

Study identifies the mechanism by which eating fish reduces risk of cardiovascular disease

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A study by researchers from the Universitat Rovira i Virgili (URV) and Harvard Medical School has found that consuming omega 3 primarily

through fish, but also in supplements containing these fatty acids, can modulate lipoproteins, that is, the particles that transport lipids through the blood, and can reduce the risk of cardiovascular disease. The association between the consumption of omega 3 and the reduction in the risk of suffering cardiovascular events has been demonstrated through the analysis of lipoprotein samples from 26,034 women, the largest and most detailed study ever carried out. The study is particularly important because cardiovascular disease is the most prevalent cause of death, with 1 in 3 people dying from cardiovascular events.

The research has been led by Núria Amigó, CEO of the URV spin off Biosfer Teslab and member of the Metabolomics Interdisciplinary Laboratory (MIL@b) - Metabolomics Platform, which was jointly created by the URV and the CIBERDEM and which is part of the Pere Virgili Health research Institute. Xavier Correig, professor from the Department of Electronic, Electrical and Automatic Engineering and director of the MIL@b—Metabolomics Platform, has participated in the study together with researchers from the Center for Lipid Metabolomics, Division of Preventive Medicine at the Brigham and Women's Hospital (Harvard Medical School) headed by Samia Mora.

Up to now it had been shown that a high [consumption](#) of omega 3 [fatty acids](#) was associated with lower levels of triglycerides in the blood. However, it had also been related to an increase in LDL [cholesterol](#), that is, low-density cholesterol transported by lipoproteins, also known as bad cholesterol. LDL cholesterol increases the risk of cardiovascular diseases because it can accelerate the formation of atherosclerosis, that is, the process by which the arteries harden and lose their elasticity.

However, the study has found that increased consumption of LDL cholesterol from fish is associated principally with the cholesterol transported by the largest LDL particles, which are less atherogenic, and not with an increase in the total number of LDL particles. This decrease

in the number of triglycerides transported by any type of lipoprotein helps protect the individual from heart disease.

The 3 types of omega 3 fatty acids studied, namely α -linoleic acid (ALA), docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) are present in fish and other foods and are essential to human physiology, and the study has found that they differ in their association with the risk of cardiovascular disease. It found that there was no increase in the smallest LDL lipoproteins that transport cholesterol; instead the increase was among the largest LDL lipoproteins, which are not associated with the risk of heart disease. There was a decrease in all of the triglyceride-transporting particles and, moreover, the average size of the HDL and LDL particles increased, a phenomenon that is associated with increased protection from cardiovascular illness.

These conclusions have been obtained through mathematical modelling of the consumption of fish and omega 3 (both as a whole and of the different types ALA, DHA and EPA) and the profile of lipoproteins. The results were obtained by Nuclear Magnetic Resonance, "which can go further than simply analysing triglyceride and cholesterol content and can quantify the number and size of the different subtypes of plasmatic lipoprotein," explained Núria Amigó. She described how among the LDL particles that transport cholesterol "it is the smallest that are associated with a future cardiovascular event."

Another important element of the study is that the mathematical models used to evaluate the association between the consumption of fish and the reduction in cardiovascular risk have isolated other nutritional factors that affect the result, such as the consumption of other foods, the concentration of omega 3 according to the origin of the fish (wild or farmed) and traditional risk factors such as a sedentary lifestyle, age, body mass index and smoking.

The study analysed a cohort from the Women's Health Study by the Brigham and Women's Hospital, affiliated to Harvard Medical School, and involved the use of Nuclear Magnetic Resonance to characterise the plasma of 26,034 women with an average age of 53 (most were between 48 and 59).

Having confirmed that the risk factor associated with lipids, cholesterol concentration, triglycerides and the different subtypes of particles is modulated by the consumption of omega 3 fatty acids, "we now need to find out if the consumption of fish is associated with lower mortality from both cardiovascular diseases and other causes," Amigó explained, because "although the risk is lower in terms of lipids, we need to look at other pro-inflammatory factors and questions such as exposure to heavy metals."

More information: Nuria Amigó et al, Habitual Fish Consumption, n-3 Fatty Acids, and Nuclear Magnetic Resonance Lipoprotein Subfractions in Women, *Journal of the American Heart Association* (2020). [DOI: 10.1161/JAHA.119.014963](https://doi.org/10.1161/JAHA.119.014963)

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