INE | INSTITUTE OF NUTRITIONAL ENDOCRINOLOGY

Blood Chemistry: Lipids and Cardiovascular System

Dr. Ritamarie Loscalzo

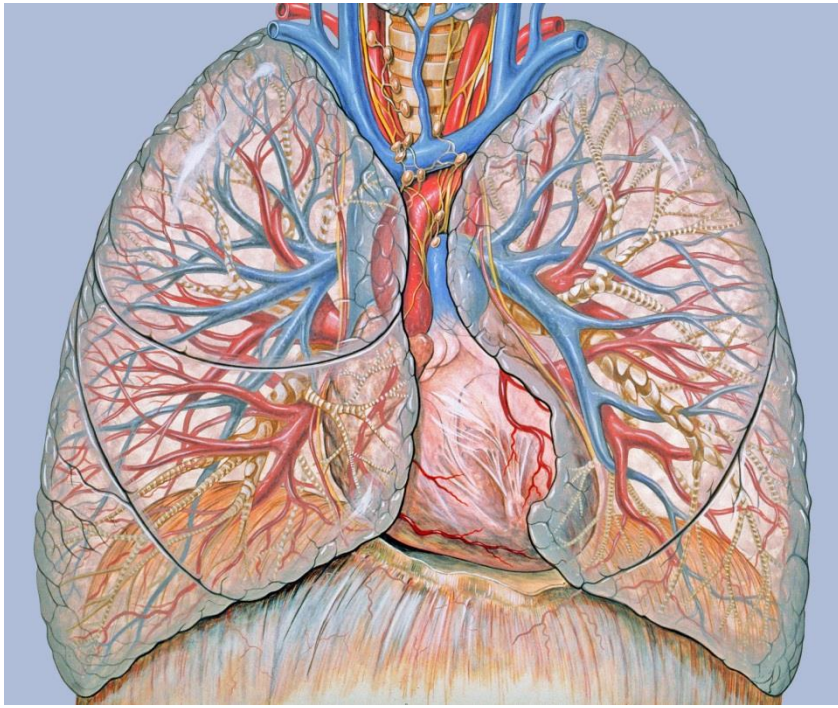
Medical Disclaimer: The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, drritamarie.com, and the experts who have contributed. We encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional.

Cardiovascular System

- ✓ Cholesterol
- ✓ Triglycerides (1/2 of cholesterol, equal to HDL)
- ✓ HDL
- ✓ LDL
- ✓ VLDL
- ✓ CRP
- ✓ Homocysteine
- ✓ Apolipoprotein A and B

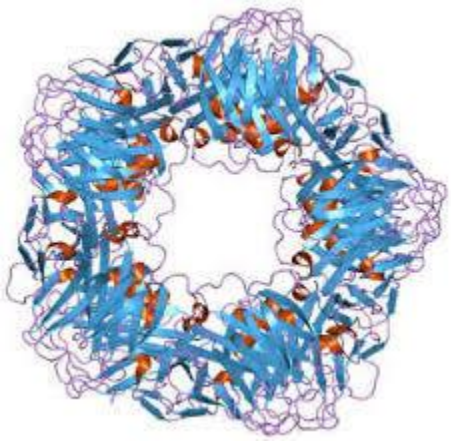
Cardiovascular Markers

- ✓ **Cholesterol, Total**
- ✓ **HDL:** High-density lipoproteins - take cholesterol away from cells and transport it back to the liver for removal - "good" cholesterol
- ✓ **LDL:** Low-density lipoproteins - deposit cholesterol on the artery walls - "bad" cholesterol
- ✓ **Cholesterol/HDL Ratio:** Relative risk for cardiovascular disease
- ✓ **Triglycerides:** Fat in the blood responsible for providing energy to the cells of the body; sugar raises them
- ✓ **CRP-hs:** Indicator of endothelial inflammation
- ✓ **Homocysteine:** Part of methylation cycle; increased cardiac risk when high
- ✓ **CPK:** Creatine phosphokinase – indicates damage to cardiac tissue



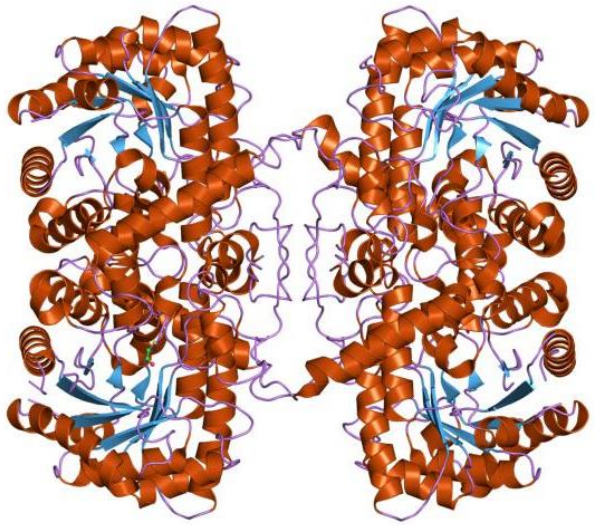
C-Reactive Protein Highly Sensitive

- ✓ CRP Increases during systemic inflammation.
- ✓ Associated with lower survival rates in patients with unstable angina and heart attack.
- ✓ High levels of hs-CRP may increase the risk that an artery will reclose after it's been opened by balloon angioplasty.
- ✓ High levels of hs-CRP predict prognosis and recurrent events in patients with stroke or peripheral arterial disease.
- ✓ High hs-CRP levels increase risk heart attack; upper third has double the risk of lower.
- ✓ Studies found association between sudden cardiac death, peripheral arterial disease, and hs-CRP.



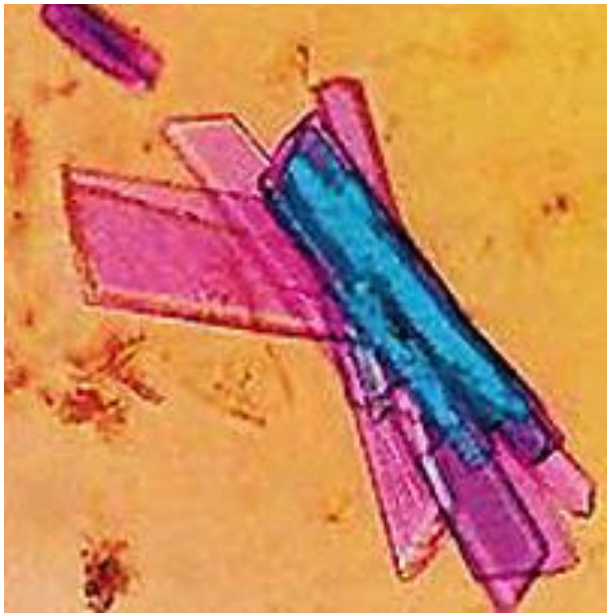
Homocysteine

- ✓ High homocysteine levels in the blood can damage the lining of the arteries.
- ✓ High levels a result of low B6, B12 and folate.
- ✓ Fruits and vegetables, especially leafy green vegetables, can lower homocysteine.
- ✓ Genetic predispositions: methylation defects
- ✓ Retest in 8 weeks.



Creatine PhosphoKinase (CPK)

- ✓ Enzyme found mainly in the heart, brain, and skeletal muscle
- ✓ Elevated when significant damage to cardiac tissue – i.e. myocardial infarct (heart attack)
- ✓ Elevated after intense exercise – breakdown of skeletal muscle
- ✓ Medications can elevate
- ✓ Isoenzymes
  - ➢ CPK-1 (CPK-BB) - mostly in the brain and lungs
  - ➢ CPK-2 (CPK-MB) - mostly in the heart
  - ➢ CPK-3 (CPK-MM) - mostly in skeletal muscle



Conditions That Can Contribute to Lipid Abnormalities

- ✓ Thyroid
- ✓ Adrenal stress
- ✓ Insulin resistance
- ✓ Diabetes
- ✓ Fatty liver
- ✓ Biliary stasis
- ✓ Poor fat metabolism
- ✓ Hypoglycemia
- ✓ Nutrient deficiencies
- ✓ Multiple sclerosis

Low Cholesterol

- ✓ Heavy metal and chemical overload
- ✓ Liver/biliary congestion (Gallbladder dysfunction)
- ✓ Excessive low fat intake
- ✓ Hyperthyroid
- ✓ Autoimmune process

VAP (Vertical Analyzer Panel)

http://www.drritamarie.com/go/VAPCholesterolTest

Cholesterol Measurements	The VAP® Test	Routine Test
LDL	♥ *LDL is directly measured*	● *LDL is a calculation*
HDL	♥	●
Triglyceride	♥	●
Total Cholesterol	♥	●
VLDL	♥	
Non-HDL	♥	
apoB 100	♥	
Lp(a)	♥	
IDL	♥	
LDL-R	♥	
LDL-R Subclass Pattern	♥	
Remnant Lipoprotiens	♥	
Metabolic Syndrome	♥	
HDL2	♥	
HDL3	♥	

VAP Markers - 1

LDL-Cholesterol-Direct	a direct measure of your Low Density Lipoprotein cholesterol. LDL is considered to be your "bad" or "heart disease" cholesterol.
Total HDL-Cholesterol-Direct	a direct measure of your High Density Lipoprotein cholesterol. HDL is considered to be the "good" or "protective" type of cholesterol.
Total VLDL-Cholesterol-Direct	a direct measure of your Very Low Density Lipoprotein cholesterol, a major carrier of energy rich molecules called "triglycerides;" excess VLDL increases risk for heart disease and diabetes.
SUM Total Cholesterol	the sum of your HDL + LDL + VLDL. As a sum total of three different cholesterol measurements, SUM Total Cholesterol alone should not be used to predict the risk of heart disease or stroke.
Triglycerides-Direct	a direct measure of energy rich Triglyceride molecules used by the body. Elevated triglycerides are a risk factor which can lead to the formation of "heart disease" lipoproteins.
Total Non-HDL Cholesterol	the sum of your LDL + VLDL; the higher the number, the greater the risk of heart disease.

VAP Markers - 2

Total apoB100	a measurement of apolipoprotein B100, which helps form, carry and deliver "bad" cholesterol particles to cells. Knowing your apoB100 value greatly increases the VAP's risk predictive value.
Lp(a) Cholesterol	a measurement of "lipoprotein a" cholesterol in your body. A highly inherited risk factor for heart disease, Lp(a) does not respond to traditional LDL-lowering drugs.
IDL Cholesterol	a measurement of your Intermediate Density Lipoprotein cholesterol. A strongly inherited risk factor for heart disease, it is elevated in patients with a family history of diabetes.
LDL-R (Real)-C	the "Real" cholesterol circulating in your body; it is a component of Total LDL Cholesterol.
Sum Total LDL-C	a the sum of Lp(a) + IDL + Real LDL.
Real-LDL Size Pattern	refers to LDL cholesterol's density. A description of type rather than amount of cholesterol, Real-LDL Size Pattern can be A, A/B or B. Pattern A is the safest density, as the human body can rid itself more easily of excess Pattern A LDL. Pattern B LDL carries the highest threat; it is much more susceptible to oxidation (a primary cause of atherosclerosis) and remains in the bloodstream longer than Pattern A LDL. The longer you are exposed to bad cholesterol groups, the greater your risk for disease. Treatments for Pattern B LDL and elevated LDL cholesterol are different, so both measurements must be known for effective treatment. Pattern A/B patients have a mix of both patterns and should work toward a Pattern A LDL value.

VAP Markers - 3

Metabolic Syndrome	Consider Insulin Resistance/Metabolic Syndrome: If this value is marked as being a risk factor, it is because your profile indicates the combined presence of Pattern B LDL, low HDL/HDL2 and elevated triglycerides, creating an elevated risk for diabetes due to insulin resistance.
HDL-2	the protective portion of HDL. Low HDL2 is a risk factor for Coronary Artery Disease (CAD), even in patients with normal cholesterol.
HDL-3	important but does not play as great a protective role in protecting against CAD as does HDL-2.
VLDL-3	a triglyceride-rich lipid which can represent an independent risk factor for heart disease.

Vap Action Plan

Diagnosis	Therapeutic Lifestyle Changes
Elevated LDL-R	Low Fat Diet, Exercise
Elevated Lp(a)	No Effect
Elevated IDL	Low Carbohydrate Diet, Exercise
Small Dense LDL Pattern B, A/B	Low Carbohydrate Diet, Reduce Sugar Intake, Exercise
Remnant Lipoproteins	Reduce Carbohydrates
Low HDL_2	Aerobic Exercise
VLDL and Elevated Triglycerides	Low Carbohydrate Diet, Reduce Sugar Intake, Exercise
Metabolic Syndrome	No Sugar, 35% Calories as Fat, Exercise

Nutrition and Lifestyle Based Treatment Recommendations

- ✓Smoking cessation
- ✓Weight loss
- ✓Exercise
- ✓Omega-3 fatty acids (EPA/DHA)
- ✓Red yeast rice
- ✓Niacin
- ✓Flaxseed oil
- ✓Dietary fiber
- ✓Plant sterols

Lipids/Fats

CATEGORIES	Units	PATHOLOGICAL RANGE		FUNCTIONAL RANGE		CURRENT 01/20/10
		Min	Max	Min	Max	
Cholesterol, total	mg/dl	0.0	200.0	150.0	200.0	186
Triglycerides	mg/dL	35.0	160.0	75.0	100.0	73
HDL Cholesterol	mg/dl	40.0	-	55.0	-	83
LDL Cholesterol Calc	mg/dl	0.0	130.0	0.0	120.0	88
T. Cholesterol/HDL Ratio	-	0.0	3.7	0.0	3.1	2.2

- Normal Findings
- Triglycerides fall below 75 with lower fat diet and vegetarian diet

Follow-ups:

- If high LDLs, High total cholesterol, consider follow-up with a panel called VAP that goes into the details, as well as Homocysteine, C-reactive Protein cardio specific

CATEGORIES	Units	PATHOLOGICAL RANGE		FUNCTIONAL RANGE	
		Min	Max	Min	Max
Lab Corp Markers					
Homocysteine (Female)	µmol/L			4.0	10.0
Homocysteine (Male)	µmol/L			4.0	12.0
Sedimentation Rate	mm/hr			0.0	20.0
C-Reactive Protein HS (CRP-hs)	mg/L			0.0	3.0
Apolipoprotein A	mg/dL	110.0	162.0	110.0	162.0
Apolipoprotein B	mg/dL	52.0	109.0	52.0	109.0

Things That Damage Your Cardiovascular System

- ✓Sugar and high fructose corn syrup
- ✓Processed grains
- ✓Fruit juices
- ✓Inflammatory foods
- ✓Alcohol
- ✓Trans and heated fats (mayonnaise, margarine, hydrogenated fats)
- ✓Caffeine

Foods & Nutrients That Support the Cardiovascular System

- ✓ B Vitamins, especially B1, B2, B3 (Niacin), B12, folate
- ✓ Vitamin C
- ✓ Vitamin E
- ✓ CoQ10
- ✓ EPA and DHA
- ✓ Hawthorne berry
- ✓ Minerals, especially magnesium and zinc
- ✓ Arginine
- ✓ Natto - Nattokinase
- ✓ Serratopepidase
- ✓ Garlic
- ✓ Ginkgo
- ✓ Turmeric

Heart-Friendly Diet and Lifestyle

- ✓ Whole foods, antioxidant-rich diet high in greens, fruits, and vegetables
- ✓ Fat balance: omega-3s daily (flax, hemp, chia, purslane, algae) and avoiding heated and processed fats
- ✓ Sugar balance
- ✓ Be wary of medications
- ✓ Manage stress
- ✓ Exercise