THE CHOLESTEROL CONTROVERSY: THE SERIES

Simultaneous with reorientation of nutritional conventional wisdom away from fat as a dietary evil and increased acceptance that refined carbohydrate is the real culprit for atherosclerosis, obesity, diabetes and metabolic syndrome, a third factor has, these last 15 years or so, solidified the evidence behind the idea that a higher fat diet may be healthier. This factor is the new science of predicting coronary artery disease, which turned everything we originally believed in about cholesterol, atherosclerosis and diet, on its head.

Ronald Krauss, one of the most influential researchers in the nutrition field, has made several important contributions towards unsettling the case against saturated fat, but the most crucial one was his discovery of a new biomarker for atherosclerosis.

The holy grail of cardiovascular research has, of course, been finding a blood marker of ischaemic heart disease risk. Ancel Keys proposed, 60 years ago, total serum cholesterol as this marker, condemning saturated fat entirely on the basis of its capacity to raise it. Decades later, scientists begun to understand that the "total cholesterol" number wasn't actually a good predictor for heart attack risk and that it masked the more subtle measures of HDL- and LDL-cholesterol. Saturated fats raise both HDL- and LDL-cholesterol. These conflicting effects have been fatal for saturated fat, because official scientific opinion, for political and other vested interests, has favoured LDL-cholesterol over HDL-cholesterol as the biomarker of choice for the last few decades.

In the 1990s, Krauss found a way to predict coronary artery disease that both surpassed and undermined the methods upon which the dietary saturated fat-heart hypothesis had been built. Krauss had seen patients with normal-range LDL-cholesterol who suffered heart attacks. He pointed out that LDL-cholesterol predicted coronary artery disease only when very high, and that borderline-high LDL-cholesterol was meaningless. Furthermore, in various major studies,[1-5] LDL-cholesterol levels were completely uncorrelated with myocardial infarction. Indeed, many researchers today argue that "high LDL-cholesterol" is no longer especially meaningful and that there is no scientific basis for treating LDL targets.[6-7] Allan Sniderman, McGill University professor of medicine and cardiology, has even gone so far as to describe LDL-cholesterol as a "historical leftover".[8]

Krauss reported that as far back as 1950, John Gofman, medical physicist, found that LDL-cholesterol was the sum of a number of "LDL sub-fractions".[9] Krauss confirmed this in the 1980s and identified LDL particles to be either large, light and buoyant orsmall and dense. He found the small ones to be closely associated with coronary artery disease risk, whereas the large ones were not liked at all.

Krauss therefore established that "high total LDL", which by conventional standards sounded bad, was in fact not a problem since it was mainly made up of the large-particle type. Conversely, one could have relatively low LDL, which seemed a good thing, but if it was mainly made up of the small dense type, it signalled a high risk.[10,11]

With this discovery, Krauss showed why "high LDL-cholesterol", endorsed by mainstream experts, was not living up to its promises of predicting ischaemic heart disease. Public health recommendations had been issued and statin drugs prescribed to millions based on the idea that these drugs worked by lowering blood LDL-cholesterol, but the science of predicting ischaemic heart disease was still unfolding.

Krauss also tested what happened to LDL sub-fractions when subjects eat different diets. He found that when more total and saturated fats were eaten, instead of carbohydrates, there was an increase in the large "good" type LDL, while the small, dense "bad" LDL went down.[12,13] The case against saturated fat as the main dietary culprit should now have been considerably weakened – if saturated fat raised only the innocuous large-particle LDL, then its effect was relatively benign. Combined with saturated fat's ability to raise HDL-cholesterol, then it looked not just benign, but maybe even healthy, and certainly far better than the carbohydrate the public had been advised to eat in its place.

Other promising new biomarkers have been discovered and promoted more recently, such as Apo-lipoprotein B (ApoB) and non-HDL-cholesterol. But only Krauss's LDL sub-fractions can explain the problematic findings from several large studies, namely, that LDL-cholesterol cannot reliably be linked to coronary artery disease outcomes. Krauss's sub-fractions are uniquely significant and important

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