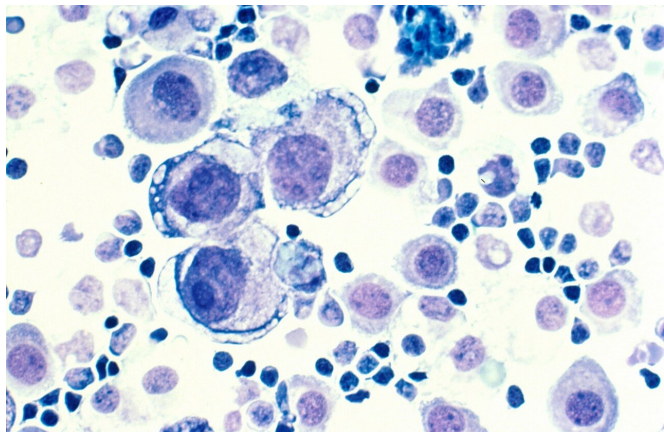


Electromagnetic fields may hinder spread of breast cancer cells

8 August 2019, by Laura Arenschield



Electromagnetic fields could block breast cancer cells from spreading throughout the body, new research has found. Source: Dr. Lance Liotta Laboratory, via Wikimedia Commons

Electromagnetic fields might help prevent some breast cancers from spreading to other parts of the body, new research has found.

The study showed that low intensity electromagnetic fields hindered the mobility of specific [breast cancer](#) cells by preventing the formation of long, thin extensions at the edge of a migrating cancer cell. The research was done on cells in a lab, and the concept hasn't yet been tested in animals or humans. The study was published today in the journal *Communications Biology*.

"A cancer cell has a tendency to do the most destructive thing imaginable," said Jonathan Song, lead author of the study. Song is an assistant professor of mechanical and aerospace engineering at The Ohio State University and a member of the molecular biology and cancer genetics program at Ohio State's Comprehensive Cancer Center.

That ability to not only proliferate locally but spread throughout the body is what makes cancer so devastating—and what prompted the research team to examine individual cancer cells to understand what makes them so harmful, Song said.

"One very destructive thing these cells do is migrate to distant areas of the body," he said. "And what we learned here is that it seems by treating them with a certain class of electric field we are altering their potential to spread somehow."

The research team, which included engineers and cancer biologists, found that cancer cells appeared to sense both the presence of the electromagnetic fields, and also the direction from which the fields were coming.

To study these effects, the researchers built an instrument called a Helmholtz coil that allowed them to apply uniform [electromagnetic energy](#) to different types of [breast](#) cancer cells. In addition, the researchers engineered an apparatus that enabled them to track continuously the trajectories of migrating breast cancer cells while viewing them under a microscope. This apparatus, Song said, "recreates and mimics what actually happens in the body in a controllable environment that we can easily test and observe." Their goal was to see if and how the cells responded to that energy, and what role electromagnetic fields might play in treating breast cancer in the future.

They found that metastatic triple-negative breast cancer cells—cancer cells that, by their nature, do not respond to hormonal therapy or to treatments that target a gene commonly expressed in breast cancer cells—were the most sensitive to electromagnetic fields.

And, in their tests, they found that certain drug therapies—and specifically one that targets a pathway for cancer called AKT—could enhance the ability of the [electromagnetic](#) fields to block the

cancer cells from spreading.

Because this research took place in a laboratory using a model the researchers designed to mimic the environment in which breast cancer cells form, the consequences of these findings for patients are still to be validated.

"But what we showed, biologically, is that these [cancer](#) cells are becoming profoundly less metastatic, which is a very important finding," Song said.

Their findings represent a significant step for researchers working to isolate the ways [cancer cells](#) couple with other [cells](#) and spread. Song said future research could expand to test [electromagnetic fields](#) and targeted molecular therapies in mice and, if those tests prove promising, to humans.

More information: Ayush Arpit Garg et al. Electromagnetic fields alter the motility of metastatic breast cancer cells, *Communications Biology* (2019). [DOI: 10.1038/s42003-019-0550-z](https://doi.org/10.1038/s42003-019-0550-z).

Provided by The Ohio State University

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