

Researchers describe new type of cancer therapy

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A study conducted at Nationwide Children's Hospital has found that a new chemotherapy is effective against both pediatric and adult cancers, and that it allows other chemotherapies to more readily reach their targets. The study published online Monday, July 25, in the journal *Pharmaceutical Research* describes a novel class of antitumor amphiphilic amines (RCn) based on a tricyclic amine hydrophilic head and a hydrophobic linear alkyl tail of variable length.

The researchers evaluated RCn for cytotoxicity and mechanism of cell death in several cancer [cell lines](#), antitumor efficacy in mouse tumor models and ability to encapsulate chemotherapy drugs. The results indicate that these amines constitute a promising new therapy for both pediatric and adult cancers.

"We tested RCn's tumor killing efficacy in cell lines of numerous cancers, including sarcomas, lymphoma and neuroblastoma," said Timothy Cripe, MD, PhD, principal investigator in the Center for Childhood Cancer and Blood Disease in The Research Institute at Nationwide Children's and senior author on the paper. "We observed anticancer activity of the RCn amines in all the cancer cell lines analyzed."

Researchers found that RCn, and RC16 in particular, is 10 times more effective in harming tumor cells than regular cells. That means the low dose needed to kill cancer will have minimal effect on normal cells.

"This is particularly important for proving the safety of a potential therapy," explained Dr. Cripe, who is also chief of the Division of Hematology, Oncology and Blood and Marrow Transplant at Nationwide Children's.

The drug was effective in shrinking human tumors implanted into mice and in a metastatic model of murine neuroblastoma when administered orally or

intravenously.

Because of the amphiphilic molecular structure of RC16, it self-assembled into micelles in water. This chemical structure allowed complexation of cancer drugs doxorubicin, etoposide and paclitaxel. These micelles significantly improved the in vitro antitumor activity of these drugs by enhancing their solubility in water.

"The antitumor activity of lipophilic amines was interesting because of its action on the mitochondria and lysosomes of cells. Moreover, their amphiphilic character improves their bioavailability," said Isabella Orienti, PhD, professor of Pharmacy and Biotechnology at the University of Bologna, and lead scientist in the study. "We correctly hypothesized these amphiphilic amines would have high [antitumor activity](#) and high bioavailability."

"We are in the process of determining our next steps with testing this new drug," said Dr. Cripe, a professor of Pediatrics at The Ohio State University College of Medicine. "This is a promising new therapy for adult and pediatric cancers, and we look forward to further testing its merits."

More information: Isabella Orienti et al, Preparation and Evaluation of a Novel Class of Amphiphilic Amines as Antitumor Agents and Nanocarriers for Bioactive Molecules, *Pharmaceutical Research* (2016). [DOI: 10.1007/s11095-016-1999-9](#)

Provided by Nationwide Children's Hospital

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