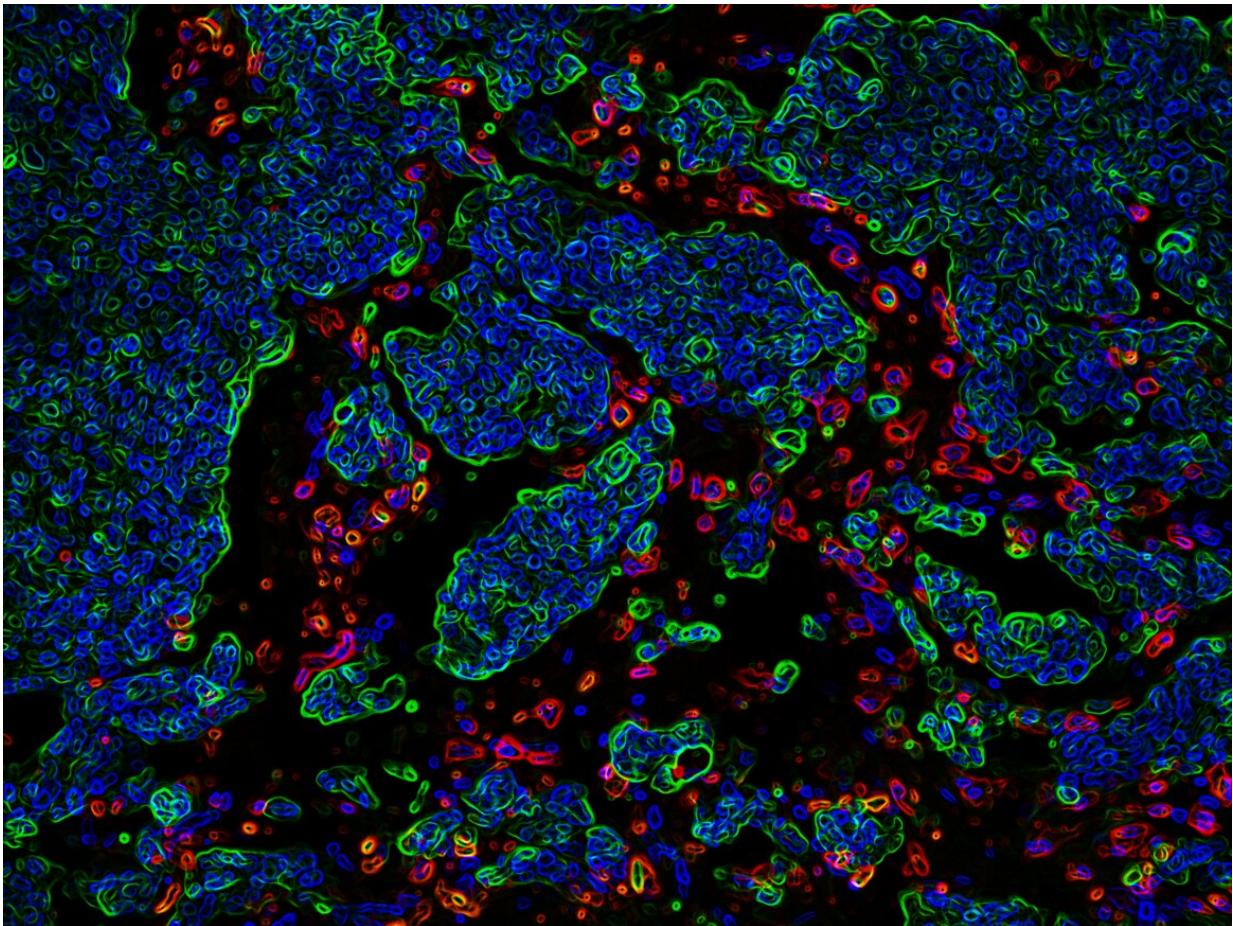


Study shows how circulating tumor cells target distant organs

October 22 2019



Development of brain metastasis is a complex process in which metastatic cells (green) overcome the protective effect of immune cells (red). Credit: University of Southern California

Most cancers kill because tumor cells spread beyond the primary site to invade other organs. Now, a USC study of brain-invading breast cancer cells circulating in the blood reveals they have a molecular signature indicating specific organ preferences.

The findings, which appear in *Cancer Discovery*, help explain how tumor cells in the blood target a particular organ and may enable the development of treatments to prevent the spread of cancers, known as metastasis.

In this study, Min Yu, assistant professor of stem cell and [regenerative medicine](#) at the Keck School of Medicine of USC, isolated [breast cancer cells](#) from the blood of breast cancer patients with metastatic tumors. Using a technique she developed previously, she expanded or grew the cells in the lab, creating a supply of material to work with.

Surface proteins predict cancer cell's destination

Analyzing the tumor cells in animal models, Yu's lab identified regulator genes and proteins within the cells that apparently directed the cancer's spread to the brain. To test this concept, human tumor cells were injected into the bloodstream of animal models. As predicted, the cells migrated to the brain. Additional analysis of cells from one patient's tumor predicted that the cells would later spread to the patient's brain—and they did.

Yu also discovered that a protein on the surface of brain-targeting tumor cells helps them to breach the [blood brain barrier](#) and lodge in brain tissue, while another protein inside the cells shield them from the brain's immune response, enabling them to grow there.

Future drugs could kill circulating tumor cells

"We can imagine someday using the information carried by circulating tumor cells to improve the detection, monitoring and treatment of the spreading cancers," Yu said. "A future therapeutic goal is to develop drugs that get rid of circulating [tumor cells](#) or target those molecular signatures to prevent the spread of cancer."

More information: Remi Klotz et al. Circulating tumor cells exhibit metastatic tropism and reveal brain metastasis drivers, *Cancer Discovery* (2019). [DOI: 10.1158/2159-8290.CD-19-0384](https://doi.org/10.1158/2159-8290.CD-19-0384)

Provided by University of Southern California

Citation: Study shows how circulating tumor cells target distant organs (2019, October 22)
retrieved 28 April 2024 from
<https://medicalxpress.com/news/2019-10-circulating-tumor-cells-distant.html>

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