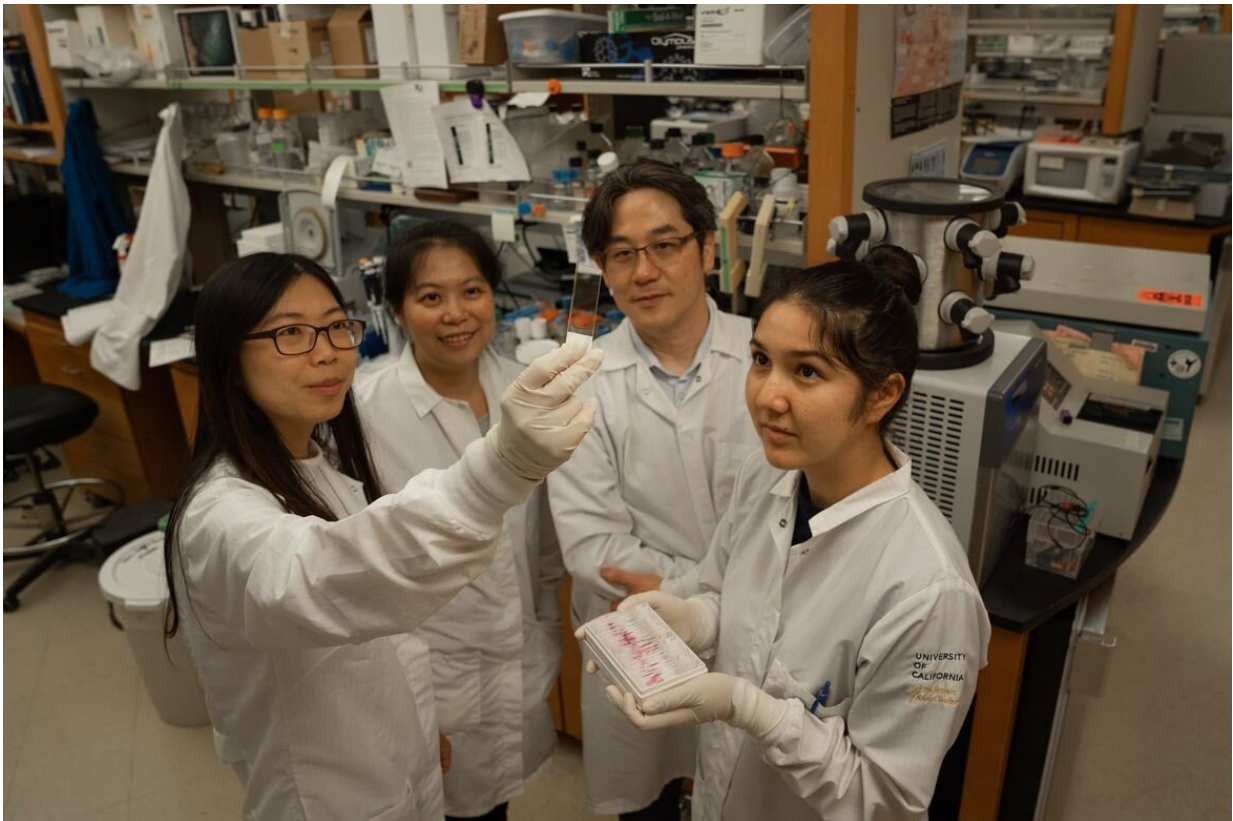


Nanocapsule reaches cancer that has spread to central nervous system in mice

August 14 2019, by Denise Heady



Jing Wen, a scientist at the UCLA AIDS Institute; Di Wu, a UCLA postdoctoral scholar; Professor Maskazu Kamata; and staff researcher Emiko Kranz. Credit: Milo Mitchell/UCLA Jonsson Comprehensive Cancer Center

Cancer that has spread to the central nervous system is notoriously difficult to treat. Now, UCLA researchers have developed a drug

delivery system that breaks through the blood-brain barrier in order to reach and treat cancer that has spread to the central nervous system.

In research conducted in mice, a single dose of cancer drugs in a nanoscale capsule developed by the scientists eliminated all B-cell lymphoma that had metastasized to the animals' [central nervous system](#).

About 15% to 40% of all cancers spread to the [nervous system](#), but there are few treatment options and they only work in a small number of patients. One reason treatments are ineffective is that the blood-brain barrier, a natural defense system that prevents harmful agents from entering the brain, blocks many drugs, preventing them from reaching cancer that has spread to the central nervous system.

To create a vessel that could carry cancer drugs to the central nervous system, the scientists produced a capsule measuring about one nanometer, or one billionth of a meter, across. (For reference, a sheet of paper is about 100,000 nanometers thick.) The capsule is coated with a substance called 2-methacryloyloxyethyl phosphorylcholine, which they hypothesized would be unlikely to be blocked by the [blood-brain barrier](#), which would enable the capsule to release antibodies when it came into close proximity with [cancerous cells](#).

The researchers loaded nanocapsules with the cancer-fighting drug rituximab and then administered them to mice with a human B-cell lymphoma that had metastasized to the animals' central nervous system. The scientists tracked how the tumors grew or shrank over a period of four months.

Pending additional research, including testing in human subjects, the UCLA-engineered capsule could be used to carry drugs that have already been approved by the FDA to treat cancer that has spread to the central nervous system.

The approach could be useful not only for cancers that metastasize to the central nervous system—such as breast cancer, small cell lung cancer and melanoma—but also for primary brain tumors or other brain diseases.

The study is published online in *Nature Biomedical Engineering*.

More information: Jing Wen et al. Sustained delivery and molecular targeting of a therapeutic monoclonal antibody to metastases in the central nervous system of mice, *Nature Biomedical Engineering* (2019). DOI: [10.1038/s41551-019-0434-z](https://doi.org/10.1038/s41551-019-0434-z)

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