2015/2016 Summer Studentship Project Application Form

Send to: Research Office, University of Otago Christchurch, PO Box 4345, Christchurch, by 5pm on **3 July 2015**

Supervisor Information (First named supervisor will be the contact):	
Supervisor's Name and Title(s): Dr. Margaret Currie and Dr. Elisabeth Phillips	
Department: Pathology	Institution: UOC
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Mailing Address: Mackenzie Cancer Research Group, University of Otago, Christchurch, 8011	

Research Category (Choose one category only – to be used for judging the students' presentations):		
Clinical	**Laboratory X**	**Community**

Project Title (20 words MAXIMUM):

Investigation of markers of fatty acid metabolism and B-oxidation in breast cancer cells.

Project Description:

We are looking for a bright, enthusiastic student to join a multidisciplinary team: The Mackenzie Cancer Research Group. The proposed summer-studentship represents an important part of our ongoing research into the role of adipocytes in the progression of cancer, but is designed for completion within a 10 week Summer-Studentship.

Introduction:

Obesity is linked to a worse outcome in patients with breast cancer, regardless of menopausal status and hormone receptor status. We are currently using an experimental co-culture system, where primary adipocytes from human breast adipose tissue are grown together with breast cancer cell lines. Culturing these cells together has remarkable impact on both the adipocytes and breast tumour cell lines. Breast tumour cells become more resistant to chemotherapy and migrate more rapidly, and adipocytes become de-differentiated, less lipid rich and secrete factors that promote the survival and migration of breast tumour cells *in-vitro*. As breast adipocytes become less lipid rich, it suggests that the breast cancer cells are inducing lipolysis in the adipocytes in the process of their interaction. Other research groups have shown that adipocyte-ovarian cancer cell co-culture stimulates adipocyte lipolysis and release of free fatty acids and glycerol (Neiman et al., 2011). Neiman reports that ovarian cancer cells co-cultured with human adipocytes activate fatty acid oxidation (FAO), and show increased rates of migration and invasion. Together, these data suggest that cancer cells may gain an energy advantage from lipid metabolism that promotes metastasis.

Hypothesis:

Our hypothesis is that breast cancer cells induce adipocyte lipolysis and release of glycerol and free fatty acids, providing a rich source of metabolites that fuels breast cancer cell invasion and metastasis.

Method:

The student will learn to isolate and culture primary human breast adipocytes and how to co-culture human adipocytes and breast cancer cells *in-vitro*. The student will prepare protein lysates from co-cultured breast cancer cell lines, and measure markers of fatty acid metabolism and beta-oxidation using Western blotting. In particular, the proteins of interest are p-AMPK, p-ACC, CPTA1, p-HSL and FASN. If time allows, the student will assess the change in the metastatic potential of the breast cancer cells grown with the adipocytes using invasion/migration assays.

Significance:

This research is important because it will increase our understanding of cancer cell metabolism and progression in fat rich tissue and together with research ongoing in MCRG may lead to more effective treatments for early-stage breast cancer patients.

Student Prerequisites (eg. Medical Student) if applicable:
An interest in science and basic scientific laboratory experience preferable.