Small-dense LDL

What is small-dense LDL?

There are five major subgroups of Low Density Lipoproteins (LDL): IDL (intermediate density lipoprotein), I, II, III and IV. IDL is the largest, least dense and most buoyant, while LDLIV is the smallest and most dense. LDL particles that are small are also dense and these terms are often used interchangeably. The smaller the LDL particle, the more dangerous it is. In fact, small-dense LDL (LDLIII and LDLIV) is three times more atherogenic than buoyant LDL.

Why measure LDL subgroups?

According to the National Cholesterol Education Program (NCEP), only about half of the variability in coronary heart disease risk can be attributed to conventional risk factors (i.e. LDL, HDL and triglyceride levels). Other, more specific risk factors, enhance predictive power of cardiovascular disease in individuals. Small - dense LDL is one of these specific risk factors that may be independent of other lipid-related risk factors.

NCEP Specific Risk Factors:

- Lp(a)
- RLP
- HDL2b
- **Small-dense LDL**

Lipoproteins transport cholesterol throughout the body. But it is the actual lipoprotein particle, not the cholesterol within them, that penetrates the arterial wall and causes heart disease. That is why it is necessary to know the number of small LDL particles.

Why is small-dense LDL so harmful?

Smaller particles of LDL can more easily penetrate the arterial wall than large LDL particles simply due to their size. Therefore, the smaller the LDL particle, the more likely it is to enter the arterial endothelium, where it becomes oxidized, is taken up by a macrophage cell which then becomes a foam cell, which eventually stick together to build plaque within the arteries. Evidence also suggests that small-dense LDL is associated with vascular dementia.

It is also important to know *how many* LDL particles are present, in addition to their size. Just as small LDL particles can fit through the arterial lining more easily than large LDL particles, the more LDL particles there are, the more likely they will enter the arterial intima, regardless of size. It is therefore imperative to measure both the size (density) *and* number of LDL particles.

How is small-dense LDL treated?

Therapeutic treatment for small-dense LDL includes the use of niacin and fibrates. Lifestyle changes (diet and exercise) show beneficial effects as well.

References

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