

Polymeric nanoparticles attack head and neck cancer

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Head and neck cancer, the sixth most common cancer in the world, has remained one of the more difficult malignancies to treat, and even when treatment is successful, patients suffer severely from the available therapies. Now, researchers at the University of Michigan have developed a tumor-targeted nanoparticle that delivers high doses of anticancer agents directly to head and neck tumors. Tests in animals have shown that this novel formulation increases survival while triggering fewer side effects.

Reporting its work in the *Journal of Oral and Maxillofacial Surgery*, a team led by James R. Baker, Jr., created a spherical polymeric nanoparticle known as a dendrimer to deliver the drug methotrexate to head and neck tumors. To target the nanoparticle to those tumors, the investigators decorated the nanoparticle's surface with folic acid. Many tumors, but few healthy cells, produce excessive amounts of a folic acid receptor on their surfaces. Dr. Baker and his colleagues pioneered the use of dendrimers as targeted drug-delivery vehicles with funding from the National Cancer Institute's Alliance for Nanotechnology in Cancer.

The researchers tested their dendrimer-based formulation in three different groups of mice. The control group had tumors grown from human head and neck tumors that did not produce the folic acid receptor. The two experimental groups had tumors grown from human head and neck tumors that expressed moderate and high levels of the folic acid receptor. Mice receiving the equivalent of three times the normally lethal dose of methotrexate, delivered on the dendrimer

nanoparticle experienced none of the weight loss normally associated with methotrexate therapy. More importantly, dendrimer-delivered therapy produced marked gains in therapeutic response even in the mice whose tumors produced only moderate levels of folic acid receptor.

This work, which is detailed in a paper titled, "Targeted Dendrimer Chemotherapy in an Animal Model for Head and Neck [Squamous Cell Carcinoma](#)," 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.

More information: [doi:10.1016/j.joms.2010.12.041](https://doi.org/10.1016/j.joms.2010.12.041)

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