

# Cardiovascular Disease



## DO STANDARD LIPID STUDIES CUT THE MUSTARD?

An important factor in measuring cardiovascular risk (CR) is the conventional lipid studies which include LDL-C, HDL, total cholesterol and triglycerides, with LDL-C a key measure of risk. But many individuals with coronary heart disease have normal LDL levels.

We also know that small dense lipid particles, whether they are LDL or the commonly perceived beneficial HDL, promote the formation of fatty plaques in the arteries (atherosclerosis) which is a major cause of cardiovascular disease (CVD).

Conventional studies do not account for this as testing for these subfractions is too technical for routine laboratory testing. Consequently, statins (which can have side effects) may be being used in cases when they are not needed. Equally, cardiovascular risk maybe being missed. Therefore, we need additional measurements to calculate cardiovascular risk more accurately. Outlined below is some additional testing that may be used.

## APOB/APOA1 RATIO

ApoA and ApoB are the main proteins involved in the metabolism of lipids.

ApoA1 is a major driver of the reverse cholesterol transport which means it has anti-atherogenic effects and so is good for health.

ApoB is the main protein constituent of the potentially atherosclerosis forming lipoproteins including LDL-C, IDL, VLDL.

The reason measuring ApoB is potentially better than measuring LDL-C is that not all LDL-C particles are the same. The LDL-C measurement does not differentiate between the light and fluffy LDL particles which are not harmful and the small dense ones which are problematic. Conversely, 90% of the apoB population is the harmful small dense LDL's. Thus, the apoB measurement can distinguish between the harmless and the harmful LDL particles.

Therefore, the ApoB/ApoA1 ratio reflects the balance between the beneficial and harmful particles. The higher the ApoB/ApoA1 ratio, the more likely cholesterol is being deposited in the arterial wall, thereby stimulating atherogenesis and potentially CVD.

In a very large study, the ApoB/ApoA1 ratio was the single best lipid-related risk variable, even considering the other conventional lipids and lipid ratios.

Moreover, McQueen (2008) recommended "The non-fasting ApoB/ApoA1 ratio was superior to any of the cholesterol ratios for estimation of the risk of acute myocardial infarction in all ethnic groups, in both sexes, and at all ages, and it should be introduced into worldwide clinical practice".

## TRIGLYCERIDE/HDL RATIO

As mentioned above, the small dense LDL particles are more atherogenic than larger floating ones. Equally, the larger and less dense HDL2 particles are considered shielding, but the small dense HDL3 particles are atherogenic. The triglycerides to HDL ratio (TG/HDL-c) is inversely correlated with the level of small dense LDL particles and can therefore be used as an independent predictor of cardiovascular disease development. Studies have shown that a TG/HDL-c ratio of greater than 4 when utilising mg/dL is very predictive of coronary artery disease and this may provide an effective surrogate marker for lipid particle profiles.

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## LIPOPROTEIN (A) (LP(A))

Genetic testing has indicated that higher plasma Lp(a) is associated with the increased risk of coronary heart disease. Lp(a) concentration is largely inherited and may represent a lipoprotein disorder with an elevated risk of CVD. As the research findings relating Lp(a) and CVD are not consistent, routine measurement and treatment of Lp(a) are currently not recommended, however, it may be beneficial in individuals with a personal or family history of premature CVD.

## CALCIUM SCORING

Calcium scoring is highly specific for atherosclerosis and can predict cardiovascular risk in asymptomatic people. This is particularly valuable because it helps with risk reclassification. While high scores are associated with increased cardiovascular risk, low coronary calcium is a negative risk marker - as such, this can remove the need for preventative therapies such as statins.

Calcium scoring involves a CT scan of the heart. The study is complete within 10 minutes, and the radiation dose is low.

Chu et al., (2020) outlines that this test would be particularly beneficial for asymptomatic people between the ages of 45-75 who are deemed intermediate risk. It can re-classify patients into either lower risk, with potential cost-savings in minimising therapy, or into higher risk group where appropriate therapies may improve outcomes. Those with a strong family history of premature coronary disease would also benefit.

## CONCLUSION

As you can see, quantifying of a person's cardiovascular risk is more complicated than the standard lipid panel. If you have an abnormal lipid study and wish to know more please reach out at:



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