

New study helps to explain why breast cancer often spreads to the lung

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New research led by Alison Allan, PhD, a scientist at Western University and the Lawson Health Research Institute, shows why breast cancer often spreads or metastasizes to the lung.

Breast cancer is the number one diagnosed cancer and the number two cause of cancer-related deaths among women in North America. If detected early, traditional chemotherapy and radiation have a high success rate, but once the disease spreads beyond the breast, many conventional treatments fail. In particular, the lung is one of the most common and deadly sites of [breast cancer metastasis](#) and this has a significant impact on patient quality of life and survival.

Previous work by Allan's research team has shown that a specific type of breast cancer cell, the breast cancer stem cell (CSC), is responsible for metastasis in animal models, particularly to the lung. In this paper, published online in the journal *Neoplasia*, the researchers developed an innovative ex vivo (outside the living organism) model system that simulates different organ environments. They observed that breast CSCs have a particular propensity for migrating towards and growing in the lung, and they identified specific interactions between breast CSCs and lung-derived proteins that could be disrupted to reduce the metastatic behavior of breast cancer.

Allan says in metastasis, there's a theory called the seed and soil hypothesis. "Analogous to a dandelion, when it goes to seed, the seeds blow all over the place. But they don't necessarily grow everywhere they land; they grow only in congenial soil that has the right nutrients that support growth of seeds in a foreign environment. In the situation of metastasis, the tumor cells ('seeds') have some inherent factors that determine their aggressiveness and ability to metastasize, while the different organs ('soil') are believed to provide important factors that attract [tumor cells](#) to particular organs and help support their survival

and growth into [metastatic tumors](#)," explains Allan, an associate professor in the Departments of Oncology, and Anatomy and Cell Biology at Western's Schulich School of Medicine & Dentistry. "A lot of research has been done on the cancer cells because they're easy to study, but not a lot has gone into understanding the 'soil factor.' We've uncovered some specific proteins that are produced in the lung that seem to interact with cancer stem cells, making the lungs a congenial place for [cancer cells](#) to grow."

The research was funded by the Canadian Breast Cancer Foundation- Ontario Region. Looking forward, the translation of this knowledge to the clinic could have important future implications for improved treatment of [breast cancer](#). The results of this study will also lay the groundwork for future clinical studies aimed at investigating whether increased breast CSCs in the primary tumor may pre-dispose some patients to lung metastasis, and if so, whether directed monitoring (i.e. by imaging or ex vivo analysis) may be beneficial for early detection and successful treatment.

Provided by University of Western Ontario

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