TBCRU Pamela Greenaway-Kohlmeier Translational Breast Cancer Research Unit

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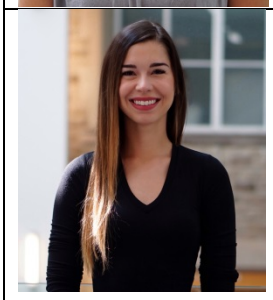
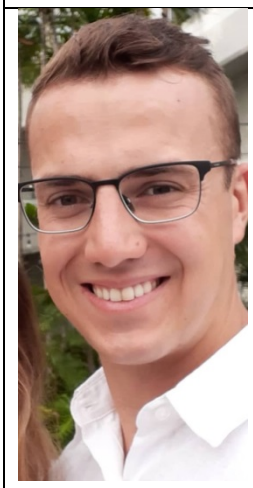
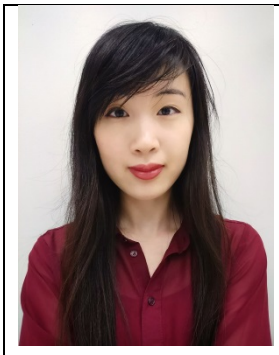
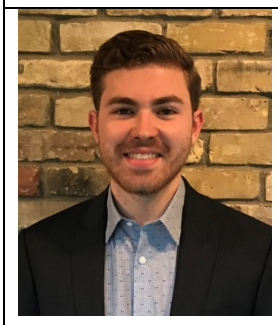
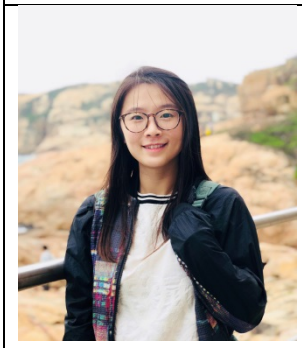
	**Veronica Dubois** is an MSc student in the Department of Medical Biophysics, under the supervision of Dr. John Ronald and co-supervision of Dr. Paula Foster. Veronica's project focuses on developing molecular imaging techniques to study chimeric antigen receptor (CAR) T cells, a cancer cell therapy made up of immune cells that have been modified to find and kill cancer cells in the body. Her project involves adding reporter genes to CAR-T cells to enable their detection during treatment using non-invasive magnetic resonance imaging and bioluminescence imaging. The valuable information provided by these imaging techniques will aid in the development of new CAR-T cell therapies that are more safe and effective against breast cancer
	**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. In her project, she will be combining non-invasive magnetic resonance imaging (MRI) techniques and bioluminescence imaging (BLI) to track how this disease progresses over time, with a hope of gaining clinically relevant insight and advancing personalized medicine.

	**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). I will be labeling breast cancer cells with iron nanoparticles and monitoring their movement throughout the body into lungs, brain, and bone. This study will help us understand how tumours start to grow early after cancer spreads.
	**Owen Hovey** is a PhD student in the Department of biochemistry, under the supervision of Dr. Shawn Li. Breast cancer cells can spread to other parts of the body, primarily lungs and bones, and this migration is known as metastasis. A primary mechanism for cell migration is known as the phosphorylation-switch or "P-switch" though some breast cancers have deactivated their “P-switch” and use alternatives mechanism. We aim to figure out how some breast cancer migrates without the use of the “P-switch”. By understanding this, we can design a specific peptide inhibitor that can be used to prevent the spread of breast cancer. Using patient biopsy samples, we can determine what proportion of breast cancers use the “P-switch” verse alternative pathways. Additionally, with the patient biopsy samples, we hope to identify novel biomarkers for determining metastatic breast cancer.
	**Braeden Medeiros** is an MSc student in the Department of Anatomy and Cell Biology, under the supervision of Dr. Alison Allan. Despite advances in diagnosis and treatment, breast cancer remains a clinical challenge. This is due to poor understanding regarding the mechanisms driving the movement (metastasis) of cancer from the breast to distant organs, a process that causes the majority of breast cancer mortalities. The lung is one of the most deadly sites of breast cancer metastasis, particularly for patients with an aggressive molecular subtype of breast cancer called triple-negative (TN) disease. We have previously observed that TN breast cancer has a particular propensity for migrating towards and growing in the lung, potentially through interactions with lung-derived proteins. This proposal will assess 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.

	**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. Cancer cells that survive initial treatment often metastasize to other parts of the body, thereby posing a unique clinical challenge. Her approach may serve as a new treatment strategy for therapy-resistant breast cancer and metastasis.
	**Nathan Orlando** is a PhD student in the Department of Medical Biophysics, under the supervision of Dr. Aaron Fenster. His research focuses on developing a guidance system for permanent breast seed implantation, an alternative form of radiation therapy where radioactive “seeds” are implanted directly into the breast to reduce treatment time to a single session. Breast-conserving therapy, the standard of care for early-stage breast cancer, often involves lengthy radiation therapy. This lengthy therapy may cause some patients, especially those with high travel times to the treatment site, to instead choose mastectomy or even forgo radiation completely. By developing a 3D ultrasound guidance system, they hope to make this alternative treatment more viable for widespread use, increasing access to breast-conserving therapy for rural patients.
	**Claire Park** is a CAMPEP PhD student in the Department of Medical Biophysics, under the supervision of Dr. Aaron Fenster. Tumour sampling with image-guided biopsy is important for breast cancer diagnosis and treatment planning. Her work focuses on developing a positron emission mammography (PEM) ultrasound-guidance system to improve breast tumour sampling. PEM is a breast-specific functional imaging method that shows potential to address current imaging challenges to detect breast cancer. When combined with ultrasound, she aims to improve targeting and needle guidance during breast biopsy. This will improve early detection and guidance for conclusive diagnosis of breast cancers, ultimately allowing for better treatment decisions and patient outcomes.
	**Salma Radwan** is a PhD student in the Department of Chemical & Biochemical Engineering, under the supervision of Dr. Sohrab Rohani & 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 we 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.

	**Nourhan Shalaby** is a PhD student in the Department of Medical Biophysics, under the supervision of Drs. John Ronald and Timothy Scholl. Nourhan 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 cancer lesions and activate expression of reporter genes that can improve detection of tumour lesions using widely available medical imaging technologies, such as PET and/or MRI. Furthermore, the cell system can be genetically modified to include a therapeutic component to allow for treatment of breast cancer at earlier disease states.
	**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 tumourous 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. To avoid being killed by cytotoxic T cells, tumors often express a kind of transmembrane protein called PD-L1 which would bind to its receptor PD-1 on T cells so to turn off the T cell-mediated immune responses. Her project aims to develop a novel class of peptide inhibitors targeting on PD-1/PD-L1 signaling 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 immunogenicity, and better organ or tumor penetration. With these peptides, it also helps us to better understand the mechanism of PD-1/PD-L1 signaling in Breast cancer.

	**Vasudeva Bhat** is a Postdoctoral Fellow in the Department of Anatomy and Cell Biology, under the supervision of Dr. Alison Allan. His project focuses on investigating the potentially paradigm-shifting concept that breast cancer patients with “oligometastasis” may represent a treatable (and potentially curable) subset of patients. Oligometastasis refers to a disease stage where the cancer has spread beyond the breast but is not yet widely metastatic. The goal of this project is to develop and validate a multi-biomarker approach for defining the oligometastatic state in breast cancer using minimally-invasive blood tests ("liquid biopsies"). We will carry out combined assessment of circulating tumor cells, circulating tumor DNA, and host immune cells; and compare these biomarkers to patient survival and disease progression following radiation treatment. Thus, a blood-based multi-biomarker panel may represent a useful prognostic and/or predictive approach in breast cancer patients with oligometastatic disease.
	**Oi Wai (April) Chau** is a PhD student in the Department of Medical 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 correlate the regional radiation dose deposition to the inflammatory response and other believed precursors to radiation induced cardiac disease. She is also performing extensive dosimetric comparison among various breast cancer radiotherapy treatment plan options including deep inspiration breathhold, this can assist in deciding treatment strategies designed to minimize cardiac damage during radiation therapy of the breast.