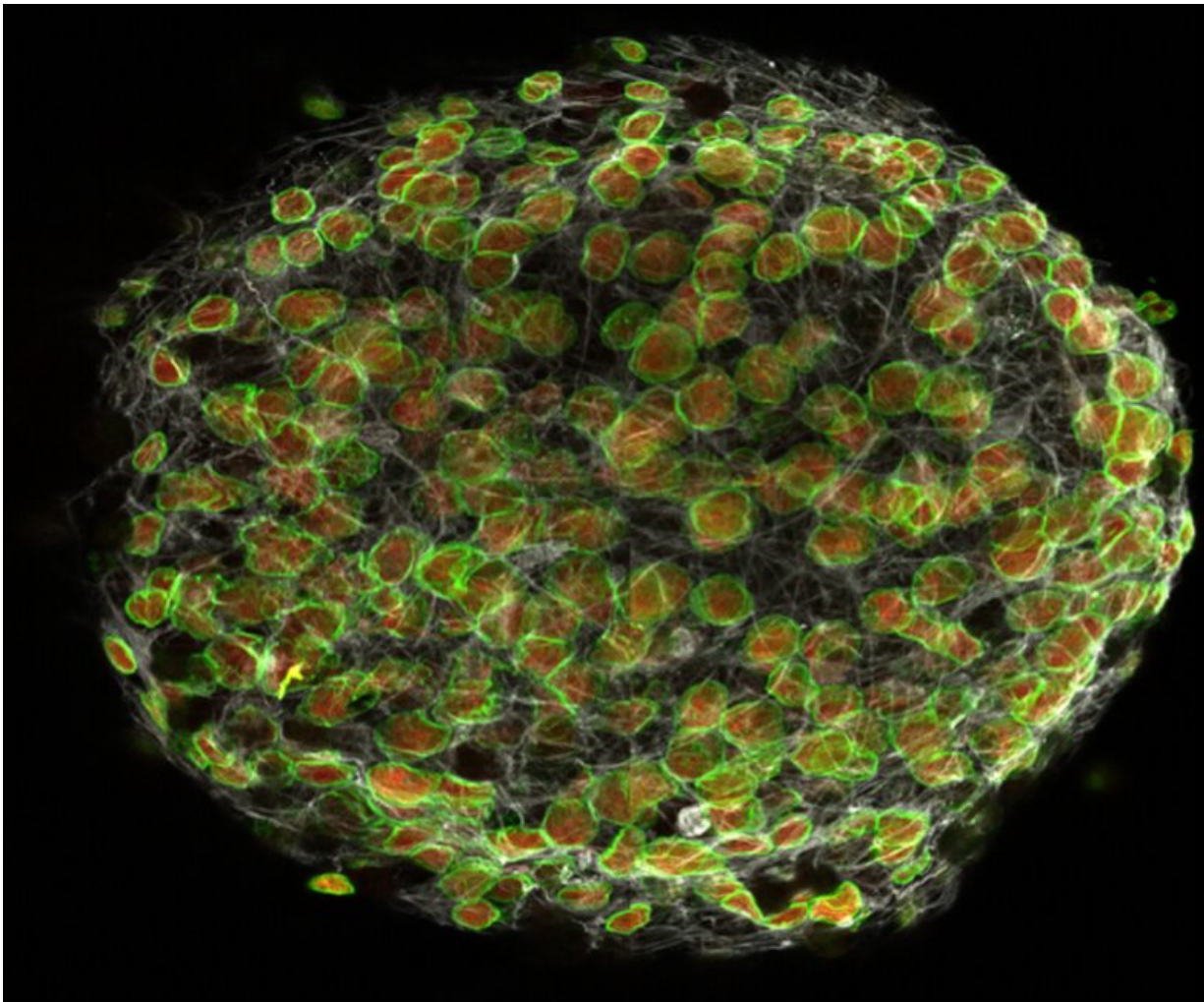


# Study finds protein in blood believed to be linked to depression

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A small group of neural stem cells isolated from mice and cultured in vitro observed under a confocal microscope. (LaminB1 in green, Sox2 in red) Credit: Perception and Memory Unit—Institut Pasteur

The process of aging is often related to the onset of neurological symptoms such as cognitive decline, memory loss or mood disorders such as depression. Previous studies have shown that the growth factor GDF11, a protein found in blood, has a beneficial effect on olfactory perception and on the generation of new cells in the brains of aged mice. However, the mechanism of action of GDF11 in the brain has remained unknown.

Researchers from the Institut Pasteur, CNRS and Inserm have discovered that long-term administration of the GDF11 protein to aged mice improves their memory and significantly reduces behavioral disturbances related to depression, allowing them to return to a behavior similar to that seen in younger mice. The results of this study were published in the journal *Nature Aging* on February 2, 2023.

The scientists conducted further studies in different aged mouse models or mouse models with depression-like behavioral disorders and in vitro neuronal cultures, which enabled them to identify the molecular mechanism of action of GDF11. They discovered that administration of GDF11 activates the natural process of intracellular cleaning, called "autophagy," in the brain and the elimination of senescent cells. The GDF11 protein thus indirectly increases cell turnover in the hippocampus and restores neuronal activity.

To better understand the link between depressive disorders and the GDF11 protein in humans, scientists from the Institut Pasteur, CNRS and Inserm, in collaboration with scientists from McMaster University, quantified the protein in the blood serum of an international cohort of young patients with [major depressive disorder](#). They observed that GDF11 levels are significantly lower in these patients. Moreover, by measuring the levels of this [protein](#) at different stages, the scientists observed a fluctuation in the level depending on the depressive state.

"This work provides [clinical evidence](#) linking low blood levels of GDF11 to [mood disorders](#) in patients with depression," said Lida Katsimpardi, a researcher in the Institut Pasteur's Perception and Memory Unit, affiliated with Inserm at the Institut Necker-Enfants Malades, and co-last author of the study. "In the future, this molecule could be used as a biomarker to diagnose depressive episodes. It could also serve as a therapeutic molecule for the treatment of cognitive and affective disorders," she concludes.

**More information:** Carine Moigneu et al, Systemic GDF11 attenuates depression-like phenotype in aged mice via stimulation of neuronal autophagy, *Nature Aging* (2023). [DOI: 10.1038/s43587-022-00352-3](https://doi.org/10.1038/s43587-022-00352-3)

Provided by Pasteur Institute

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