2020 Cholesterol Insights
Functional PEOs & Cholesterol Explained

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BRIEF HISTORY: I thank my colleague, EFA / eicosanoid specialist Paul Beatty, Toronto, Canada for this brief history regarding cholesterol: In 1958, Ancel Keys published the historic “7-COUNTRIES STUDY,” showing a linearly increasing cholesterol level / increasing heart disease connection. **He misled the world** by not including many other countries where this correlation does not exist and would have contradicted his hypothesis. Furthermore, **he made no distinction in the quality** of fats / oils being critical to human health — he incorrectly stated that all fats raise cholesterol — especially, saturated fats. **To the contrary, unprocessed / fully functional EFA-containing plant- and seed-based oils lower LDL-cholesterol.**

Keys’ misleading and wrong conclusions were opposed by at least 3 prominent researchers — Hugh Sinclair and Kinsell & Groen in 1952. Sadly, Keys ill-founded argument won the day. This was the beginning of the “no/low fat hypothesis” (guess) and the beginning of calling the absolutely required cholesterol [Textbook of Medical Physiology], “the enemy.” **To this day, the majority of healthcare practitioners in the medical community are still misled in this area, as are their patients.**

INSIGHTS:

1. **There is no cholesterol sensor in the bloodstream.** No, this is not a “genetic defect.” There are sensors for maintaining blood glucose (0.1% tolerance across all patients unless diabetic), sodium level, potassium level, etc. Given a system of n-1 linear equations with n independent variables (and no other conditions), there must be 1 degree of freedom; LDL-C will be dependent on virtually everything else. Utilizing a biological systems approach, cholesterol can be viewed as a dependent variable.
**LDL-C’s absolute number, therefore, is irrelevant.** This explains a lack of a required sensor to fix a set amount in the bloodstream. Furthermore, in addition to healing cardiovascular abnormalities, cholesterol has no less than 10 critical functions in the body, *(Textbook of Medical Physiology)*. Pre-1990 LDL-C was never considered “bad.”

2. **Other than healing an impaired vascular issue, does cholesterol have other important functions?** YES. Via *esterification*, LDL-C is the transporter of Essential EFAs (linoleic acid (LA) and alpha-linolenic acid (ALA) — the only 2 essential fatty acids). “Esterification” is a condensation reaction (the water is removed) – think of the Essential EFAs being “magnetized” to the cholesteryl molecule for transport in the bloodstream.

“80%-90% of the dietary cholesterol absorbed is esterified with long-chain fatty acids in the intestinal mucosa” *(Harper’s Illustrated Biochemistry)*. Approximately 55% of the esterified portion is Essential omega-6 – LA in both LDL-C and HDL-C, and about 20% of the free fatty acids in each class (Sinclair). “LA, [Essential omega-6] is one of the most abundant fatty acids in LDL-C.” *(Bowen, Current Atherosclerosis Reports; 6:477-484, 2004)*. We see the structure in apolipoprotein B (Apo B) below:

![Structure and Composition of a Low-Density Lipoprotein](Textbook of Medical Physiology, pg 874)
3. Why is this esterification of the cholesteryl molecule to the Essential EFAs critical to the understanding of the action of statins? Because, due to ubiquitous food processing, all cooking oils contain significant amounts of highly chemically processed, nonfunctional seed oil’s LA (transformed from active to functionally impaired via harmful transfats / interesterified fat formation, etc.). Therefore, when LDL-C is reduced, its nonfunctional / adulterated LA it transports is also REDUCED, which is very good. HOWEVER, at the same time, the fully functional, vitally important (esterified) LA is REDUCED — very, very bad. In fact, “all-cause” mortality would be expected to significantly increase in statin users; and it does increase (e.g., increased cancer and diabetes).

4. Fully functional LA is critical to each of your 100 trillion cells. Fully functional LA in the cell membranes allow hormones — including insulin — to be more effectively utilized (less insulin resistance). Essential EFAs comprise 25% - 33% of each of the 100 trillion cellular membranes in tissue and organs (Molecular Biology of the Cell). Mitochondria are loaded with LA in the cardiolipin, too (Harper’s Illustrated Biochemistry / Textbook of Medical Physiology). There is significantly more LA than ALA in every cell membrane regardless of organ — 4Xs-6Xs more LA than ALA, as well as dominating plasma lipids (Spector, Chapkin, Markides, Anderson).

Fully functional LA is also critically important for maximizing CELLULAR OXYGENATION (Campbell) — and lack of / impairment of (cellular) oxygen transport is known to be highly cancer-causing — the prime cause of cancer (Warburg).

5. Does reduction of LDL-C’s (esterified) LA cause additional problems? Yes. Statins are sometimes claimed to possess a mild anti-inflammatory action; however, LA’s long-chain metabolite — \( \text{PGE}_1 \) — is the body’s most potent natural anti-inflammatory. Statin use impairs its production. \( \text{PGE}_1 \) is also known to reverse existing arterial occlusions / thromboses (Weiss) and is a potent
natural vasodilator which increases blood flow — all helping to prevent CVD. Statins decrease both of these positive effects.

6. Why is LA adulterated in the diet? To obtain longer shelf-life and allow long-term use in commercial restaurant baking and frying. Use of cooking oils from the super-market cause shorter lifespan in humans because of processed cooking oils’ significantly impaired LA functionality. Note: Essential omega-3 oils, like flax oil, is never used in cooking or baking.

7. The intima — inner lining of the artery is 100% exclusively made of LA (Chapkin, et al.). Therefore, if there is less of the raw substrate (LA) that is fully functional, the patient has a defective arterial lining. If the patient is consuming processed foods (as the vast majority do), he will also have an increase in defective intima and defective / functionally impaired cell membranes throughout all organs / tissues. Furthermore, virtually all medical textbooks, including the medical standard — *Textbook of Medical Physiology* — state the intima is a mere 1 cell thick. This is incorrect; the intimal structure is actually 8-10 layers thick. [Note: esteemed pathologist, V. Subbotin, MD, PhD, came across my work and sent me a journal article with high-resolution photography confirming the multi-layer structure of the intima]. The intima is “self-inflaming” because of the ubiquitous use of processed LA. Therefore, with defective / adulterated / nonfunctional LA there is in actuality up to 10x more chance of impairment to the inner multi-layer arterial wall and its structure; particularly, large arteries.

IF available, (Esterified) Cholesterol transports fully functional LA to the arterial wall in an attempt to repair defects. Dead macrophages filled with cholesterol esters are finally deposited in arteries (Spiteller).

8. Exactly, what is oxidizing in LDL-C – the cholesteryl molecule itself or something else? The answer is “something else.”
Cholesterol / cholesteryl molecule and LA are both HIGHLY RESISTANT to OXIDATION in the body.

There is a mere 1 antioxidant molecule per 165 PUFA molecules; in particular, LA — far too few “protectors” to oxidation (1:165), IF in vivo oxidation were a significant issue, which it isn’t (Esterbauer, et al., 1991).

Note: Three double bonds are required before in vivo oxidation becomes an issue, and LA has only 2 double bonds (Peroxide Index (PI), AJ Hulbert) — it is exclusively the adulterated / processed / nonfunctional LA that the cholesteryl molecule is transporting that is oxidized exogenously (from consumed food).

This oxidized LA is NOT becoming oxidized in the body it is exogenous — coming in from consumed food already oxidized (Spiteller).

9. What comprises an arterial occlusion (clog)? High resolution chromatography confirms the occlusion is approx. 85% nonfunctional / adulterated / processed LA (Waddington / Kuhn / Felton).

10. Can increasing HDL solve the problem. Given the analysis above, no, not at all.

SOLUTION: Consuming fully functional LA & ALA (the Essential EFAs) each day is the only answer — it’s easy and the problem is solved.

Keto followers: Since fully functional / unadulterated LA and ALA are long-chain (18-carbon), not medium- or short-chain fatty acids, you are likely deficient in them.