

## Elevated concentration of small-dense LDL subfractions (sdLDL) as a risk factor for atherosclerosis

Low density lipoproteins (LDL) vary in their composition, dimension, and density. The subclass that includes the small dense LDL particles (sdLDL) is known for its increased atherogenicity and considered a major and independent risk factor in the development and progression of atherosclerosis.

Atherosclerosis remains the leading cause of death worldwide. Adding parameters to the routine lipid profile to improve the assessment of cardiovascular risk is therefore in everybody's interest. Numerous studies have shown that sdLDL is a valuable parameter for complementing existing screening methods.

Within the LDL lipoprotein class, the small dense LDL particles (sdLDL) represent a particular subclass in terms of risk potential: **Independent from the LDL value and other parameters used in basic cardiovascular diagnostics, the predominance of sdLDL has been associated with a 3 to 7-fold greater risk of myocardial infarction.** The extent of coronary heart disease correlates significantly with the sdLDL value. Compared to LDL, sdLDL is a better predictor of cardiovascular events. In addition, high sdLDL concentrations are associated with the occurrence of the metabolic syndrome independent of obesity and systemic inflammation. The NCEP ATP III (National Cholesterol Education Program Adult Treatment Panel III) has recognised sdLDL as an independent risk factor for atherosclerosis.

### Indications

Small-dense LDL particles have a lower binding affinity for the LDL receptor compared to the other LDL subfractions, which means that sdLDL particles are broken down more slowly and circulate longer in the blood plasma. Due to their small size, sdLDL particles also penetrate the arterial wall better than larger LDL fractions. Besides, their increased affinity for sub-endothelial proteoglycans means that sdLDL particles reside longer in the subendothelial space, which increases their exposure to oxidative risk. As sdLDL particles are also deficient in antioxidants (vitamin E), they are even more susceptible to oxidation.

The **increased atherogenicity of small dense LDL** makes these particles a very valuable parameter for complementing existing lipid screening tools, especially since the **concentration of sdLDL can be significantly increased despite a normal LDL value.**

The determination of sdLDL can be recommended for the following indications and clinical features:

- hyperlipoproteinemia
- type 2 diabetes mellitus
- metabolic syndrome
- insulin resistance
- obesity
- postprandial hypertriglyceridemia
- familial predisposition to coronary heart disease
- dialysis patients
- renal insufficiency
- monitoring of lipid-lowering therapy

### Major classes and subclasses of lipoproteins

Based on their density, lipoproteins are divided into the major classes known as: Chylomicrons, VLDL (Very Low Density Lipoproteins), IDL (Intermediary Density Lipoproteins), LDL (Low Density Lipoproteins) and HDL (High Density Lipoproteins). Different methods allow the determination of subclasses from the major classes. We determine the small dense LDL subclass (sdLDL) by means of a new enzymatic colorimetric test.

Based on the concentration of the different LDL subclasses, two LDL phenotypes are defined: LDL phenotype A is characterised by the predominance of large buoyant LDL, and the phenotype B by the predominance of small dense subclasses (sdLDL). Compared to phenotype A, phenotype B has been associated with a 3 to 7-fold higher risk of myocardial infarction.

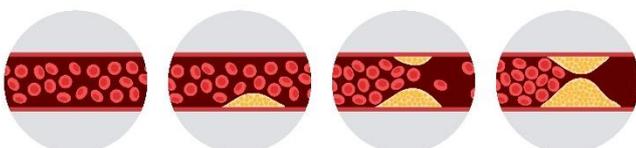


Fig. 1: Course of atherosclerosis (Pikovit/Shutterstock.com)

## Causes and therapy

The exact origins of sdLDL have not been fully established yet. Genetic and environmental factors influence the concentration of sdLDL: Dyslipidemia, obesity and insulin resistance are often associated with increased sdLDL concentrations. A diet rich in fructose and trans fatty acids also appears to promote the formation of sdLDL particles. Therapeutic measures include the use of lipid-reducing drugs and lifestyle adjustments such as reducing monosaccharides in the diet, increasing physical activity and reducing stress.

### Analysis

**7953** sdLDL (small dense LDL)

**Price:** CHF 31.00, mandatory provision

**Material & Volume:** Serum, 1 ml

**Execution time:** 1 day

### References:

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