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Research highlight

Organic promise for nerve diseases

Biplab Das

Researchers have stumbled upon an organic compound that might help uncover the underlying cause of nerve diseases. The researchers used pyrene, a polycyclic aromatic hydrocarbon, to measure depleted levels of cholesterol in the membrane of neurons¹ (#B1).

The structure and function of membrane proteins often depends on their interaction with the surrounding lipids. Cholesterol is an important lipid as it is known to regulate the function of neuronal receptors. Brain membranes have higher levels of cholesterol than membranes in other body parts. Due to aging, cholesterol levels in brain membranes modulate naturally. Yet, the role of cholesterol remains poorly understood.

To find out the precise role of cholesterol in brain membranes, the researchers depleted cholesterol levels from bovine hippocampal membranes using methyl-beta-cyclodextrin. They extracted lipids from normal and cholesterol-depleted membranes. Then they measured fluorescence of pyrene incorporated in normal membranes, cholesterol-depleted membranes and extracted lipids.

The polarity of hippocampal membranes increased upon cholesterol depletion. This happened due to an increase in water penetration in the membrane bilayer upon cholesterol depletion. Fluorescence of pyrene changed depending on the cholesterol content of the membrane. Pyrene fluorescence was found to exhibit distinctive difference in cholesterol-rich and cholesterol-depleted hippocampal membranes.

"This would be potentially useful in understanding changes in membrane (and hence brain) function with aging and neurodegeneration," says lead researcher Amitabha Chattopadhyay, deputy director of Centre for Cellular and Molecular Biology, Hyderabad. It may have functional implications in neuronal diseases such as Smith-Lemli-Opitz syndrome in which defective cholesterol synthesis leads to cholesterol depletion, he adds.



The researchers (from left) Roopali Saxena, Amitabha Chattopadhyay & Sandeep Shrivastava.

References

1. Saxena, R. *et al.* Exploring the Organization and Dynamics of Hippocampal Membranes Utilizing Pyrene Fluorescence. *J. Phys. Chem. B* (2008) [Article](http://pubs.acs.org/cgi-bin/abstract.cgi/jpcb/k/asap/abs/jp804353m.html)
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