

Gold nanorods hitch ride on immune cells that target breast tumors

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One of the challenges in treating cancer, whether using nanotechnology or not, is that tumors can often be inaccessible to the therapies designed to kill them. Mostafa El-Sayed, of the Georgia Institute of Technology, and his colleagues are attempting to overcome this obstacle by designing drug-loaded gold nanorods that attract the attention of tumor-associated immune cells known as macrophages. The researchers believe that these macrophages will then deliver the nanorods to the tumors, crossing the normally impermeable blood-brain barrier to do so.

Dr. El-Sayed, who is a co-principal investigator of a [Cancer Nanotechnology](#) Platform Partnership held jointly by Georgia Tech and Emory University, and his colleagues have synthesized gold nanorods that target [tumor-associated macrophages](#). The investigators have published the initial results of their work in the journal *Small*.

To attract the attention of tumor-associated macrophages, Dr. El-Sayed's team coated them with an antibiotic belonging to a family of molecules called macrolides. These broad-spectrum antibiotics are known to accumulate at very high concentrations inside macrophages. Therefore, when macrolide-coated nanorods were added to macrophages growing in culture along with breast tumor cells, the macrophages quickly took up the nanorods. When the investigators then irradiated the nanorod-loaded macrophages with light from a near-infrared laser, they found that the co-cultured breast tumor cells, which were not directly exposed to the nanorods, were killed. The researchers hypothesize that the light-activated gold nanorods enhanced the innate tumor-killing activity of the

macrophages.

The investigators note that “the ability of tumor-associated macrophages to migrate freely in circulation, bypass the blood-brain barrier, and preferentially accumulate and infiltrate into solid tumors make macrolide-functionalized gold nanoparticles promising candidates for targeted cancer drug delivery to breast and brain tumors.” They also hypothesize that this type of therapy could operate synergistically with conventional chemotherapy.

This work is detailed in a paper titled, “Small molecule-gold nanorod conjugates selectively target and induce macrophage cytotoxicity towards breast cancer cells.” An abstract of this paper is available at the journal's website.

More information: Abstract: [DOI: 10.1002/sml.201200333](https://doi.org/10.1002/sml.201200333)

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