

Study shows how calcium helps brain cells “tune” into neighbourhood, keep neurodegeneration at bay

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It is the presence of calcium that signals to the cells for undertaking enhanced amounts of lipid transfers and the need for creating more contact sites, ensuring smooth and continuous lipid transfer. (Express File)

In a new study, a group of neuroscientists in Bengaluru has explained how calcium aids cells in the body “listen” to their surroundings and stay immune to neurodegenerative disorders that often result in the onset of conditions like Alzheimer’s or Parkinson’s diseases.

The 2019 estimates made by the World Health Organization (WHO) found that one out of 8 people, worldwide, lived with some kind of a **mental disorder**. In India, the WHO estimates the economic loss due to mental health problems to be USD 1.03 trillion (2012 – 2030). In its recent Economic Survey released last month, the central government has laid out elaborate measures to tackle the rising case load of people with mental conditions.

The research team led by Raghu Padinjat at the National Centre for Biological Sciences (NCBS-TIFR) used *Drosophila* fly model and have identified a new protein named Extended synaptotagmin (Esyt), which was found located close to the cell membrane of neurons. Its dysfunction, they said, had direct implications on the cell health, details of which have been elaborated in their latest paper published in the Journal of Cell Biology.

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Importantly, they said that Esyt could be used as a smart sensor as it monitors and tweaks the working of a cell with respect to the available light.

Cells in the brain need to communicate with one another, so that they function in tandem to support the body's requirements. For effective communication and transport of essentials like lipids, presence of healthy Membrane Contact Site (MCS) — a region where the plasma membrane (the cells' outer boundary) and endoplasmic reticulum (membranes in the cell's interior) meet — is paramount. Though previous studies had established the presence of over 20 proteins hovering close to MCS, their exact role in maintaining cell health is yet to be fully understood.

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Throwing new light into this domain, the NCBS scientists have proposed that Esyt possesses a C2 domain capable of binding and detecting calcium. A loss in this ability makes the cell incapable of adjusting its MCS function in response to illumination, when the *Drosophila* flies are subjected to light during the laboratory experiment.

“We hence propose that it is the Esyt's strategic presence at the membrane contact site that it can first decode the calcium binding to the C2 domain. To this, a cell then responds, by either increasing or decreasing the number of contact sites for lipid transfers,” Padinjat, Professor at NCBS told [The Indian Express](#).

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“We have established that it is this presence of calcium that governs lipid transfers into the cell,” he said, adding,

It is for the first time, cell health has been closely tied to the presence of healthy contact sites.

“When the cell is unable to maintain healthy contact sites in adequate numbers, it could lead to neurodegenerative diseases. In *Drosophila* flies, they suffered retinal degeneration,” he said.

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