2016/2017 Summer Studentship Project Application Form

Send to: Research Office, University of Otago Christchurch, PO Box 4345, Christchurch, by 5pm on **4 July 2016**

Supervisor Information (First named supervisor will be the contact):	
First Supervisor's Name and Title: Jérôme Damet, PhD	
Department - UOC &/or CDHB (if applicable): Radiology UOC	
First Supervisors Phone: 027 360 7382 (or 022 654 0417 Aamir Raja)	First Supervisors Email: jerome.damet@cern.ch
First Supervisors Mailing Address: Radiology, UOC	
Co-Supervisors Name and Title(s): Pierre Carbonez; Aamir Raja, PhD	

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

Project Title (20 words MAXIMUM):

Radiation dose optimisation for pre-clinical examinations with MARS-CT

Project Description:

Introduction:

The MARS CT scanner is a revolutionary new type of CT (Computed Tomography) scanner based on the CERN Medipix detector technology. MARS promises not only images with new and improved diagnostic information, but will also allow faster and lower cost radiology procedures while delivering lower radiation doses than conventional systems. Two of the supervisors (Drs Damet and Carbonez) are from the CERN dosimetry service in Geneva. They also have appointments with Radiology UOC. Spectral imaging, through its ability to accurately differentiate the atomic and density variation within body tissues, offers to revolutionise the field of computed tomography and provide a significant new technology platform for diagnostic imaging. The first Human MARS-spectral CT is being built in Christchurch. This dosimetry study is thus the next challenge as optimisation of radiation dose levels to patients in diagnostic imaging procedures is essential. The present small animal MARS system has been characterised in terms of dose delivery based on phantoms. The next phase is to measure dose in small animals.

Aim:

1. Measure dose for several scan protocols using TLDS in phantoms and mice
2. Define optimal dose reduction while maintaining image quality

Possible impact (in lay terms):

CT scanning offers clinicians a way of noninvasively diagnosing a wide range of dieases and brings marked benefit to patient care but has brought with it creating concerns about individual and population doses of ionizing radiation. Spectral imaging offers reduced radiation dose but with greater diagnostic benefit than standard CT. Measuring and documenting the extent of radiation dose reduction will be an important step, and not previously attempted. Also, a personalised dosimetry The summer studentship will advance collaborations between UOC (Radiology), CERN and Lausanne University Hospital (CHUV), Switzerland (Radiology) to enable improved dose assessment. The research project fits into a broader objective to provide new insights on personalised dosimetry by calculating the effective dose delivered to the patient from individual organ doses measured with the data registered by the Medipix chip during the scanning phase. Radiation doses for conventional CT scanners are derived from standardised measurements done a phantom performed for the assurance control protocols.

Method:

CERN and CHUV will provide the student with relevant dosimeters (TLDs) and phantoms, and expertise on data analysis as well as on protocols to determine optimal scanning parameters. The TLDS will be first placed around new phantoms, MARS scan performed, Next, TLDS will be inserted around and within the organs of euthenised mice to accuretly measure organ dose. The student will corroborate the findings from the previous Masters students with newer phantoms and will perform the first organ dose on small animals.