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SapC-DOPS technology may help with imaging brain tumors, research shows

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Just because you can't see something doesn't mean it's not there. Brain tumors are an extremely serious example of this and are not only difficult to treat—both adult and pediatric patients have a five-year survival rate of only 30 percent—but also have even been difficult to image, which could provide important information for deciding next steps in the treatment process.

However, Cincinnati Cancer Center and University of Cincinnati Cancer Institute research studies published in an April online issue of the *Journal of Magnetic Resonance Imaging* and a May issue of the *Journal of Visualized Experiments* (JoVE), an online peer-reviewed scientific journal that publishes experimental methods in video format, reveal possibly new ways to image glioblastoma multiforme tumors—a form of brain tumor—using the SapC-DOPS technology.

A lysosomal protein saposin C (SapC), and a phospholipid, known as dioleoylphosphatidylserine (DOPS), can be combined and assembled into tiny cavities, or nanovesicles, to target and kill many forms of cancer cells.

Lysosomes are membrane-enclosed organelles that contain enzymes capable of breaking down all types of biological components; phospholipids are major components of all cell membranes and form lipid bilayers—or cell membranes.

Xiaoyang Qi, PhD, member of the CCC, associate professor in the

division of hematology oncology at the University of Cincinnati, a member of the UC Cancer and Neuroscience Institutes and the Brain Tumor Center, says his lab and collaborators have previously found that the combination of two natural cellular components, called SapC-DOPS, caused cell death in cancer cell types, including brain, lung, skin, prostate, blood and breast cancer, while sparing normal cells and tissues.

"We used this knowledge to gain assistance from our collaborators Kati LaSance, Vontz Core Imaging Lab (VCIL) director, and Patrick Winter, PhD, in the Imaging Research Center (IRC) at Cincinnati Children's Hospital Medical Center. We used SapC-DOPS as a transport vesicle to deliver bio-fluorescence agents and gadolinium-labeled contrast agents directly to brain tumors which provided visualization using optical imaging and MRI," Qi says.

"There are two things lacking when it comes to brain tumors: getting a good picture of them and treating them effectively," says LaSance. "With this discovery, there are possibilities to improve both. With good visualization of the tumor, physicians might one day be able to better determine which form of treatment—chemotherapy, radiation or surgery—would be best for a patient and can image a tumor at its smallest stages with hopes of intervening much earlier."

Qi says this is preclinical research, as the studies were done using animal models that were injected with the SapC-DOPS vesicle assembled with illuminating agents, but is translational in nature and could be tested soon in human populations.

"While optical imaging is not applicable to a patient population, both MRI and PET imaging are," he says. "The bio-fluorescent molecule used in the JoVE study can be substituted for a PET molecule and fortunately, PET imaging is widely used by doctors and hospitals in current cancer patients.

"This research has the potential to make a large impact in treatment of brain tumors, and most importantly, it would not have been impossible without support and collaboration from the VCIL and the IRC."

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