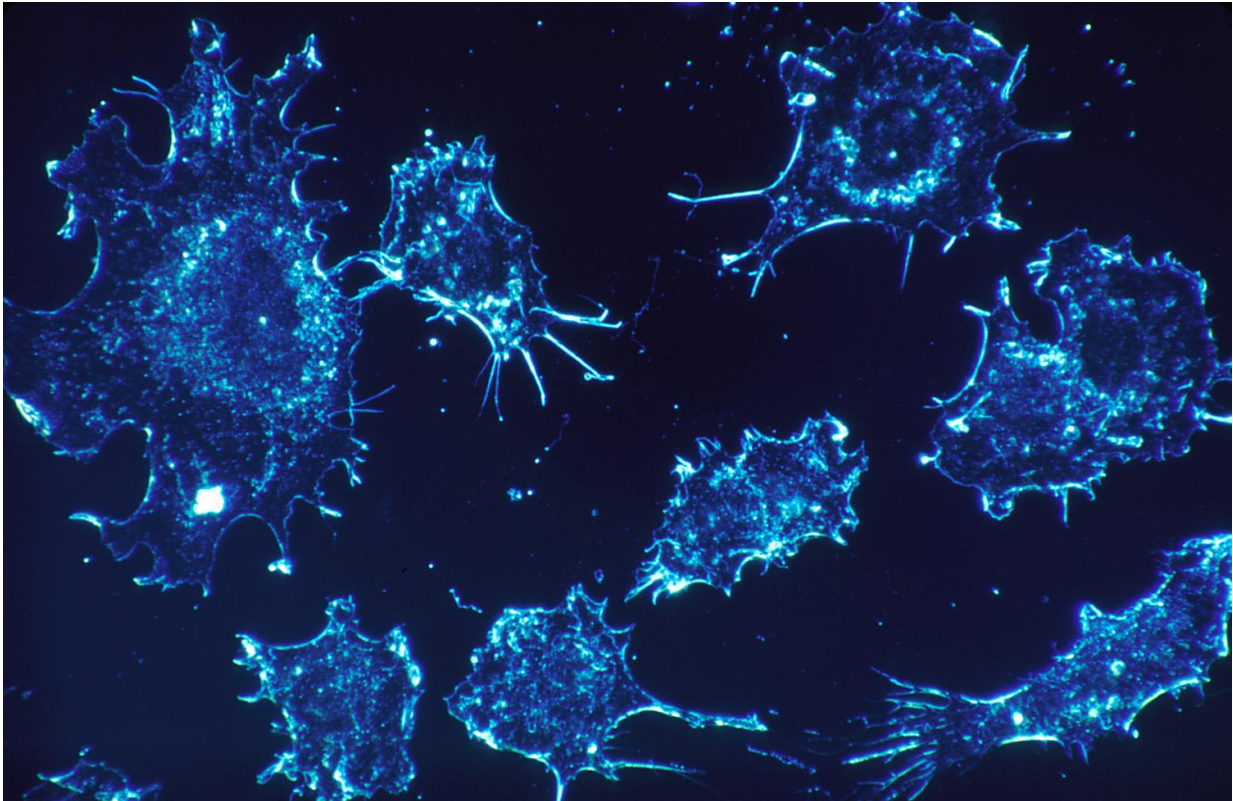


# Math can predict how cancer cells evolve

January 16 2018

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Cancer cells. Credit: Dr. Cecil Fox, National Cancer Institute

Applied mathematics can be a powerful tool in helping predict the genesis and evolution of different types of cancers, a study from the University of Waterloo has found.

The study used a form of mathematical analysis called [evolutionary](#)

[dynamics](#) to look at how malignant mutations evolve in both stem and non-stem cells in colorectal and intestinal cancers.

"Using applied math to map out the evolution of [cancer](#) has the potential to give oncologists a kind of road map to track the progression of a particular cancer and essentially captures crucial details of the evolution of the disease." said Mohammad Kohandel, an associate professor of applied [mathematics](#) at Waterloo. "Combining the use of applied math with previous research advances in cancer biology, can contribute to a much deeper understanding of this disease on several fronts."

The study found when cancer stem cells divide and replicate, the new cells that are created can be substantially different from the original cell. This characteristic can have a substantial impact on the progression of cancer in both positive and negative ways and the use of [math](#) can help better predict cell behaviour.

The study also concluded that this type of analysis may be useful in preventing the emergence of cancer cells, in addition to helping develop more intense and effective treatments.

"Being able to predict the [evolution](#) of cancer cells could be crucial to tailoring treatments that will target them effectively," said Siv Sivaloganathan, a professor and chair of the department of applied mathematics, at Waterloo. "It may also help avoid the drug-induced resistance known to develop in many cancers.

"In addition to predicting the behaviour of cancer [cells](#), this mathematical framework can also be applied more generally to other areas, including population genetics and ecology."

Sivaloganathan and Kohandel's study was recently published in the journal *PLoS ONE*.

Provided by University of Waterloo

Citation: Math can predict how cancer cells evolve (2018, January 16) retrieved 26 April 2024 from <https://phys.org/news/2018-01-math-cancer-cells-evolve.html>

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