Nanotherapy: Treating deadly brain tumors by delivering big radiation with tiny tools

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For the past 40 years, radiation has been the most effective method for treating deadly brain tumors called glioblastomas. But, although the targeting technology has been refined, beams of radiation still must pass through healthy brain tissue to reach the tumor, and patients can only tolerate small amounts before developing serious side effects.

A group of researchers at The University of Texas Health Science Center at San Antonio have developed a way to deliver nanoparticle radiation directly to the brain tumor and keep it there. The method doses the tumor itself with much higher levels of radiation — 20 to 30 times the current dose of radiation therapy to patients — but spares a much greater area of brain tissue.

The study, published today in the journal *Neuro-Oncology*, has been successful enough in laboratory experiments that they're preparing to start a clinical trial at the Cancer Therapy & Research Center, said Andrew Brenner, M.D., Ph.D., the study's corresponding author and a neuro-oncologist at the CTRC who will lead the clinical trial.

"We saw that we could deliver much higher doses of radiation in animal models," Dr. Brenner said. "We were able to give it safely and we were able to completely eradicate tumors."

The radiation comes in the form of an isotope called rhenium-186, which has a short half-life. Once placed inside the tumor, the rhenium emits radiation that only extends out a few millimeters.

But simply putting the rhenium into a brain tumor would not work well without a way to keep it there — the tiny particles would be picked up by the bloodstream and carried away. That problem was solved by a team led by nuclear medicine physician William T. Phillips, M.D., and biochemist Beth A. Goins, Ph.D., in the Department of Radiology; and Ande Bao, Ph.D., a medical physicist and pharmaceutical chemist in the Department of Otolaryngology, all of the School of Medicine at the Health Science Center. They encapsulated the rhenium in miniscule fat molecules, or liposomes, about 100 nanometers across.

"The technology is unique," Dr. Brenner said. "Only we can load the liposomes to these very high radioactivity levels."

The doctors hope to launch the clinical trial by summer.

Provided by University of Texas Health Science Center at San Antonio