Gold Nanoparticles Delivery Platinum Warheads to Tumors

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(PhysOrg.com) -- Cisplatin is one of the most powerful and effective drugs for treating a wide variety of cancers, but serious side effects ultimately limit the drug's use and effectiveness. Now, however, researchers have developed a nanoparticulate formulation of cisplatin that may be able to eliminate or reduce platinum-associated toxicity while boosting cisplatin's tumor-killing activity.

Reporting its work in the Journal of the American Chemical Society, a team of investigators led by Stephen Lippard, of the Massachusetts Institute of Technology, and Chad Mirkin, of Northwestern University and principal investigator of the Northwestern Center for Cancer Nanotechnology Excellence, describes its development and characterization of gold nanoparticles as a delivery vehicle for a non-toxic form of platinum known as platinum(IV).

The gold nanoparticles are coated with short pieces of nucleic acid to which the investigators chemically attach platinum(IV). This construct can circulate safely through the blood stream and readily enter tumor cells, which take up the nanoparticles and their payload by engulfing them in tiny pockets of cell membrane called endosomes. The acidic environment inside the endosome is such that platinum(IV) undergoes a chemical reaction that converts it into platinum(II), the highly toxic form of this element.

When administered to four different kinds of tumor cells, the nanoparticle-platinum(IV) construct was more toxic than an equivalent

dose of cisplatin. But more importantly, the platinum(IV) compound itself, unattached to a nucleic acid-decorated gold nanoparticle, was unable to kill any of the treated cancer cells. The investigators then showed that the nanoparticle-delivered platinum(IV) compound killed the treated tumor cells in the same way that cisplatin does.

More information: "Polyvalent Oligonucleotide Gold Nanoparticle Conjugates as Delivery Vehicles for Platinum(IV) Warheads." An abstract of this paper is available at the journal's Web site.

Provided by National Cancer Institute (news : web)

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