Levels of 'ugly cholesterol' in the blood are much higher than previously imagined

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Credit: University of Copenhagen

The amount of remnant particle cholesterol in the blood, the so-called ugly cholesterol, is much higher than previously believed. This is shown in new research from the University of Copenhagen and Copenhagen University Hospital. The discovery may have implications for future prevention and treatment of cardiovascular disease.

Three quarters of the Danish population have moderately elevated levels of cholesterol. If cholesterol levels are too high, risk of cardiovascular disease is increased. Often, LDL cholesterol, the so-called bad cholesterol, is considered the culprit. However, new research from the Faculty of Health and Medical Sciences at the University of Copenhagen and Copenhagen University Hospital shows that a completely different type of cholesterol may be more responsible than previously assumed. What we are talking about is remnant cholesterol—also known as ugly cholesterol.

To their surprise, the researchers have discovered that the amount of remnant cholesterol in the blood of adult Danes is much higher than previously believed. From the age of 20 until the age of 60, the amount in the blood is constantly increasing, and for many people it remains at a high level for the rest of their lives.

"Our results show that the amount of remnant cholesterol in the blood of adult Danes is just as high as the amount of the bad LDL cholesterol. We have previously shown that remnant cholesterol is at least as critical as LDL cholesterol in relation to an increased risk of myocardial infarction and stroke, and it is therefore a disturbing development," says Professor and Chief Physician Børge Nordestgaard from the University of Copenhagen and Copenhagen University Hospital.

The results are based on data from people from the Copenhagen General Population Study. A total of 9,000 individuals had cholesterol in their fat particles in the blood measured by means of new advanced measuring equipment, known as 'metabolomics." The measurements show that total cholesterol in the blood consists of equal parts of "ugly," "bad" and "good" cholesterol.

Overweight and Obesity Are the Main Cause

"Previous studies from the Copenhagen General Population Study show that overweight and obesity are the main cause of the very high amount of remnant cholesterol in the blood of adult Danes. In addition, diabetes, hereditary genes and lack of exercise play a part," says one of the authors, MD Mie Balling from the University of Copenhagen and the Department of Clinical Biochemistry, Copenhagen University Hospital.

In 2018, a large international, controlled clinical trial was published that clearly showed that when triglycerides and thus remnant cholesterol were reduced by the help of medication in people with elevated levels in the blood, the risk of cardiovascular disease was reduced by 25%.

"Our findings point to the fact that prevention of myocardial infarction and stroke should not just focus on reducing the bad LDL cholesterol, but also on reducing remnant cholesterol and triglycerides. So far, both cardiologists and GPs have focused mostly on reducing LDL cholesterol, but in the future, the focus will also be on reducing triglycerides and remnant cholesterol," says Professor Børge Nordestgaard.

According to Børge Nordestgaard, the most important thing you yourself can do to achieve the lowest possible level of remnant cholesterol and triglycerides in the blood is to maintain a normal body weight.

The three kinds of cholesterol:

- Remnant cholesterol = ugly cholesterol: the cholesterol content in triglyceride-rich lipoproteins or remnant particles. Elevated remnant cholesterol leads to cardiovascular disease.
- LDL cholesterol = bad cholesterol: the cholesterol content in low-density lipoprotein (LDL). Elevated LDL cholesterol leads to cardiovascular disease.
- HDL cholesterol = "good" cholesterol = innocent cholesterol: the cholesterol content in high-density lipoprotein (HDL). Levels of

HDL cholesterol does not affect cardiovascular disease risk.

More information: Mie Balling et al, A third of nonfasting plasma cholesterol is in remnant lipoproteins: Lipoprotein subclass profiling in 9293 individuals, *Atherosclerosis* (2019). DOI: 10.1016/j.atherosclerosis.2019.05.011

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