

For example, the laboratory of [Doris Germain, PhD](#), is investigating the links between breast cancer and aging (aging is one of the most significant risk factors for developing breast cancer, yet little research has been done in this area). Specifically, her lab is focusing on how mitochondrial stress actively affects gene expression profiles and alters cellular behavior. They recently reported that specific axes of the mitochondrial unfolded protein response (UPR), discovered in their lab, are essential for breast cancer to metastasize. And, they recently discovered that mammary tumors that are driven by the same oncogene are drastically different between young mice and old mice. R01 grant funding from the National Institutes of Health is supporting further studies on the role of the mitochondrial UPR in breast cancer and aging.

Another unique aspect of the research in the Germain lab relates to the link between pregnancy and breast cancer. The lab is the first to have identified a pregnancy-dependent oncogene and to have identified a mechanism for the protective role of breastfeeding against breast cancer.

In the arena of clinical applications, The Tisch Cancer Institute at Mount Sinai is the first center in the country to offer a [Phase I/II ASPIRE clinical trial](#)—an all biologic, targeted regimen combining anastrozole, palbociclib, trastuzumab and pertuzumab for metastatic hormone receptor-positive, human epidermal growth factor receptor 2 (HER2)-positive breast cancer. Led by principal investigator [Amy Tiersten, MD](#), the investigator initiated, multi-center trial was the recipient of an [ASPIRE breast cancer research award](#) from Pfizer; it will open soon at New York University, Columbia, and Cornell. Palbociclib, a CDK 4/6 inhibitor, is among the most exciting new drugs for metastatic breast cancer, but has previously been studied only in hormone receptor-positive, **HER2-negative** patients. The ASPIRE trial is the first to study the role of palbociclib in **HER2-positive** patients. The groundbreaking treatment regimen does not include any chemotherapy or radiation, and is therefore much less toxic. This contrasts with the standard of care for HER2-positive metastatic breast cancer patients, which includes chemotherapy plus the anti-HER2 antibodies trastuzumab and pertuzumab. Of the eight patients enrolled on the ASPIRE trial to date, six have had response assessment so far. All six have had at least disease stabilization, with one of the six showing a dramatic decrease in disease and one having disappearance of all evidence of disease. In all cases, the side effects were extremely manageable.

These advances are representative of the breadth of research and progress in clinical care for breast cancer being conducted at Mount Sinai and bode well for improved quality of life and outcomes for patients.

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