

# Scientific research reveals brain alterations linking omega 3 deficit with depression

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The link between deficits of omega-3 poly-unsaturated fatty acids (AGPO-3) and the onset of depressive disorders is not new in the medical field. However, what has not been known until now is the brain mechanism by which diet can condition mental health to a certain extent. Research undertaken by scientists in Bordeaux (France) and at the Faculty of Medicine and Odontology of the University of the Basque Country (UPV/EHU, Spain) and published in *Nature Neuroscience*, provides new clues to understanding this phenomenon.

The name of the research work, 'Omega-3 nutritional deficiencies annul the neuronal functions of the endocannabinoid system' describes the research findings, [endocannabinoid system](#) being linked to the onset of depressive disorders.

According to Doctor Susana Mato, researcher in the Ramón y Cajal programme, attached to the Neurosciences Department of the Faculty of Medicine and Odontology at the UPV/EHU and member of the Neurobiology Group, "we have observed that, in mice subjected to a diet low in omega-3 poly-unsaturated fatty acids, they have lower AGPO-3 brain levels, and this fact is associated with an alteration in the functioning of the endocannabinoid system". More concretely, the researcher points to the confirmation of "the existence of a deficit in the signalling of the CB1 cannabinoid receptor in the prefrontal cortex of the brain. This protein — the CB1 cannabinoid receptor — has been linked, over the last decade and in various studies, to depressive disorders."

Doctor Rafael Rodríguez-Puertas, research worker responsible for the Neurochemical and Neurodegeneration team at the Faculty of Medicine and Odontology at the UPV/EHU, points out that "certain forms of synaptic plasticity — a change in the efficiency of neuronal communication — measured by the brain's endocannabinoid system, disappear specifically from certain zones of the brains of mice with AGPO-3 deficit".

Despite several example in the scientific literature referring to the existence of a link between the low presence of AGPO-3 in the diet and depressive disorders, Susana Mato recognises that "little more is known about how modern Western diets, poor in AGPO-3, affect brain function and what might be the reason for a greater rate of depression associated with a deficit of these fatty acids".

As doctor Rodríguez-Puertas points out, "thanks to the results of this research new possibilities are opened up for undertaking deeper research, such as how diet modifies the functioning of the brain in general and the endocannabinoid system in particular, and how this is linked to mental disorders".

It also, "reinforces the idea that manipulating the endocannabinoid system can be useful for the treatment of depressive disorders, although the data we have up to now is very green for us to say what would be the ideal way to do so", pointed out Dr Mato.

The research work started with two French teams located in Bordeaux and led respectively by doctors Olivier J Manzoni and Sophie Layé. They have been working for a number of years with mice which show low levels of AGPO-3 in their [brain](#), due to a low diet in these fatty acids.

"Dr Manzoni's team discovered that the synaptic plasticity of the

neuronal connections, which is mediated by endocannabinoids, disappears in these animals", pointed out Dr S. Mato. To this end, in 2008, they made contact with researchers at the Faculty of Medicine at the UPV/EHU in order to obtain their collaboration in undertaking new research in order to identify possible change sin the expression and activity of the cannabinoid receptors.

In fact, in order to draw conclusions from the study, it has been necessary to employ a large number of research techniques, amongst which were "the analysis of the brain's fatty acids, electrophysiology, autoradiography of receptors, the western blot (for quantification of proteins), the determination of levels of endocannabinoids and behaviour tests", listed Doctor Rodríguez-Puertas. "In fact", continued the researcher, "in our research team we are experts in the autoradiography of receptors technique and in anatomically identifying the activation of the receptors of the endocannabinoid system".

Provided by Elhuyar Fundazioa

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