

Pune researchers develop a new drug delivery system

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Researchers at the Indian Institute of Science Education and Research (IISER) Pune have successfully developed a novel cancer drug delivery system using graphene oxide nanoparticles. The researchers found that when a FDA-approved anticancer drug cisplatin was added, the graphene oxide sheets self-assembled into spherical nanoparticles enclosing the drug within.

The nanoparticles of 90-120 nanometre size containing cisplatin were taken up by cervical cancer cells leading to programmed cell death. Two DNA-damaging anticancer drugs, proflavine and doxorubicin that bind to graphene oxide through non-covalent bond were also used. The drugs bind to the DNA strands and break the strands so cell division does not happen and programmed cell death ensues.

The cisplatin nanoparticles containing either proflavine or doxorubicin were found to get into the lysosomes of a cell in a time-dependent manner. Once inside the lysosomes, the drugs were released in a slow and sustained manner and killed the cancer cells predominantly through programmed cell death.

Interestingly, once cisplatin is released inside the cell, the spherical nanoparticle loses its shape and once again regains its original sheet-like structure. The researchers are planning to undertake more studies using other cancer cells and eventually use animal models. It is anticipated that the graphene oxide-based nanopatform will be useful for next-generation cancer therapy.