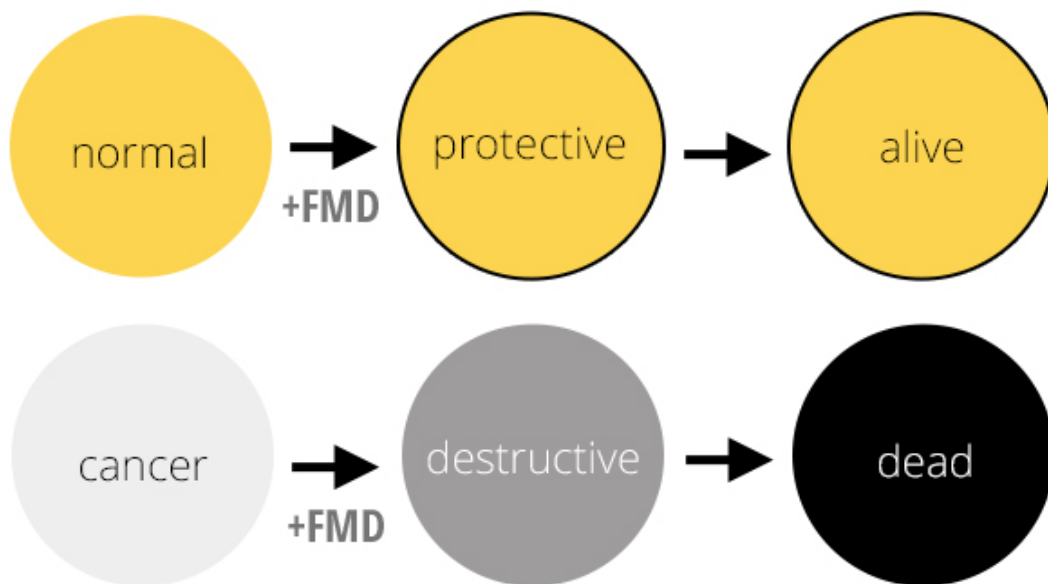


Team discovers molecules that could kill cancer while protecting healthy cells

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FEMTOMEDICINE MAY ACCELERATE DRUG DISCOVERY FOR EFFECTIVE TREATMENT OF CANCER



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Researchers have identified new molecules that kill cancer cells while protecting healthy cells and that could be used to treat a variety of different cancers. The research shines a light on what happens to cells at the moment they become cancerous.

The research and pre-clinical trial results were published this month as an open-access article in *EBioMedicine*, a new joint research-clinical journal from the editors of *Cell* and *The Lancet*. Credit: University of Waterloo

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Professor Qing-Bin Lu, from the University of Waterloo's Faculty of Science, initiated a novel molecular-mechanism-based program to discover a new class of non-platinum-based-halogenated [molecules](#) that kill cancer cells, yet prevent healthy cells from being damaged.

The most effective cancer drugs today may kill cancer cells, but they also kill healthy cells, causing severe side effects for patients in the process.

Femtosecond time-resolved laser spectroscopy is a technique traditionally applied to study chemical reactions as they occur on a molecular level. The laser takes a series of rapid "snapshots" of molecules as they interact and change structure over time. The technique is part of a potential new field of science developed by Professor Lu

called femtomedicine (FMD), which integrates the ultrafast laser with molecular biology and cell biology.

Professor Lu has applied the tool to understand the molecular mechanisms that cause cancer at the very moment when the DNA becomes damaged. He has also used it to investigate how radiation therapy and chemotherapy using chemical agents, in particular the widely used platinum chemotherapeutic Cisplatin, work in treating a variety of cancers.

"We know DNA damage is the initial step," said Professor Lu. "With the novel femtomedicine approach we can go back to the very beginning to find out what causes DNA damage in the first place, then mutation, and then cancer."

By understanding more about the fundamental mechanisms of the diseases, Professor Lu pre-selected molecules most likely to be effective as anti-cancer agents. In this case, he discovered a new family of non-platinum-based molecules similar in structure to Cisplatin but containing no toxic platinum.

Pre-clinical studies with various cultured human cells as well as on rodents show that these new molecules are effective against cervical, breast, ovarian, and lung cancers.

Cisplatin, discovered more than 40 years ago, is an important, widely used platinum-based anti-cancer agent. Unfortunately, the inclusion of platinum in the molecule causes serious side effects like neurotoxicity, kidney damage, hearing loss, nausea and vomiting.

"It is extremely rare to discover anti-cancer agents that can selectively kill [cancer cells](#) and protect [healthy cells](#), as well as being effective in treating many different types of cancer and having a novel molecular

mechanism of action. These candidate drugs should have a high potential to pass through clinical trials and could ultimately save lives", said Professor Lu.

Professor Lu has already applied for patents on the new family of non-platinum-based-halogenated molecules that he has discovered and hopes to start clinical trials soon.

More information: "In Vitro and In Vivo Studies of Non-Platinum-Based Halogenated Compounds as Potent Antitumor Agents for Natural Targeted Chemotherapy of Cancers" *EBioMedicine*

[dx.doi.org/10.1016/j.ebiom.2015.04.011](https://doi.org/10.1016/j.ebiom.2015.04.011)

Provided by University of Waterloo

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