Advanced Lipid Testing – Getting Closer to Personalized Medicine

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Let's say your goal is to optimize your health and attain high level functioning throughout your lifespan. You want to age well so that you can enjoy your relationships and pursue your passions without illnesses and suffering. You are willing to work hard at it – you just need guidance to determine the lifestyle choices that will enable you to achieve your goal. Unfortunately, you will soon be inundated with conflicting opinions: vegan, paleo, walking, high intensity training, fasting, grazing, 8 hours sleep, napping, meditation, yoga —all claim to optimize health. Why is there so much conflicting information out there, even among the health authorities?

Unfortunately there are many stakeholders in the health industry that do not have optimizing health as their main goal—and some of these influence the development of guidelines. The most egregious example of this was reported in the September 2016 JAMA article that exposed the influence of the sugar industry on our understanding of heart disease. For decades the American public has been warned about the dangers of eating too much cholesterol. Cholesterol lowering drugs (statins) have become the most prescribed and most profitable drugs in America. The cholesterol connection to heart disease has gone unquestioned since the late 1960s. Prior to that there were two theories emerging to explain America's increasingly high rate of heart disease. One was cholesterol and the other was an increasingly higher sugar diet. Archival research into a trade group called the Sugar Research Foundation revealed how the "science" was settled. The JAMA authors reported that this trade group crafted a plan to shift public opinion away from "sugar is bad for your heart" and towards cholesterol as the causative agent. The plan included paying three Harvard researchers about $50,000 (in today's dollars) to manipulate the data in a review article they were writing about sugar, fat and heart disease. That article, printed in 1967 in the New England Journal of Medicine, implicated saturated fat and cholesterol as the major causative agents and minimized the link between sugar and heart disease. This pay-off benefitted the sugar industry for decades (witness the supermarkets) and led to the development of low fat foods, high carbohydrate consumption, a diabetes and obesity epidemic, and a continued high rate of heart disease. The health of millions of Americans has suffered over these 50 years because of conflicts of interest in our researchers and policy makers.

Another reason we are failing to optimize our health strategies involves our research paradigm. Health guidelines are based on population health research. These are studies of thousands of people using one intervention (usually not uniform) and controlling for other variables (usually not well). Confirming some hypothesis under these circumstances may come up with a useful intervention for an "average person" but who would that be? Population health guidelines are just that – guidelines, and our current knowledge of complex systems-based biology can narrow those guidelines to more specific recommendations for individuals. Advanced lipid testing is a good example. (Lipids are fats. We often call cholesterol blood tests, lipid tests)

It turns out that having a low total cholesterol (less than 200), a low "bad cholesterol" (LDL less than 130) and a high "good cholesterol" (HDL over 50 or 60) does not ensure low risk of heart disease. Most people who develop coronary heart disease have normal standard lipid values including normal Triglycerides, HDL and LDL. In studies of people who were taking statin drugs to prevent a heart attack or stroke, it was found that more heart attacks and strokes actually occurred than were prevented. Instead of evaluating people based on old guidelines, advanced lipid testing looks at many of the newer markers to more clearly distinguish who is at risk and who is not.

The two markers that have the most significance to me are the Small Dense LDL-cholesterol (sdLDL-C) and the markers of inflammation (eg, hsCRP). Small dense LDL-cholesterol is a subclass of the total LDL ("bad cholesterol"). An elevated sdLDL-C predicts a higher risk of heart disease and rate of progression. A reduction in sdLDL-C is associated with improvement in scans and fewer heart attacks and strokes. Even people assessed as "low risk" (with low total LDL less than 100) can have high sdLDL-C so it should be tested in everyone. The reason you probably have not had your sdLDL-C measured is that despite the 50 + years of NIH research on this particle, no national guidelines have yet recommended testing for it. Being cynical, perhaps the disinterest in testing for elevated sdLDL-C has to do with its treatment. The best treatment is therapeutic lifestyle changes. Lowering refined carbohydrates and sugars, reducing body fat, exercise, niacin and fish oil can bring down sdLDL-C quite well. I'm skeptical that our guidelines will change anytime soon since lifestyle coaching is too time consuming and not as profitable as pharmaceuticals in our American health care system. However, on your next trip to Europe, you might stop to get your blood drawn because the 2011 European Consensus Statement on LDL Subclasses does recommend testing for sdLDL-C.

By now you must have heard that all chronic disease is associated with inflammation. This is a normal process of the small blood vessels stretching and leaking out immune cells into an area of tissue injury for the purpose of clearing and repairing. The white blood cells of the immune system produce a protein that stimulates the liver to produce C-reactive protein (C-RP). This normal acute response to injury can stayed "turned on" in certain circumstances and become chronic inflammation. Chronic inflammation damages the blood vessels which then become a set up for atherosclerosis (plaque build-up) and plaque rupture. Measurement of hsCRP, a marker of inflammation of the blood vessel walls, is essential in determining risk for heart disease. Elevated hsCRP is associated with aging (hence the term, "Inflamm-aging"), smoking, obesity, diabetes, infection, autoimmunity, and toxicity. Elevated hsCRP is associated with an increased risk of: having atherosclerosis, the risk of having a first heart attack or stroke, and the risk having a recurrent heart attack or stroke. Inflammation can be treated with lifestyle medicine as well – weight loss, smoking cessation, low refined carbohydrate diet, anti-inflammatory diet, fish oil, vitamin C, vitamin E, zinc, selenium and concentrated flavonoid supplements. The statin drugs reduce inflammation (which is probably their main effect in reducing heart attack rates) but lifestyle modifications are less risky for most people. Although in widespread use, the effectiveness of statin drugs in reducing cardiovascular events has come into question based on industry research exaggerating risk reduction by reporting results in relative risk vs absolute risk. Also the statin drugs have documented side effects of memory loss, confusion, muscle weakness and elevated blood sugar. Yes, elevated blood sugar is inflammatory and often the real devil in heart disease risk. So now we have come full circle. Don't follow the flock, be an individual - evaluate your heart disease risks and choose your treatments more precisely. Advanced Lipid Testing —ask for it.

Dr. Kate Thomsen's office for holistic health care is located in Pennington, NJ. She is board certified in Family Medicine, certified in Integrative/Holistic Medicine, and an Institute for Functional Medicine Certified Practitioner. She has been practicing Functional Medicine for over 15 years. For more information see www.drkatethomsen.com or call the office at 609-818-9700.

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Integrative and Holistic Health and Wellness

In our office we use these Advanced Lipid Testing Markers:

Conventional Lipid tests:

Total cholesterol, LDL, HDL, Triglycerides

Cholesterol Particle Subclasses:

sdLDL-C (the most dangerous of the LDLs)
HDL2b (the best at clearing out LDL)
Lp(a) (inherited, increases risk of all others)

Origins of Cholesterol (informs how to treat)

Is Liver Production of cholesterol increased?
Is Dietary Absorption of cholesterol increased?

Inflammation Markers

hsCRP – inflammation in blood vessel walls
Fibrinogen – increased risk of clotting
Myeloperoxidase – plaque inflammation and vulnerability
LpPLA2 – plaque inflammation and vulnerability

Blood Sugar Markers

Blood sugar: Fasting glucose, fructosamine, HgA1c
Insulin Resistance: Insulin, Adiponectin, HOMA-IR

And we use the **EndoPAT**— an FDA cleared non-invasive evaluation of the overall health of the endothelium (blood vessel wall)

You Tube: Endothelial Function by Itamar Medical

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