DNA cages 'can survive inside living cells'

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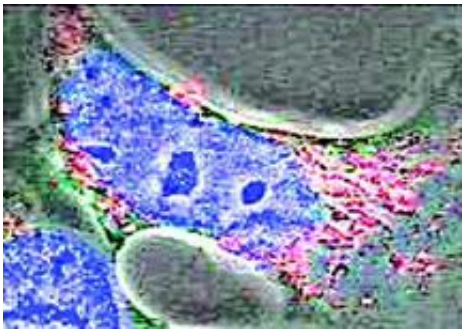

Human embryonic kidney cells were used to test the DNA cages

(PhysOrg.com) -- Scientists at Oxford University have shown for the first time that molecular cages made from DNA can enter and survive inside living cells.

The work, a collaboration between physicists and molecular neuroscientists at Oxford, shows that artificial DNA cages that could be used to carry cargoes of drugs can enter living cells, potentially leading to new methods of drug delivery.

A report of the research is published online in the journal *ACS Nano.*

The cages developed by the researchers are made from four short strands of synthetic DNA. These strands are designed so that they naturally assemble themselves into a tetrahedron (a pyramid with four triangular faces) around 7 nanometres tall.

The Oxford researchers have previously shown that it is possible to assemble these cages around protein molecules, so that the protein is trapped inside, and that DNA cages can be programmed to open when they encounter specific 'trigger' molecules that are found inside cells.

In the new experiment they introduced fluorescently-labelled DNA tetrahedrons into human kidney cells grown in the laboratory. They then examined the cells under the microscope and found that the cages remained substantially intact, surviving attack by cellular enzymes, for at least 48 hours. This is a crucial advance: to be useful as a drug delivery vehicle, a DNA cage must enter cells efficiently and survive until it can release its cargo where and when it is needed.

'At the moment we are only testing our ability to create and control cages made of DNA,' said Professor Andrew Turberfield of Oxford University's Department of Physics, who led the work. 'However, these results are an important first step towards proving that DNA cages could be used to deliver cargoes, such as drugs, inside living cells.'

Professor Turberfield said: 'Previous studies have shown that the size of particles is an important factor in whether or not they can easily enter cells, with particles with a radius less than 50 nanometres proving much more successful at gaining entry than larger particles. At 7 nanometres across our DNA tetrahedrons are compact enough to easily enter cells but still large enough to carry a useful cargo. More work is now needed to understand exactly how these DNA cages manage to find their way inside living cells.'

Provided by Oxford University