

A. Translational Breast Cancer Research Traineeship Program

This program supports the best and brightest graduate students, postdoctoral fellows, and clinical research fellows working on patient-centred breast cancer research in different scientific disciplines across the city of London. The goal of the program is to provide the very best training possible for the next generation of breast cancer researchers such that they learn how to work on collaborative teams focused on research that makes the greatest impact on improving the outcome of breast cancer in Canada.

Research projects must have a focus on the understanding, prevention, tracking and/or treatment of breast cancer; and must involve collaboration of both basic science and clinical investigators. Trainees are rigorously evaluated and selected for awards based on their outstanding academic accomplishments, their research experience/potential, the scientific quality of the project, and the translational relevance of the research and applicability to metastatic breast cancer.

There are several examples of how the breast cancer research carried out by TBCRU Trainees is helping to move scientific discovery into clinical impact for breast cancer. Here we provide some details about a few featured translational projects:




- PhD candidate **Nathan Orlando** and his supervisor **Dr. Aaron Fenster** are developing a 3D ultrasound imaging guidance system to improve the ability of radiation oncologists to use permanent breast seed implantation (PBSI) as an alternative form of radiation therapy to help prevent metastasis in patients. In PBSI, small radioactive “seeds” are implanted directly into the breast, reducing treatment time to a single session. This could allow increased access to care for rural patients, who may not be able to travel long distances to a cancer centre for multiple “traditional” radiation treatments. In 2019-2020, this work is expected to move into early phase clinical trials in London and in Kelowna, BC.
- Postdoctoral fellow **Dr. Vasu Bhat** and his supervisors **Dr. Alison Allan** and **Dr. Palma** are focused on investigating a stage of disease called “oligometastasis”; where the cancer has spread beyond the breast but is not yet widely metastatic. Dr. Palma is leading an international, multi-centre Phase III clinical trial that is testing the potentially paradigm-shifting concept that breast cancer patients with oligometastasis may represent a treatable (and potentially curable) subset of Stage IV patients using a specialized treatment approach called stereotactic ablative radiotherapy (SABR). This is a follow-up to a highly successful Phase II clinical trial, which [has already impacted breast cancer patients](#) in a meaningful way. Within the Phase III clinical trial, Dr. Bhat is developing and validating a multi-biomarker approach for defining the oligometastatic state in breast cancer using minimally-invasive blood tests (“liquid biopsies”). In the future, this multi-biomarker panel could be used to identify breast patients who would benefit most from SABR.









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2019-2020 Breast Cancer Society of Canada Graduate Student Scholarship Recipients and their Research Projects

In October 2019, the TBCRU announced 14 new Breast Cancer Society of Canada graduate student scholarship recipients for the 2019-2020 academic year. Three MSc students, ten PhD students and 1 postdoctoral fellow were selected for awards this year. These trainees are enrolled in five different departments/programs at Western University (Anatomy & Cell Biology, Biochemistry, Chemical and Biochemical Engineering, Medical Biophysics, and Pathology & Laboratory Medicine) and are from two Western Faculties (Schulich and Engineering). The trainees are working in research laboratories located across the city of London; at the London Regional Cancer Program, St. Joseph's Health Care London, Robarts Research Institute, and Western University. Their translational research projects are broadly focused on the understanding, prevention, tracking and/or treatment of metastatic breast cancer-- with a key focus on improving care for breast cancer patients. **In addition to the 2 trainees featured above, descriptions of the other 12 projects are below, and the students post their research progress on the BCSC website's [Research](#) page.**

	<p>Veronica Dubois is an MSc student in the Department of Medical Biophysics, under the supervision of Dr. John Ronald and co-supervision of Dr. Paula Foster. Veronica's project focuses on developing molecular imaging techniques to study chimeric antigen receptor (CAR) T cells, a cancer cell therapy made up of immune cells that have been modified to find and kill cancer cells in the body. The valuable information provided by these imaging techniques will aid in the development of new CAR-T cell therapies that are safer and more effective against breast cancer.</p>
	<p>Natasha Knier is an MSc student in the Department of Medical Biophysics, under the supervision of Dr. Paula Foster. Natasha's project focuses on studying how breast cancer spreads to the brain using patient-derived xenograft (PDX) models, which are human tumours that are grown directly in mice. PDX models are beneficial to study as they represent tumours seen clinically more than cells grown in a dish. Her project will use novel imaging to track how disease progresses over time, with a hope of gaining clinically relevant insight and advancing personalized medicine.</p>
	<p>Julia Gevaert is a MSc student in the Department of Medical Biophysics under the supervision of Dr. Paula Foster. The aim of this research project is to investigate the way breast cancer spreads using Magnetic Particle Imaging (MPI). This brand-new technique can detect iron labeled cells in areas that remain hidden in other imaging techniques, such as Magnetic Resonance Imaging (MRI). This study will help gain an understanding how tumours start to grow early after cancer spreads.</p>
	<p>Oi Wai (April) Chau is a PhD student in the Department of Medical</p>

	<p>Biophysics, under the supervision of Dr. Stewart Gaede. She is working on assessing the acute cardiac inflammation after left-side breast cancer radiotherapy with hybrid PET/MRI. Information gained from the study will help avoid the negative side-effect of radiation-induced cardiac disease that can occur in some patients.</p>
	<p>Owen Hovey is a PhD student in the Department of biochemistry, under the supervision of Dr. Shawn Li. His project is focused on understanding cell migration, a critical process for breast cancer spread and metastasis. In particular Owen is investigating a mechanism called the phosphorylation-switch or "P-switch" and testing whether drugs can be designed to target this and inhibit metastasis. Additionally, by assessing P-switch in patient biopsy samples, he hopes to identify novel biomarkers that predict metastasis in breast cancer.</p>
	<p>Braeden Medeiros is an MSc student in the Department of Anatomy & Cell Biology, under the supervision of Dr. Alison Allan. He is investigating lung metastasis, one of the deadliest types of breast cancer metastasis, particularly for patients with an aggressive molecular subtype of breast cancer called triple-negative (TN) disease. He is assessing how molecular subtype influences the ability of the lung to produce/attract specific factors that support breast cancer metastasis, and to identify when, why and how lung metastasis develops in a subtype-specific manner. The resulting data could facilitate improved clinical management, including earlier detection, treatment, and/or prevention of metastasis.</p>
	<p>Vy Ngo is a PhD student in the Department of Pathology and Laboratory Medicine, under the supervision of Dr. Martin Duennwald. She is investigating mechanisms of therapy resistance in breast cancer and designing a novel approach using small molecules to enhance the efficacy of cancer therapeutics. In the future, her approach may serve as a new treatment strategy for therapy-resistant breast cancer and metastasis.</p>
	<p>Claire Park is a PhD student in the Department of Medical Biophysics, under the supervision of Dr. Aaron Fenster. Her work focuses on developing a positron emission mammography (PEM) ultrasound-guidance system to improve the accuracy of biopsy sampling for breast cancer diagnosis. PEM is a breast-specific functional imaging method that shows potential to address current imaging challenges to detect breast cancer. This will improve early detection and guidance for conclusive diagnosis of breast cancers, ultimately allowing for better treatment decisions and patient outcomes.</p>
	<p>Salma Radwan is a PhD student in the Department of Chemical & Biochemical Engineering, under the supervision of Dr. Sohrab Rohani and Dr. Alison Allan. Most women with triple negative breast cancer (TNBC) will develop resistance to chemotherapy. Two drugs called apatinib and tetrandrine have recently shown potential in the treatment of TNBC. In this project she will formulate and test a protein-based nano-delivery system to co-deliver both apatinib and tetrandrine, with the goal of overcoming multidrug resistance and enhancing the effectiveness of the drugs for treatment of TNBC.</p>



Nourhan Shalaby is a PhD student in the Department of Medical Biophysics, under the supervision of Drs. John Ronald and Timothy Scholl. Nourhan's project exploits the stiffness property of breast cancer, which is commonly used by woman for self-assessment, to develop a stiffness-sensing cancer-activatable cell system. The cell system is genetically engineered to specifically target and improve detection of breast cancer using PET and MRI imaging. Furthermore, the cell system can be genetically modified to include a therapeutic component to allow for treatment of breast cancer.



Lawrence Yip is a PhD student in the Department of Medical Biophysics, under the supervision of Dr. Jeffrey Carson. He is working on developing a photoacoustic tomography system, which is a hybrid imaging system combining the advantages of ultrasound and optical imaging. With this system, he hopes to help guide surgeons during breast-conserving surgery to more accurately remove malignant tumor tissue and reduce repeat surgeries.



Shanshan (Jenny) Zhong is a PhD student in the department of Biochemistry, under the supervision of Dr. Shawn Li. It is commonly believed that immune cells such as T cells in the microenvironment of breast cancer can effectively inhibit the growth of the tumor. Her project aims to develop a novel class of peptide inhibitors targeting immune cell signalling and evaluate their therapeutic potential in breast cancer treatment. Compared to current therapeutic antibodies, peptide inhibitors have several advantages as drug candidates, including lower manufacturing costs, reduced side effect, and better uptake by patient tissues.