Radioactive Gold Nanoparticles Destroy Prostate Tumors, Leaving Healthy Tissue Untouched

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(PhysOrg.com) -- One of the promises of nanoparticles as delivery agents for cancer therapeutics is that they will attack tumors while sparing healthy tissue from the damage normally associated with today's anticancer therapies. That promise is closer to realization thanks to the results of a study in which tumor-bearing mice were treated with a single dose of radioactive gold nanoparticles.

The results of this study, which was led by Kattesh Katti and Raghuraman Kannan, both of the University of Missouri at Colombia, were published in the journal Nanomedicine. Dr. Katti is the principle investigator of the Hybrid Nanoparticles in Imaging and Therapy of Prostate Cancer project, a National Cancer Institute Cancer Nanotechnology Platform Partnership.

For this study, Dr. Katti's research group prepared their gold nanoparticles using the radioactive isotope gold-198. They then coated the resulting nanoparticles with gum Arabic glycoprotein to create biocompatible nanoparticles capable of escaping the blood stream and accumulating in tumors. Studies in mice showed that these nanoparticles, when injected into the blood stream, only accumulate in implanted human prostate tumors, with minimal or no leakage of radioactivity into other organs.

Tumor-bearing animals injected with a single dose of the nanoparticles

were followed for three weeks. At the end of that time, tumor volume in the treated animals was 82% smaller compared to tumors in animals that received non-radioactive nanoparticles coated with gum Arabic glycoprotein. In addition, the treated animals did not lose weight during the three-week period, while the untreated animals experienced significant weight loss. The researchers also examined various blood cells for signs of radiation damage and found none, an encouraging sign that these nanoparticles are only toxic to tumors.

This work, which is detailed in a paper titled, "Radioactive gold nanoparticles in cancer therapy: therapeutic efficacy studies of GA-198AuNP nanoconstruct in prostate tumor-bearing mice," was supported in part by the NCI Alliance for Nanotechnology in Cancer, a comprehensive initiative designed to accelerate the application of nanotechnology to the prevention, diagnosis, and treatment of cancer. An abstract of this paper is available at the journal's Web site.

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