

Halting the Progression of Breast Cancer Leptomeningeal Brain Metastases

Melanie Hayden Gephart, MD, MAS

Assistant Professor

Leland Stanford Junior University

As treatments for breast cancer improve and patients survive longer, the prevalence of breast-to-brain metastases increases, severely affecting patients' function, quality of life, and overall prognosis. Brain metastases can be either within the brain (solid) or on the surface of the brain and nerves (leptomeningeal). Patients with leptomeningeal brain metastases are frequently excluded from clinical trials, and standard treatment options of radiation and chemotherapy are ineffective. Leptomeningeal brain metastases cannot be biopsied and the number of cancer cells in the cerebral spinal fluid are few, limiting the tissue available for research to develop effective treatments. To find effective treatments we must better understand the mechanisms leptomeningeal metastasis cells use to seed and flourish on the surface of the brain, which will suggest therapies to improve patient survival. To do this **we have developed sensitive and accurate methods to capture single cancer cells, identify the genes and pathways aberrantly activated, and test new treatments in an experimental model that uses patient-derived brain metastases.** We are beginning to use this technique to find FDA-approved drugs known to pass through the blood-brain barrier, which may change dramatically the treatment options for breast cancer patients with brain metastases.