

## Fruit flies could be used to test “smart materials” as medicinal drug carriers

Studies carried out by Dr. Gaurav Das and his team at the National Centre for Cell Science (NCCS), Pune, have shown that the fly gut, which has distinct acidic or alkaline zones like the human gut, can serve as a good model to test and tweak acid/alkali-sensitive smart carrier materials as well. These researchers made porous silica nanoparticles loaded with a red dye for visualisation, and coated the particles with acid-sensitive polymers. These particles were fed to flies and the dynamics of these particles in the fly gut were then observed under a microscope. The nanoparticles were found to release their cargo dye specifically at a highly acidic zone in the fly midgut, as expected.

The research group tested two different acid-sensitive polymer coatings, and both yielded similar results. Results indicate that fruit flies could serve as highly versatile, inexpensive and complete genetic model organisms to directly test the efficacy of various carrier materials with specific acid/alkali-sensitive modifications. The fly gut could, in fact, serve the purpose better than just cells grown in the laboratory, since it is a complex organ with various cell types, similar to that in humans. The cells could further be used as model targets for optimising the delivery of drugs via other biocompatible materials to specific cell types. The research group at NCCS aims to further explore strategies for such cell-directed drug delivery.

“Smart” materials that respond to specific stimuli like change in acidity or alkalinity, temperature, or other physiological signals, can be used to encapsulate drug molecules to enable release only at the disease site. Normally, such smart drug delivery approaches are tested in animal cells grown in the laboratory or in small laboratory animals like rodents. However, another commonly used laboratory model organism, the fruit fly *Drosophila*, remains underutilized for optimising smart drug carrier materials. These flies are versatile genetic model organisms that have led the way for many critical areas of biomedical research. They have helped us gain a better understanding of how animals develop and function, and how diseases occur, including learning about the genes and proteins responsible. The findings are published in journal, RSC Advances.

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