Why fish is so good for you

EurekAlert!

Scientists of Friedrich Schiller University Jena and Jena University Hospital decode the antihypertensive impact of omega-3 fatty acids

Jena (Germany) Fish is healthy: Easy to digest and with a high level of precious proteins, fish is considered an important part of a healthy diet. And with the so-called omega-3 fatty acids, fish contains real 'fountains of youth'. These fatty acids — like docosahexaeonic acid (DHA) — occur mostly in fatty fish like herring, salmon, and mackerel. They are thought to lower the blood pressure, to strengthen the immune system, and to have positive effects on the development on the nervous system and the cardiovascular system.

"Clinical studies about the intake of nutritional supplements containing omega-3 fatty acids haven't provided complete clarity so far," Prof. Dr. Stefan H. Heinemann from Friedrich Schiller University Jena (Germany) says. "The molecular impact of the omega-3 fatty acids isn't fully understood yet," the biophysicist continues. But now scientists of the DFG research group FOR 1738 based at Jena University are able to bring new facts to light: In two newly published articles for the well-known science magazine '*Proceedings of the National Academy of Sciences*, USA', they describe how they analyzed the impact of omega-3 fatty acids on a systemic level, and they also described the underlying molecular mechanisms for the first time.

The teams around Prof. Heinemann (Jena University), Prof. Dr. Michael Bauer (Jena University Hospital) and Prof. Dr. Toshinori Hoshi (University of Pennsylvania), were able to show that the so-called 'SLO1' potassium channel is an important component in the effectiveness of omega-3 fatty acids. "These ionic channels act

like very specific receptors for DHA and are opened by the binding of the omega-3 fatty acids," Biophysicist Heinemann explains. In the case of other omega-3 fatty acids — like the shorter eicosapentaenoic acid (EPA) or the alpha-linolenic acid (ALA) extracted from plants — the impact is much weaker.

Prof. Bauer and his colleagues examined the effects of omega-3 fatty acids on SLO1 channels of the cardiovascular system by experimenting with mice. "Administration of DHA should result in an expansion of the blood vessels and consequently a drop in blood pressure," the physician says. The laboratory experiments confirmed exactly that. In genetically modified mice, however, which were not able to produce the SLO1 channel, the antihypertensive impact of DHA failed to appear. "Thus, we were able to show for the first time that DHA directly influences the blood pressure, which is being mediated through SLO1 channels," Bauer summarizes.

Beyond that, the scientists made another surprising discovery: A variant of DHA, which can often be found in nutritional supplements containing omega-3 fatty acids, doesn't show an antihypertensive effect. Moreover, it suppresses and even diminishes the effect of the natural DHA from fish oil. "The intake of non-natural omega-3 fatty acids can therefore also have counter-productive effects," Prof. Bauer stresses. This is of particular importance for the nutritional supplements of patients in intensive care who are being drip-fed: Their supplements of omega-3 fatty acids should be specifically aimed at and adapted to the patients' clinical requirements.

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