

New drug targets brain-tumour cells

Nano drug crosses blood-brain tumour barrier, targets brain tumour cells and blood vessels.



Balveen Kaur, PhD.

- The blood-brain barrier protects the brain from poisons but also prevents drugs from reaching brain tumours; innovative new treatments are needed.
- This laboratory study shows that a nanotechnology drug called SapC-DOPS crosses that barrier and targets brain-tumour cells and retards growth of tumour blood vessels.
- The findings also show how the agent targets tumour cells and recommend its further development as a novel treatment for glioblastoma.

An experimental drug in early development for aggressive brain tumours can cross the blood-brain tumour barrier and kill tumour cells and block the growth of tumour blood vessels, according to a recent study led by researchers at the Ohio State University Comprehensive Cancer Centre - Arthur G. James Cancer Hospital and Richard J. Solove Research Institute (OSUCCC - James).

The laboratory and animal study also shows how the agent, called SapC-DOPS, targets tumour cells and blood vessels. The findings support further development of the drug as a novel treatment for brain tumours.

[Glioblastoma multiforme](#) is the most common and aggressive form of brain cancer, with a median survival of about 15 months. A major obstacle to improving treatment for the 3,470 cases of the disease expected in the United States this year is the [blood-brain barrier](#), the name given to the tight fit of cells that make up the blood vessels in the brain. That barrier protects the brain from toxins in the blood but also keeps drugs in the bloodstream from reaching brain tumours.

"Few drugs have the capacity to cross the tumour blood-brain barrier and specifically target tumour cells," says principal investigator Balveen Kaur, PhD, associate professor of neurological surgery and chief of the Dardinger Laboratory of Neurosciences at the OSUCCC - James. "Our preclinical study indicates that SapC-DOPS does both and inhibits the growth of new tumour blood vessels, suggesting that this agent could one day be an important treatment for glioblastoma and other solid tumours."

The [findings](#) were published recently in the journal Molecular Therapy.

SapC-DOPS (saposin-C dioleoylphosphatidylserine), is a nanovesicle drug that has shown activity in glioblastoma, pancreatic cancer and other solid tumours in preclinical studies. The nanovesicles fuse with tumour cells, causing them to self-destruct by apoptosis.

Key findings of the study, which used two brain-tumour models, include:

- SapC-DOPS crosses the blood-brain tumour barrier and selectively targets brain tumours;
- The drug binds with exposed patches of the phospholipid phosphatidylserine (PtdSer) the surface of tumour cells;
- Blocking PtdSer on cells inhibited tumour targeting;
- SapC-DOPS strongly inhibited brain-tumour blood-vessel growth in cell and animal models, probably because these cells also have high levels of exposed PtdSer.
- Hypoxic cells were sensitised to killing by SapC-DOPS.

"Based on our findings, we speculate that SapC-DOPS could have a synergistic effect when combined with chemotherapy or radiation therapy, both of which are known to increase the levels of exposed PtdSer on cancer cells," Kaur says.

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Other researchers involved in this study were Jeffrey Wojton, Haritha Mathsaraja, Walter H. Meisen, Nicholas Denton, Chang-Hyuk Kwon and Michael C. Ostrowski of The Ohio State University; and Zhengtao Chu, Lionel M.L. Chow, Mary Palascak, Robert Franco, Tristan Bourdeau, Sherry Thornton and Xiaoyang Qi of the University of Cincinnati.

- See more at: <http://cancer.osu.edu/mediaroom/releases/Pages/Nano-Drug-Crosses-Blood-Brain-Tumor-Barrier-Targets-Brain-Tumor-Cells-and-Blood-Vessels.aspx#sthash.DakFhCtX.dpuf>

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