

# Eating fish could prevent Parkinson's disease

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The link between higher consumption of fish and better long-term health for the brain has been long established. Now, new research from Chalmers shows that the protein parvalbumin may be a contributing factor. Credit: Johan Bodell/Chalmers University of Technology

A new study from Chalmers University of Technology, Sweden, shines more light on the link between consumption of fish and better long-term

neurological health. Parvalbumin, a protein found in great quantities in several fish species, has been shown to prevent the formation of certain protein structures closely associated with Parkinson's disease.

Fish has long been considered a healthy food, linked to improved long-term cognitive health, but the reasons for this have been unclear.

Omega-3 and -6 fatty acids, commonly found in [fish](#), are often assumed to be responsible, and are commonly marketed in this fashion. However, the scientific research regarding this topic has drawn mixed conclusions. Now, research from Chalmers has shown that the [protein](#) parvalbumin, which is very common in many fish species, may be contributing to this effect.

One of the hallmarks of Parkinson's disease is amyloid formation of a particular human protein called alpha-synuclein. Alpha-synuclein is even sometimes referred to as the Parkinson's protein. What the Chalmers researchers have now discovered is that parvalbumin can form amyloid structures that bind together with the alpha-synuclein protein.

Parvalbumin effectively scavenges the alpha-synuclein proteins, using them for its own purposes, thus preventing them from forming their own potentially harmful amyloids later on.

"Parvalbumin collects up the Parkinson's protein, and actually prevents it from aggregating, simply by aggregating itself first," explains Pernilla Wittung-Stafshede, Professor and Head of the Chemical Biology division at Chalmers, and lead author on the study.

With the parvalbumin protein so highly abundant in fish species, increasing the amount of dietary fish might be a simple way to fight off Parkinson's disease. Herring, cod, carp and redbfish, including sockeye salmon and red snapper, have particularly high levels of parvalbumin, but it is common in many other [fish species](#), too. The levels of parvalbumin can also vary greatly throughout the year.

"Fish is normally a lot more nutritious at the end of the summer, because of increased metabolic activity. Levels of parvalbumin are much higher in fish after they have had a lot of sun, so it could be worthwhile increasing consumption during autumn," says Nathalie Scheers, assistant professor in the Department of Biology and Biological Engineering, and researcher on the study. It was Nathalie who first had the inspiration to investigate parvalbumin more closely, after a previous study she conducted looking at biomarkers for fish consumption.

Other neurodegenerative diseases, including Alzheimer's, ALS and Huntington's disease, are also caused by certain amyloid structures interfering in the brain. The team is therefore keen to research this topic further, to see if the discovery relating to Parkinson's disease could have implications for other neurodegenerative disorders as well. Pernilla Wittung-Stafshede stresses the importance of finding ways to combat these neurological conditions in the future: "These diseases come with age, and people are living longer and longer. There's going to be an explosion of these diseases in the future—and the scary part is that we currently have no cures. So we need to follow up on anything that looks promising."

A follow-up study looking at parvalbumin from another angle is planned for this autumn. Nathalie Scheers, together with Professor Ingrid Undeland, also of Chalmers, will investigate parvalbumin from herring, and its transport in human tissues. "It will be very interesting to study how parvalbumin distributes within human tissues in more depth. There could be some really exciting results."

The link between higher consumption of fish and better long-term health for the brain has been long established. There is correlation between certain diets and decreased rates of Parkinson's [disease](#)—as well as other neurodegenerative conditions. "Among those who follow a Mediterranean diet, with more fish, we observe lower rates of

Parkinson's and Alzheimer's," says Tony Werner, a Ph.D. student in the Department of Biology and Biological Engineering, and lead researcher on the study. This has also been observed in Japan, where seafood forms a central part of the diet. The team is careful to note that no definite links can be established at this point, however.

Nathalie Scheers had looked at parvalbumin before in another context. "I was on a previous study where we looked at possible compliance markers for fish intake. Parvalbumin is a cause of fish allergies, so we knew that it passed over to the blood, and that this form of parvalbumin is specific for fish."

She joined forces with Pernilla Wittung-Stafshede, and together they took the idea forward. "Because Nathalie had previously shown that parvalbumin passes into the body of the person eating fish, it made sense to study its interaction with human proteins. We already knew that they can meet in the gut, the blood, or the brain," explains Pernilla Wittung-Stafshede.

**More information:** Tony Werner et al, Abundant fish protein inhibits  $\alpha$ -synuclein amyloid formation, *Scientific Reports* (2018). [DOI: 10.1038/s41598-018-23850-0](https://doi.org/10.1038/s41598-018-23850-0)

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