

Breast cancer cells disguise themselves as neurons to cause brain tumors

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Treatment and "cure" of breast cancer doesn't ensure that the disease won't spread to the brain. Too often, sometimes years after an initial diagnosis and remission, breast cancer cells are discovered growing as new tumors within the brain. Now City of Hope researchers have found how this happens.

Breast [cancer cells](#) masquerade as [neurons](#), allowing them to hide from the immune system, cross the blood-[brain](#) barrier and begin to form ultimately-deadly brain tumors, the researchers found.

"The most dreaded location for cancer to spread is the brain," said Rahul Jandial, M.D., Ph.D., a City of Hope neurosurgeon who led the study, available online and slated for print publication in the *Proceedings of the National Academy of Science* in February. "As we have become better at keeping cancer at bay with drugs such as Herceptin, women are fortunately living longer. In this hard-fought life extension, [brain metastases](#) are being unmasked as the next battleground for extending the lives of women with [breast cancer](#)."

Jandial and other City of Hope scientists wanted to explore how [breast cancer cells](#) cross the [blood-brain barrier](#) – a separation of the blood circulating in the body from fluid in the brain – without being destroyed by the immune system.

"If, by chance, a malignant breast cancer cell swimming in the bloodstream crossed into the brain, how would it survive in a completely

new, foreign habitat?" Jandial said. Jandial and his team's hypothesis: Given that the brain is rich in many brain-specific types of chemicals and proteins, perhaps breast cancer cells exploit these resources by assuming similar properties. These cancer cells could potentially deceive the immune system by blending in with the neurons, neurotransmitters, other types of proteins, cells and chemicals.

Taking samples from brain tumors resulting from breast cancer, Jandial and his team found that the breast cancer cells were using the brain's most abundant chemical as a fuel source. This chemical, GABA, is a neurotransmitter used for communication between neurons.

When compared to cells from non-metastatic breast cancer, the metastasized cells expressed a receptor for GABA, as well as for a protein that draws the transmitter into cells. This allowed the cancer cells to essentially masquerade as neurons.

"Breast cancer cells can be cellular chameleons (or masquerade as neurons) and spread to the brain," Jandial said.

Jandial says that further study is required to better understand the mechanisms that allow the cancer cells to achieve this disguise. He hopes that ultimately, unmasking these disguised invaders will result in new therapies.

Provided by City of Hope

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