

Nanoscale 'Egg' Kills Tumor Cells with Platinum

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Researchers at the Hong Kong University of Science and Technology have developed a nanoscale “egg” that could safely deliver platinum, a known anticancer agent, to tumor cells. Tests with this nanoscale egg, which has a hard cobalt shell surrounding a “yolk” of platinum and iron, show that it is seven times more toxic than the anticancer agent cisplatin to cancer cells.

Reporting its work in the *Journal of the American Chemical Society*, a team of investigators led by Bing Xu, Ph.D., describes the methods used to make these novel nanoparticles. The researchers start by synthesizing cobalt sulfide nanoparticles, which naturally form a hollow shell structure, in the presence of nanoparticles made of iron and platinum.

Transmission electron microscopy (TEM) and x-ray spectroscopy studies of these nanoparticles indicate that the resulting structures have a porous crystalline shell of cobalt sulfide surrounding nanocrystals of iron/platinum. The pores in the outer shell are large enough for water to access the interior of the nanoparticle.

When added to cultured human tumor cells, these nanoparticles had an immediate effect on cell viability. After 72 hours, all tumor cells exposed to the nanoparticles died. Again using TEM, the investigators showed that the cobalt sulfide shell remained intact after the nanoparticles were taken up by tumor cells. By themselves, hollow cobalt sulfide nanoparticles – the egg without the yolk – were not toxic to cultured human cancer cells.

The researchers hypothesize that cells take up the nanoparticles via a process known as endocytosis. As a result of endocytosis, the nanoparticles would end up in small intracellular compartments that are acidic. Under those conditions, the iron/platinum nanocrystals would dissolve, allowing the nanoscale eggs to release platinum into the cancer cells.

This work is detailed in a paper titled, “FePt@CoS₂ yolk-shell nanocrystals as a potent agent to kill HeLa cells.” This paper was published online in advance of print publication. An abstract of this paper is available at the [journal's website](#).

Source: National Cancer Institute

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