IIT Indore develops new dye to track lysosomes

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Scientists at Indian Institute of Technology, Indore, have developed L-lyso—a new water soluble, fluorescent dye, which can permeate the membranes of lysosomes, marking them for future tracking and imaging.

This has been reported on website, researchmatters.in. The IIT Indore authorities have confirmed this scientific feat achieved by Sophisticated Instruments Centre head Dr Shaikh Md Mobin and his students Pratibha Kumari and Sanjay K Verma.

Lysosomes are organelles found in almost every animal cell that help in digestion of biomolecules, macromolecules, old cell parts and micro organisms.

The interiors of a lysosome have an acidic environment, with a variety of hydrolytic enzymes, which break down biomolecules, like nucleic acids, proteins and polysaccharides.

Lysosomes are also considered as powerful indicators of various pathological disorders. The disorder could either affect the acid hydrolases within the lysosomes or cause genetic mutations, affecting the functioning of a lysosome.

Such disorders, however, can be tracked by monitoring the lysosomes.

Conventionally, tools and dyes like LysoTracker are used as a marker. However, these are either expensive or are not efficient at tracking a lysosome for longer periods without losing their fluorescent properties.

To overcome the limitations of conventional dyes, the team at IIT Indore developed L-lyso.

L-lyso, according to scientists, "is a new water soluble, fluorescent Schiff-base ligand (L-lyso) containing two hydroxyl groups".

Here Schiff base refers to a class of compounds with a pre-defined structure and a sub-class of imines. Ligands are ions or molecules which are bound to a biomolecule to serve a biological purpose.

L-lyso is also said to display excellent two-photon properties. Two-photon excitation microscopy is a technique where, a subject is first marked with a fluorescent dye, and then illuminated with a source of light, generally in the near infra-red wavelength.

How it works?

The dye absorbs two photons of the incident IR light and begins to fluoresce, acting as a marker for the subject. The light also penetrates deep in to the subject, providing clear an image with deeper penetration.

According to the scientists "L-lyso exhibits excellent two-photon properties with tracking of lysosomes in live cells as well as in 3D tumor spheroids". L-lyso also remains active for 3 days, enabling tracking for longer periods.

According to scientists, L-lyso has an edge over commercially available expensive LysoTracker probes and also over other reported probes in terms of its long-term imaging, water solubility and facile synthesis.

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