

Using Gold Nanoparticles to Hit Cancer Where It Hurts

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(PhysOrg.com) -- Taking gold nanoparticles to the cancer cell and hitting them with a laser has been shown to be a promising tool in fighting cancer, but what about cancers that occur in places where a laser light can't reach? Scientists at the Georgia Institute of Technology have shown that by directing gold nanoparticles into the nuclei of cancer cells, they can not only prevent them from multiplying, but can kill them where they lurk. The research appeared as a communication in the February 10 edition of the *Journal of the American Chemical Society*.

“We’ve developed a system that can kill cancer cells by shining light on [gold nanoparticles](#), but what if the cancer is in a place where we can’t shine light on it? To fix that problem, we’ve decorated the gold with a chemical that brings it inside the nucleus of the cancer cell and stops it from dividing,” said Mostafa El-Sayed, Regents professor and director of the Laser Dynamics Laboratory at Georgia Tech.

Once the cell stops dividing, apoptosis sets in and kills the cell.

“In cancer, the nucleus divides much faster than that of a normal cell, so if we can stop it from dividing, we can stop the cancer,” said El-Sayed.

The team tested their hypothesis on cells harvested from cancer of the ear, nose and throat. They decorated the cells with an arginine-glycine-aspartic acid peptide (RGD) to bring the gold nano-particles into the cytoplasm of a cancer cell but not the healthy cells and a nuclear localization signal peptide (NLS) to bring it into the nucleus.

In previous work they showed that just bringing the gold into the [cytoplasm](#) does nothing. In this current study, they found that implanting the gold into the nucleus effectively kills the cell.

“The cell starts dividing and then it collapses,” said El-Sayed. “Once you have a cell with two nuclei, it dies.” The gold works by interfering with the cells’ DNA, he added. How that works exactly is the subject of a follow-up study.

“Previously, we’ve shown that we can bring gold nanoparticles into cancer cells and by shining a light on them, can kill the cells. Now we’ve shown that if we direct those [gold](#) nanoparticles into the nucleus, we can kill the [cancer cells](#) that are in spots we can’t hit with the light,” said El-Sayed.

Next the team will test how the treatment works in vivo.

Provided by Georgia Institute of Technology

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