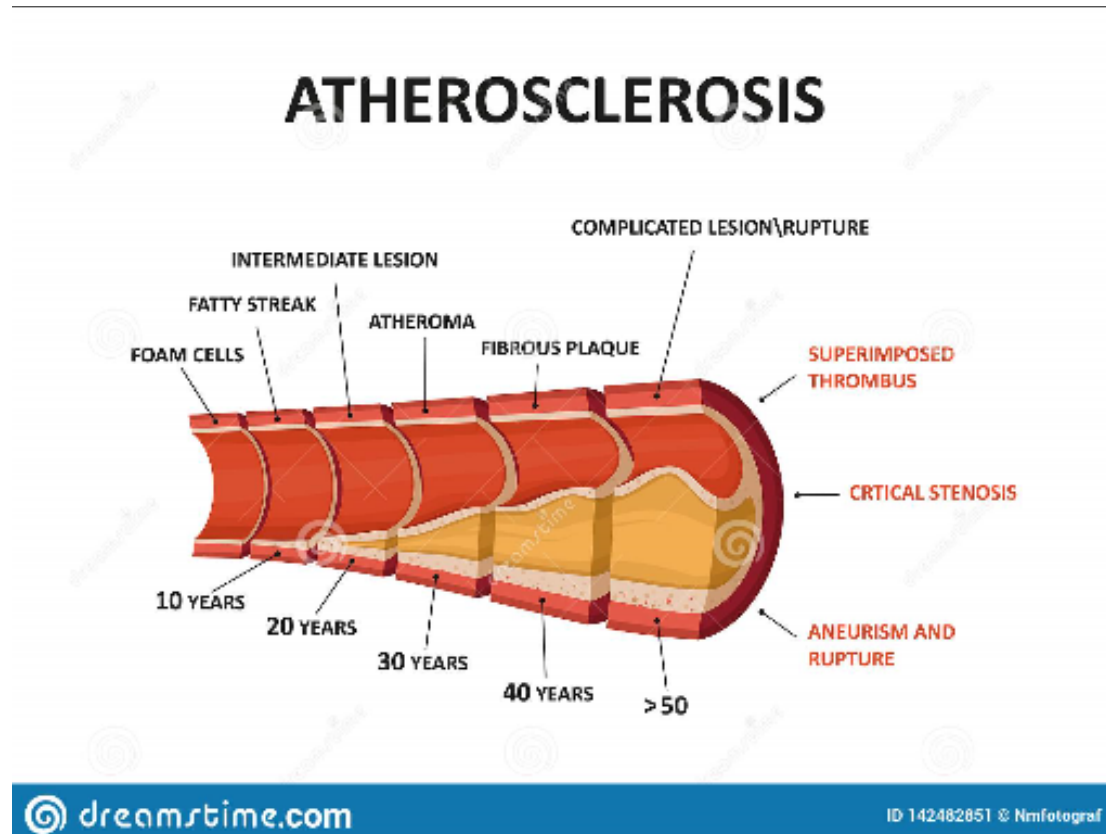


**YOUSEF ELYAMAN, MD**

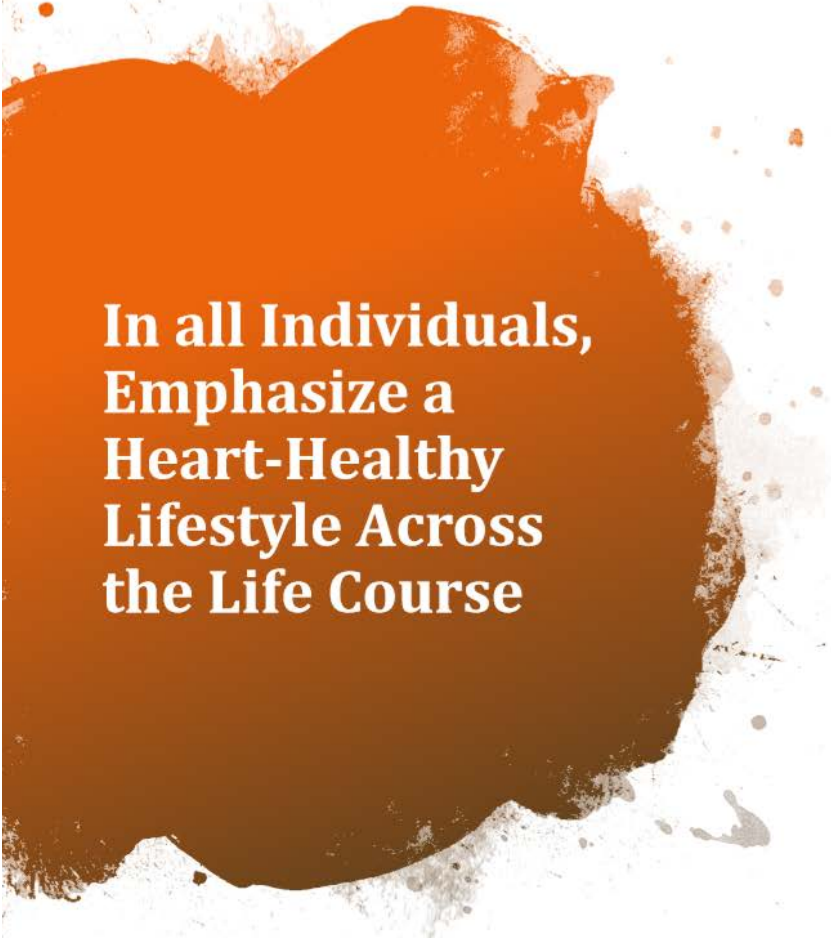
Cardiometabolic Advanced Practice Module  
Atlanta, GA  
February 2019

# Functional Medicine Series

## The Skinny on Fats



# 2018 Guidelines: Normal Risk



**In all Individuals,  
Emphasize a  
Heart-Healthy  
Lifestyle Across  
the Life Course**

- Start young
- Focus on decreasing components of metabolic syndrome
- Healthy 7:
  - Manage BP
  - Control cholesterol
  - Reduce blood sugar
  - Get active
  - Eat better
  - Lose weight
  - Stop smoking

# 2018 Guidelines: High Risk

## Clinical ASCVD

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- Acute Coronary Syndrome
- History of MI
- History of angina (stable or unstable)
- History of arterial revascularization
- History of stroke, TIA or PAD
- Aortic aneurysm  
(atherosclerotic in origin)



- Goal is to lower LDL by 50% or more
- High Intensity Statin:
  - Atorvastatin (40-80 mg)
  - Rosuvastatin (20-40 mg)

# 2018 Guidelines: Very High Risk

## Major ASCVD Event

- ACS within past 12 months
- History of MI
- History of ischemic stroke
- Symptomatic peripheral arterial disease
- History of claudication with ABI <0.85
- Previous revascularization or amputation

2 From This list

or

## High-Risk Conditions

- Age  $\geq 65$  y/o
- Heterozygous familial hypercholesterolemia
- History of prior coronary artery bypass surgery or percutaneous coronary intervention outside of the major ASCVD event(s)
- Diabetes mellitus
- Hypertension
- CKD (eGFR 15-59 mL/min/1.73 m<sup>2</sup>)
- Current smoking
- History of congestive HF

1 +2

# 2018 Guidelines: Very High Risk Treatment



Goal: LDL-C of 70 mg/dL

## PCSK9 Inhibitors

### Severe Primary Hypercholesterolemia (LDL $\geq$ 190)

- Age 20-75?
- Start high intensity statin
- LDL-C level remains  $\geq$ 100 mg/dL consider adding ezetimibe
- LDL-C level remains  $\geq$ 100 mg/dL and has multiple risk factors, consider adding a PCSK9 inhibitor

### • Alirocumab (Praluent)

- SubQ: Initial: 75 mg every 2 weeks or 300 mg every 4 weeks

### • Evolocumab (Repatha)

- SubQ: 140 mg every 2 weeks or 420 mg once monthly

1978-2017 Lexicomp

High-Intensity

Lowers LDL  $\geq$  50%

Atorvastatin (40)-80 mg  
Rosuvastatin 20 (40) mg

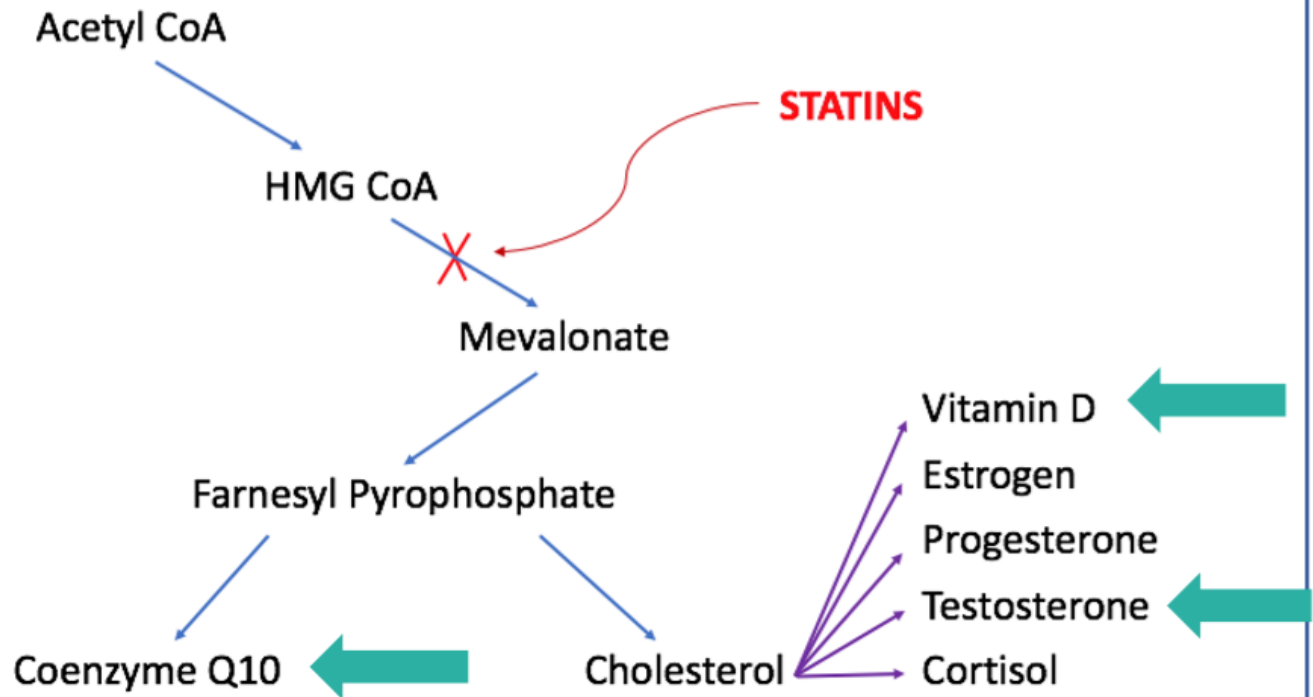
# 2018 Guidelines: Diabetic

Diabetics Age  
40-75 with  
LDL  $\geq$  70?

- Start moderate intensity statin
- Consider high intensity statin if:
  - Higher risk (20% on heart risk calculator)
  - Age 50-75 with multiple risk factors
  - High intensity statin goal: reduce LDL-C by  $\geq$  50%

# Why Statins are Risky

## Statin Drug Mechanism of Action





# Potential Statin Risks



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- Statins may be causative in coronary artery calcification and can function as mitochondrial toxins that impair muscle function in the heart and blood vessels
- Thus, the epidemic of heart failure and atherosclerosis that plagues the modern world may paradoxically be aggravated by the pervasive use of statin drugs.

Okuyama H, Langsjoen PH, Hamazaki T, Ogushi Y, Hama R, Kobayashi T, Uchino H. Statins stimulate atherosclerosis and heart failure: pharmacological mechanisms. *Expert Rev Clin Pharmacol.* 2015 Mar;8(2):189-99. doi:10.1586/17512433.2015.1011125. Erratum in: *Expert Rev Clin Pharmacol.* 2015;8(4):503-5.

- 1 in 50 develop Type II Diabetes
- 1 in 10 develop myalgia/muscle atrophy
- Suspected link to MCI/Alzheimer's, neuropathy
- Depression, increased suicide (more in women)
- Atrial fibrillation
- Possible preterm delivery and microcephaly

# Options: Summary

## SUMMARY IFM DYSLIPIDEMIA TREATMENT RECOMMENDATIONS BASED ON REPORTED ACTION

Agent	Dose	Reported Action	↓ LDL	↑ HDL	↓ TG	Pattern B	Mod LDL
Trans Resveratrol	250 mg QD	Reduces TC, TG, and LDL; blocks uptake of modified LDL by CD36SR (1)	♥		♥		
N-Acetyl-Cysteine	1000 mg BID	Blocks uptake of modified LDL by CD36SR (1)					♥
Aged Garlic Extract	600-900 mg BID	Reduces CAC and plaque progression and lowers HS-CRP (2,3)					
Bergamot	500-1,000mg QD	Reduces TC, LDL, TG, glucose. Increases HDL. Some vasodilatory effect.	♥				
Niacin (B3) Nicotinic Ac.	500 to 4000 mg QD as tolerated	Reduces TC, LDL, APO-B, TG, and shifts LDL from small type B to large type A (4)	♥		♥	♥	
Red Yeast Rice	2400-4800 mg QD	Statin like effects (5)			♥		
Curcumin	500 mg BID	Inhibits atherosclerosis, increases HDL, anti-inflammatory (6, 7)		♥	♥		
Green Tea/EGCG	500-1000 mf QD or 60oz tea	Inhibits HMG-CoA, reduces oxLDL and APO-B, increases PON-1 and LDL receptor; decreases inflammation decreases body fat. (8, 9)	♥		♥	♥	♥
Plant Sterols	2-3 g QD	Reduces TC and LDL, anti-inflammatory (10, 11)	♥		♥		♥
Pomegranate	8 oz. juice or 1-2 c. seeds QD	Anti-inflammatory, improves function of HDL, inhibits platelets, reduces IMT (12, 13, 14)		♥	♥		♥
Pantethine	300 mg TID or 450 mg BID	Reduces TC, LDL, APO-B, and TG; increases HDL and APO-A1 (15, 16)	♥	♥	♥	♥	
Probiotics	60-100b organisms QD	Reduce TC, LDL, and TG (17)	♥		♥	♥	
Berberine HCL	500 mg QD	Reduces TC, LDL, and TG (19); lowers glucose; anti-inflammatory properties.	♥		♥	♥	
Omega-3 Fatty Acids	1-5g QD mixed EPA DHA	Reduces TG (18), COX-2 inhibition by DHA, (21), IL-1b inhibition by EPA (22), Increases HDL/HDL2 (23), EPA reduces pattern-B, sdLDL & CRP (24)		♥	♥	♥	♥

# ACC/AHA ASCVD Risk Calculator

<http://www.cvriskcalculator.com>

Heart Risk Calculator

Home

About

Contact

Age (years)	<input type="text" value="20-79"/>	←
Gender	<input checked="" type="radio"/> Male <input type="radio"/> Female	←
Race	<input type="radio"/> African American <input checked="" type="radio"/> Other	←
Total cholesterol (mg/dL)	<input type="text" value="130-320"/>	←
HDL cholesterol (mg/dL)	<input type="text" value="20-100"/>	←
Systolic blood pressure (mmHg)	<input type="text" value="90-200"/>	←
Diastolic blood pressure (mmHg)	<input type="text" value="30-140"/>	←
Treated for high blood pressure	<input checked="" type="radio"/> No <input type="radio"/> Yes	←
Diabetes	<input checked="" type="radio"/> No <input type="radio"/> Yes	←
Smoker	<input checked="" type="radio"/> No <input type="radio"/> Yes	←
<input type="button" value="Calculate"/>		

Calculate your 10-year risk of heart disease or stroke using the ASCVD algorithm published in [2013 ACC/AHA Guideline on the Assessment of Cardiovascular Risk](#).

This calculator assumes that you have not had a prior heart attack or stroke. If you have, generally it is recommended that you discuss with your doctor about starting aspirin and a statin. Furthermore, if you have an LDL-cholesterol (bad cholesterol) greater than 190, it is also generally recommended that you discuss with your doctor about starting aspirin and a statin.

Unfortunately, there is insufficient data to reliably predict risk for those less than 20 years of age or greater than 79 years of age and for those with total cholesterol greater than 320.

UPDATE (6/30/16) -- The calculator has been vetted against the [final guidelines from the USPSTF](#) for initiating aspirin therapy.

UPDATE (9/18/15) -- The calculator now also incorporates [draft guidelines from the USPSTF](#) for initiating aspirin therapy.

UPDATE (5/26/14) -- The calculator now also incorporates [guidelines from JNC-8](#) for blood pressure management.

An [excel spreadsheet](#) is also available for download.

# [StatinDecisionAd.Mayoclinic.org](http://StatinDecisionAd.Mayoclinic.org)

Current Risk   Intervention   **Issues**   Notes   Document

Benefits vs Downsides according to my personal health information  
Using ACC/AHA ASCVD Risk Calculator

3. View Issues


### Current Risk of having a heart attack

Risk for 100 people like you who **do not** medicate for heart problems

Over 10 years

**9** people will have a heart attack

**91** people will have no heart attack



### Future Risk of having a heart attack

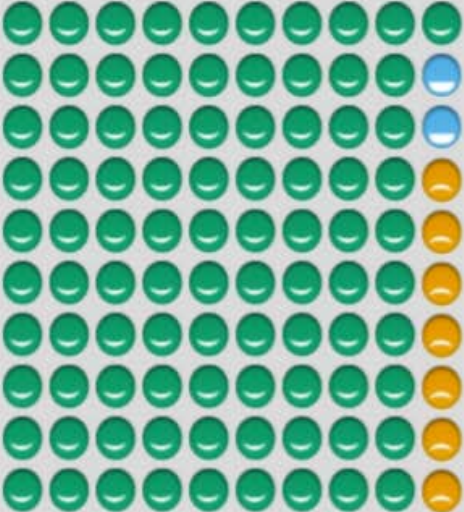
Risk for 100 people like you who do take **standard dose statins**

Over 10 years

**7** people will have a heart attack

**91** people will have no heart attack

**2** people will be saved from a heart attack by taking medicine

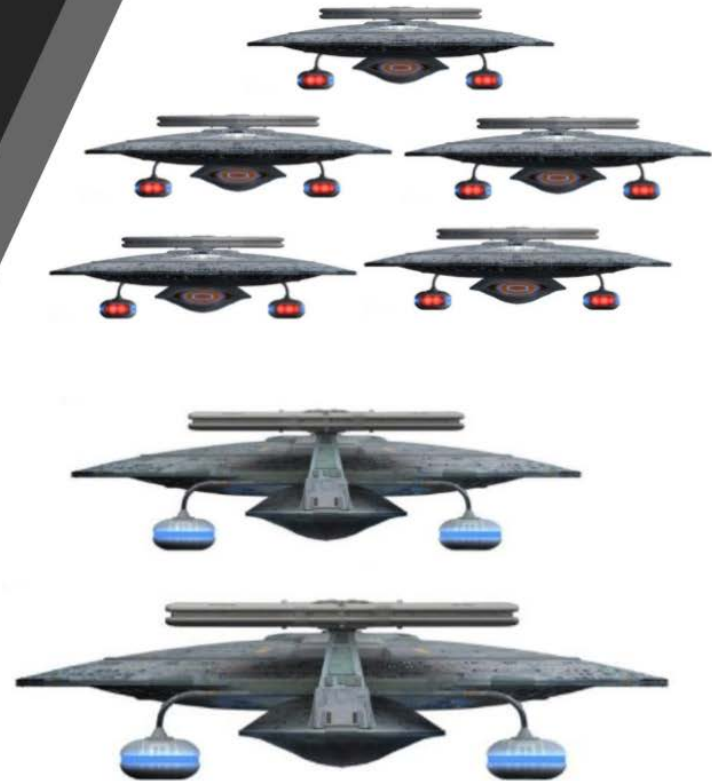


Learn how to embed Statin Choice in my EMR/Organization

# It's not JUST LDL

## Atherogenic Determinants of LDL

- LDL particle **number**
- LDL particle **size** (e.g. nm, Angstroms)
- **sdLDL** has a **1.7X** increase in endothelial penetration
- **sdLDL** has a greater chance of **oxidation**



# ... Or even cholesterol

50% of heart attacks leading to sudden death happen in patients with normal cholesterol!



Sachdeva A, Cannon CP, Deedwania PC, et al; for the Get With The Guidelines Steering Committee and Hospitals. Lipid levels in patients hospitalized with coronary artery disease: an analysis of 136,905 hospitalizations in Get With The Guidelines. *Am Heart J.* 2009;157(1):111–117.e2.

# Factors Affecting Cardiometabolic Health

## CARDIOMETABOLIC MATRIX (The Usual Suspects)

### Retelling the Patient's Story

#### Antecedents

Age, Smoking, Gender  
 Familial hypercholesterolemia  
 APOE status  
 Family Hx of CVD

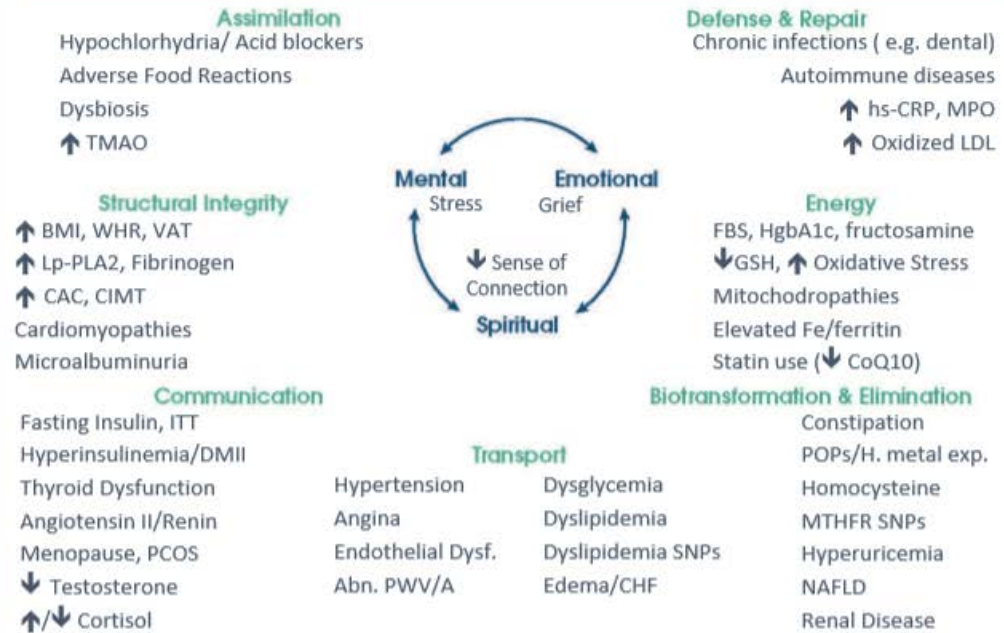
#### Triggering Events

Stress/Injury  
 Infection/Dysbiosis  
 Toxic exposures

#### Mediators/Perpetuators

Hyperinsulinemia  
 Visceral Adipose Tissue (VAT)  
 Oxidative stress/Inflammation  
 Chronic stress

### Physiology and Function: Organizing the Patient's Clinical Imbalances



### Modifiable Personal Lifestyle Factors

#### Sleep & Relaxation

↓ Sleep (Qn/QI)  
 Sleep apnea  
 Shallow breathing  
 Decreased HRV  
 Non-dipping (BP)

#### Exercise & Movement

Excess sitting  
 Sedentary lifestyle  
 Exercise deficit  
 Orthopedic pain  
 Low motivation  
 Low knowledge

#### Nutrition

↑ Glycemic impact  
 ↑ Processed foods  
 ↑ Na<sup>+</sup>, trans fats  
 ↓ Nutrient diversity, Ω3  
 ↓ Bs, K, D, K<sup>+</sup> & Mg<sup>++</sup>  
 Caffeine + slow Cyp1A2

#### Stress

Hx of abuse/neglect  
 Poor coping skills  
 Anxiety/Depression  
 Financial stress  
 Drug/Alcohol overuse  
 Tobacco use

#### Relationships

Isolation  
 Grief  
 No Pets  
 Caregiver burden

Name: \_\_\_\_\_

Date: \_\_\_\_\_

CC: \_\_\_\_\_

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 Version 2



# RISK FACTOR DISCUSSION



- Family history of premature ASCVD (males <55, females <65)
- Persistently elevated LDL-C levels  $\geq 160$  mg/dl
- Metabolic syndrome
- Chronic kidney disease (eGFR 15–59 mL/min/1.73 m<sup>2</sup>)
- History of preeclampsia or premature menopause (age <40 years)
- Chronic inflammatory disorders (rheumatoid arthritis, psoriasis, lupus, or chronic HIV)
- Hs-CRP  $\geq 2.0$  mg/L
- high-risk ethnic groups (e.g., South Asian)
- Persistent elevations of triglycerides  $\geq 175$  mg/dl
- Apolipoprotein B  $\geq 130$  mg/dl (if measured) (consider if triglyceride  $\geq 200$  mg/dL)
- Lipoprotein (a)  $\geq 50$  mg/dl (in women, only if they also have high cholesterol)
- ABI <0.9
- Radiation tx: left main, left anterior descending, and proximal right coronary artery is in the field (left breast cancer)



# Coronary Artery Calcium Score

- If 0, treatment with statin therapy may be deferred for 5-10 years
- If 0 but smoker, diabetic, or strong family history of premature ASCVD (<55 males & ,65 females) → statin
- A CAC score of 1-99 favors statin
- For any patient, if the CAC score is  $\geq 100$  Agatston units or  $\geq 75$ th percentile: statin therapy is indicated (unless otherwise deferred by the outcome of clinician)

## Radiation Dose

- CAC scanning delivered 0.74 to 1.26 mSv\* of radiation (similar to mammogram dose)
- There can be up to a 10 fold variance!
- Radiation increases cancer risk

Test	Radiation Dose
Chest X-ray	0.1 mSv
Coronary Artery Calcium Score	0.99 mSv
Chest CT	7 mSv

\*mSv=Millisievert

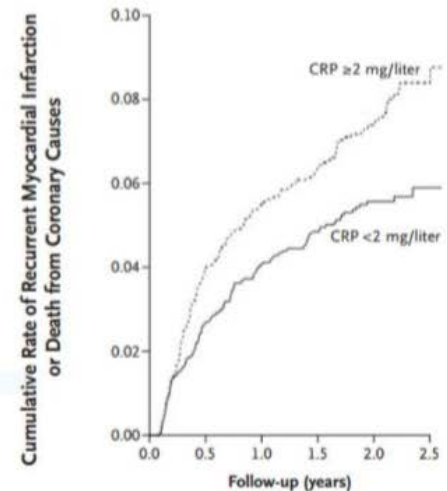
# Inflammation

## hs-CRP PROVE IT-TIMI

### CONCLUSIONS

*Patients who have low CRP levels after statin therapy have better clinical outcomes than those with higher CRP levels, **regardless of the resultant level of LDL cholesterol.***

*Strategies to lower cardiovascular risk with statins should include monitoring CRP as well as cholesterol.*



*PROVE IT- TIMI = Pravastatin or Atorvastatin Evaluation and Infection Therapy–Thrombolysis in Myocardial Infarction 22 (PROVE IT-TIMI 22) trial, published in 2004, randomized 4,162 patients with recent ACS to high-dose atorvastatin 80mg daily or moderate-dose pravastatin 40mg daily.*

Ridker PM, Cannon CP, Morrow D, et al. Rofivastatin or Atorvastatin evaluation and infection therapy-thrombolysis in myocardial infarction 22 (PROVE IT-TIMI 22) investigators.. C-reactive protein levels and outcomes after statin therapy. *N Engl J Med.* 2005 6;352(1):20-8. doi: 10.1586/17512433.2015.1011125.

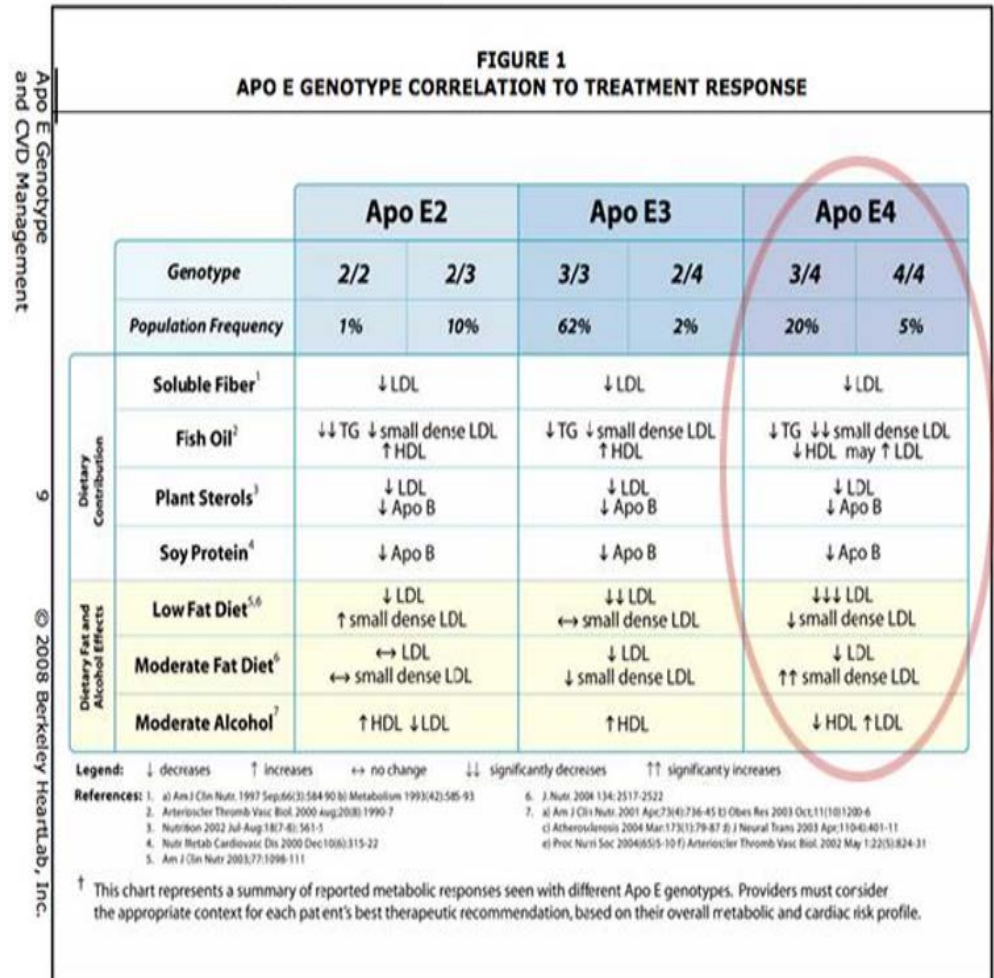
# Genetics

## APOE-Genetic Variants

- **ApoE2** is associated with lower cholesterol; increased triglycerides; Hyperproteinemia Type III
- **ApoE3 & 4** are associated with higher serum cholesterol
- E3/E3, E3/E4 and E4/E4 genotypes were found to be associated with an increase in CA-IMT

- LDLR
- PCSK9
- LDL>190 and 1<sup>st</sup> degree relative with LDL>190 or premature CVD
- MTHFR, MTR, MTRR
- COMT
  - VA/VAL (upregulated, ADD)
    - **NO** Vit E, ASA
  - MET/MET: YES Vit E, ASA

## Dietary Responses and Apo E



# Apo B

## Apo B & ApoB:ApoA1 Ratio

### HOW DO APOLIPOPROTEINS ApoB AND ApoA1 PERFORM IN PATIENTS WITH ACUTE CORONARY SYNDROMES

The **superiority of ApoB, and especially the apoB:apoA-I ratio** in patients with the highest cardiometabolic risk (known CVD or diabetes) and two additional major risk factors (e.g. smoking, hypertension, or family history of premature CAD), for assessing risk of future events and in the secondary prevention in ACS patients seems to be indisputable

# Lp (a)

Helps assess overall risk of at atherosclerotic process

Most likely involved in coagulation

*Dr. Weiss:*

*When elevated, consider a quality fish oil and additional anti-coagulation to mitigate potential risk*

# Lab Summary: Lipids

Lab	TARGET/OPTIMAL (varies by lab)	Explanation
<b>LDL-P</b>	< 1000 nmol/L	LDL-Particle count is strong, independent predictor of CHD. When combined with LDL-C, may be used to assess Insulin Resistance risk.
<b>LDL-Pattern</b>	Pattern B: "Bad" <25.5 nm or <218.2 Angstrom Pattern A: "Good" <25.5 nm or >222.5 Angstrom	Pattern B "Bad" are smaller, and more numerous, i.e. higher LDL-P count Pattern A "Good" are larger, more buoyant and less numerous
<b>HDL2/3</b>		HDL2 is large, buoyant and most protective HDL; Low HDL2 + normal LDL → increased CHD risk HDL3 is smaller, not as protective
<b>VLDL3</b>	>30 mg/dL is considered elevated; usually calculated as percentage of TG	Densest VLDL → Higher risk than VLDL1 and VLDL 2 The best way to lower VLDL is to lower triglycerides
<b>ApoE Genotype</b>		Diagnostic value for individuals suspected of type III hyperlipoproteinemia. ApoE2 is associated with lower cholesterol; increased triglycerides; Hyperproteinemia Type III. ApoE3 & 4 are associated with higher serum cholesterol E3/E3, E3/E4 and E4/E4 genotypes were found to be associated with an increase in CA-IMT
<b>ApoA1</b>	>20 yo female: >130mg/dL is low risk; <115 mg/dL is high risk >20 yo male: >120 mg/dL is low risk; <121 mg/dL is high risk	Protein core of HDL (Good)
<b>ApoB</b>	>20 yo: <100 mg/dL is low risk; >120 mg/dL is high risk	Protein core of LDL/VLDL (Bad)
<b>ApoB:ApoA1</b>	Ratio of <0.80	
<b>Ox-LDL</b>	<60 U/L low risk; 60-69 U/L moderate risk; >70 U/L high risk	Oxidized LDL is a risk factor for CHD, independent of TC/LDL Lp(a) and Ox-LDL are correlated
<b>Lp(a)</b>	<30 mg/dL	Lipoprotein-a is inherited levels of small, low density cholesterol protein; correlated with Ox-LDL
<b>LpPLA2</b>	<75 nmol/min/mL is low risk >75 nmol/min/mL is high risk	Lipoprotein-associated Phospholipase A-2 is an inflammatory protein produced in the vascular intima; upregulated in atherosclerotic plaques, correlated with progression of atherosclerosis and plaque rupture vulnerability; correlated with Ox-LDL

# Other Risks: Heavy Metals

## Heavy Metals and Dyslipidemia

Mercury and other heavy metals will

- Increase **LDL and TG**, decrease **HDL**, and induce **dysfunctional HDL**
- Increase CVD, hypertension, **atherosclerosis**
- Reduce total **antioxidant** capacity
- Act as **mitochondrial toxins**



# Other Risks: Infection

## Infectious Agents Associated with Dyslipidemia & Cardiovascular Disease

- *Brucella spp.*
- *Chlamydia pneumoniae*
- *Helicobacter pylori*
- *Porphyromonas gingivalis*
- Hepatitis C (chronic)



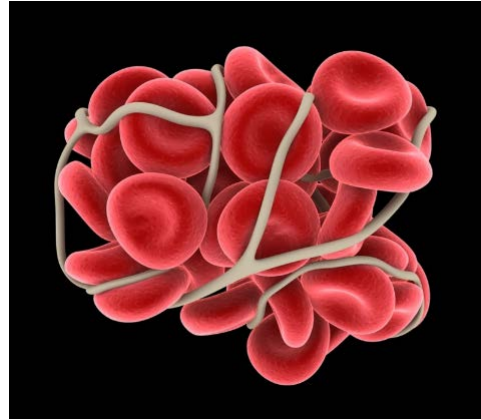


# Other Risks: Inflammation

- Proton Pump Inhibitors
- Poor Methylation
- Increased oxidation
- Poor Dietary Choices
- Lack of Exercise
- Visceral Fat
- Chronic infections and dysbiosis
- Toxins (organic pollutants)
- Poor Sleep
- Stress / Sympathetic Dominance



# Other Risks: Fibrinogen



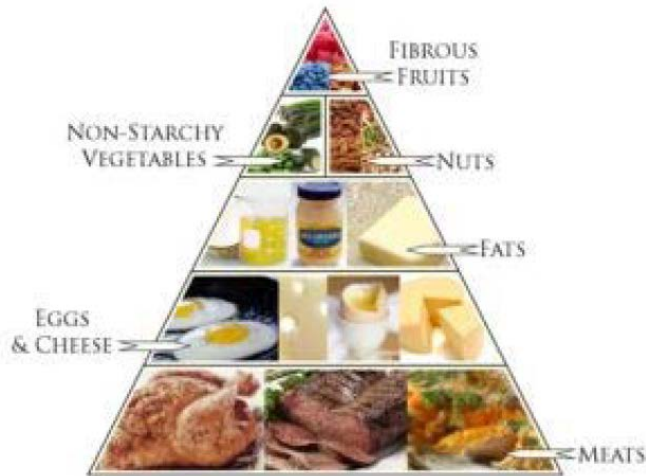
- Independent risk factor for CVD
- Increased in response to:
  - Inflammation
  - Tissue Injury
  - FBG gene

# “Lifestyle” can reverse or prevent CVD

- Get off wheat (if it affects you) and all high glycemic foods/sugars
- Choose a diet high in natural protein, fiber, antioxidants, omega fats
  - (Dark chocolate 45-77% lower ASCVD, Nuts 23% decrease cardiovascular mortality)
- Exercise 30 minutes/day
  - (30-40% decrease cardiac events)
- Optimize hormones, remove toxins (Lead etc)
- Alkalize? (High green vegetable)
- Measure and supplement endothelial dysfunction
  - (arginine, folate, Vit C, taurine, Mg, NAC etc)
- Supplement proper inflammatory inhibition
- Own a cat (30% decreased risk of CV death and stroke)

# Ketogenic Pyramid

## Ketogenic Pyramid



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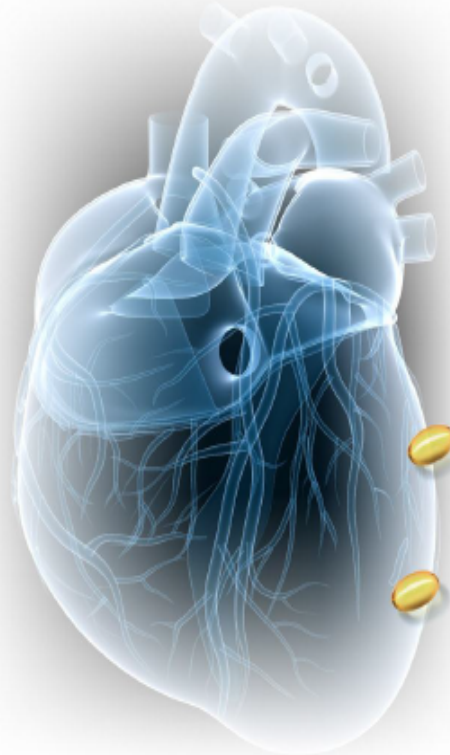
- reduces inflammation (NFkB)
  - enhances mitochondrial biogenesis
  - enhances ATP production
  - reduces ROS production
  - reduces apoptosis
- Increases:
    - atherosclerosis/CVD risk
    - Liver fibrosis
    - Sympathetic tone
    - Adrenal “fatigue”
  - Very hard for women
  - Difficult to maintain long term

# Mediterranean Diet

- A diet in the Mediterranean?
- Abundant vegetables, legumes, fruit
- Small amounts of fish/meat/cheese
- Cheese and yogurt
- Olive oil in moderation
- Wine in moderation
- Variety of antioxidants
- Little sugar/refined white flour

# EFA: Dosing

- Elevated triglycerides
  - 2–4 g/day g omega-3 fatty acids daily
  - 1.5–2.4 gm EPA/1-1.6 g DHA
- Hypertension
  - Average dose 3.6 g/day
- History MI-
  - as little as 1g/day omega-3 from fish oil;
  - cons/ 3g/day
- Arrhythmia
  - 1–4.3 gm/day omega-3 fatty acids from fish oil
- High Cardiovascular disease risk
  - 1–3 gm/day total omega-3 fatty acids from fish oil



## ♦ Heart

- Reduces triglycerides by 25%–30%
- Improves endothelial function
- Reduces inflammatory markers (CRP)
- Reduces risk of stroke
- Improves blood pressure
- Improves survival after a heart attack
- Lowers risk of heart disease
- Enhances longevity and vitality

# MCT (Medium Chain Triglycerides)

(caprylic and capric acids)

- Absorbed intact across gut wall; transported into mitochondria independent of the carnitine shuttle.\*
- **MCTs are anti-inflammatory**: blunts linoleic acid-induced increases in **TNF-alpha production by 45%**. (in vitro)
- MCTs prevent **endotoxemia-induced liver damage** (mice)

**MCT foods**: coconut oil 66%

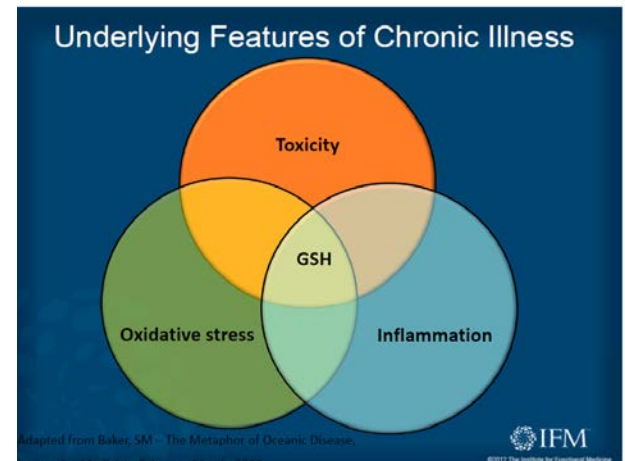
\*Calabrese C et al. *Altern Med Rev* 1999;4(1):23-28  
Kono H et al. *Ann Surg* 2003;237(2):246-55

# Glutathione

## Glutathione: Atherogenesis

- **Depletion of the protective glutathione precedes lipid oxidation and atherogenesis *in vivo*.**

Biswas SK et al. Depressed glutathione synthesis precedes oxidative stress and atherogenesis in Apo-E(-/-) mice. *Biochem Biophys Res Comm* 2005; 338: 1368-73.





# CASE 1

TEST	RESULT	STATUS	REF	UNIT
CHOLESTEROL	249	H	140 - 199	(MG/DL)
HDL CHOLESTEROL	42		35 - 80	(MG/DL)
LDL (CALCULATED)	164	H	0 - 129	(MG/DL)
CHOL/HDL CHOL RATIO	5.9	H	< 5.0	
LDL/HDL RATIO	3.92		0.9 - 5.3	
VLDL, CALCULATED	42	H	< 41	(MG/DL)
TRIGLYCERIDES	211	H	0 - 150	(MG/DL)

- No medication, no cardiac history
- EKG 8/19 shows 1 mm T wave inversions V4, minor T inversions V5, V6 (ischemia?)
- Fam hx: Father age 68 heart failure after falling 30' onto concrete

# Case 2: 54 yo female

CARDIAC RISK-----		
CHOLESTEROL	229	100-240 mg/dL
HIGH DENSITY LIPOPROTEIN (HDL)	73.0	25.0-75.0 mg/dL
TRIGLYCERIDES	94	10-200 mg/dL
CHOLESTEROL/HDL RATIO	3.13	1.50-5.00

I have reviewed done his latest results of her cholesterol panel. Her total cholesterol was 298. Her HDL was 102. Her LDL was 179, and her triglycerides were 83. With these numbers her 10-year cardiovascular risk is only at 1.4%. This is well below the 7.5% recommended for statin use. The question is whether she has any evidence of coronary disease given these high numbers. She did have a calcium score several years ago, and the score was 0. I am going to order another calcium score to reassess. If her calcium score is essentially anything except for 0, then she will be instructed to start a statin. I did inform her since she is postmenopausal that her cholesterol panel will continue to slowly worsen.

## IMPRESSION

1. coronary calcium score of zero. No identifiable calcified coronary

# Case 3: 79 yo male

## CVD FOLLOW UP

### Lipid Panel Comprehensive

Total Cholesterol	182			<200	mg/dL	200
Triglycerides	75			<150	mg/dL	
HDL-C [3]	49	L		*See Table	mg/dL	
Direct LDL-C [4]	121			*See Table	mg/dL	
sdLDL-C [5]	24	H		<20	mg/dL	
Lp(a)	<15			<30	mg/dL	
ApoA-1	120.0	L		>160.0	mg/dL	
ApoB	101	H		<80	mg/dL	
Non-HDL-C [6]	133			*See Table	mg/dL	
VLDL-C	12			<30	mg/dL	
%sd-LDL	20	H		<20	%	
TC/HDL-C [7]	3.7			*See Table	Ratio	
HDL-C/TG	0.65			>0.50	Ratio	
VLDL-C/TG	0.16			<0.20	Ratio	
ApoB/ApoA-1 [8]	0.8			*See Table	Ratio	
Boston Heart HDL Map(R) Test	PENDING					
Boston Heart Cholesterol Balance (R)	PENDING					
hs-CRP [9]	13.7	H		<1.0	mg/L	200
LpPLA2 [9]	149			<180	nmol/min/mL	200
NT pro-BNP [10]	1572	H		<450	pg/mL	200

- 2012 Calcium score 1027- no observed CAD
- 5/19 echo: Mild aortic stenosis, mild left ventricular diastolic dysfunction (confirms BNP), mild dilated left atrium.

# Case 4: 34 yo male smoker

## CARDIAC RISK-----

CHOLESTEROL	158		140-275 mg/dL
HIGH DENSITY LIPOPROTEIN (HDL)	22.9	LOW	25.0-75.0 mg/dL
LOW DENSITY LIPOPROTEIN (LDL)	67	LOW	80-200 mg/dL
VERYLOW DENSITY LIPO. (VLDL)	68	HIGH	5-40 mg/dL
TRIGLYCERIDES	340	HIGH	10-200 mg/dL
CHOLESTEROL/HDL RATIO	6.89	HIGH	1.50-5.00
LDL/HDL RATIO	2.92		0.00-3.60

- Build 6'0" 220 (BMI 29.8)
- No APS / no admitted history