

## 2014/2015 Summer Studentship Project Application Form

Send to: Research Office, University of Otago Christchurch, PO Box 4345, Christchurch, by 5pm on **4 July 2014**

### Supervisor Information (First named supervisor will be the contact):

Supervisor's Name(s): Dr Anitra Carr and Dr Gabi Dachs

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### Research Category (Choose one category only – to be used for judging the students' presentations):

**Clinical**

**Laboratory x**

**Community**

Project Title (20 words MAXIMUM):

**Is the vitamin C content of red blood cells a more stable indicator of body ascorbate status?**

Project Description:

We are looking for a bright, enthusiastic student to join our multidisciplinary cancer and free radical research groups. The Centre for Free Radical Research is interested in advancing health by exploring the biology of free radicals and antioxidants, and the Mackenzie Cancer Research Group is interested in the cellular and molecular basis of cancer and response to therapy. We have close links with clinical practice and the proposed study represents an important part of our ongoing research.

#### Background:

The role of vitamin C in cancer remains controversial, mainly due to issues with poorly designed clinical trials and a lack of understanding of vitamin C pharmacokinetics. However, persistent case reports of benefit in cancer patients have continued to fuel the debate. Support for a role for vitamin C in cancer has come from our recent studies of human tumour samples from patients with endometrial cancer (Kuiper 2010) and colorectal cancer (Kuiper 2014). There are a small number of early reports on the vitamin C status of cancer patients in the literature, indicating that many patients have suboptimal levels, likely due to enhanced metabolic turnover of the vitamin. We have also questioned cancer patients about their dietary habits, and found that most do not consume the recommended amount of vitamin C to prevent chronic diseases (Munn 2014).

#### Aim:

We would now like to investigate the vitamin C status of cancer patients at Christchurch hospital. However, plasma vitamin C concentrations are highly unstable and vary with recent dietary intake, thus requiring fasting prior to sampling. Yet for many cancer patients this is inconvenient and challenging. We therefore would like to develop a method for measuring vitamin C in red blood cells (RBC), which may be less variable and thus more representative of body status than plasma levels.

#### Methods:

The student will

- recruit 5 healthy volunteers, who are willing to provide repeat blood samples (fasting and at various times following a vitamin C-containing meal);
- isolate plasma and RBCs from blood samples of healthy volunteers;
- optimize a method for the detection of vitamin C in RBCs using high performance liquid chromatography (HPLC);
- in parallel measure vitamin C in plasma using HPLC;
- determine the relationship between plasma and RBC levels in the healthy volunteers over time following a vitamin C-containing meal;
- if RBCs in healthy volunteers appear to be a more stable indicator of vitamin C status, then assay a small number (5-20) of fresh blood samples from cancer patients (via the Cancer Society Tissue Bank).

All general laboratory methods are established in our groups, and the student will be trained to carry out the procedures.

#### Significance:

The vitamin C status of most cancer patients is currently not known, yet many cancer patients choose high dose vitamin C treatment provided by alternative providers. This study will develop a valuable method which may allow scientists to routinely measure the vitamin C status of cancer patients without requiring fasting. It would also provide valuable scientific data to inform the ongoing vitamin C and cancer debate.

