

SINAPSE
PhD Project Proposal Template for PhDs with Industry starting in 2010

PROJECT

Title:

Image guidance for in situ ablation cryotherapy treatment for cancer

Planned start date (month/year):

October 2010

SINAPSE Centre (i.e. primary university to which this studentship will be attached):

Dundee

University first supervisor: contact details

Name: Prof Graeme Houston
Department: Clinical Radiology
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Second academic supervisor/ other university or other people in primary university involved with project

Mr Nabi Ghulam, Senior lecturer in Urology, Ninewells Hospital, Dundee
Prof Stewart Fleming, Dept Pathology, Ninewells Hospital, Dundee
Prof Hing Leung, Glasgow University

Industry

Galil Medical

Industry main contact details

Derek Jerome
Clinical Affairs
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Key Other Industry people involved with Project including Industry Supervisor (if different to Industry main contact above)

Mr Ray Win

Likely background of suitable student (eg. Neuroscience, MR Physics, Chemistry, Engineering, Informatics, Psychology) and essential skills required prior to starting this PhD:

The background of the suitable student would be medical physics or engineering with clinical imaging experience.

The essential skills would be the potential to work between multiple disciplinary research themes, ie. Medical Imaging, Medical Physics, Engineering and also industry

Summary of proposed project (approximately 200 words):

The incidence of renal cancer is rising with greatest rise in the small renal masses (<4cm). While surgical excision is the cornerstone of the treatment (partial or complete removal of kidney, this approach is associated with an unacceptably high rate of benign histology (20%) and a significant complication rate (20-25%). Moreover, our recent Cochrane Review (Nabi G et al- in press) comprising 340 papers, with 42 selected for review suggest a persuasive need for further good quality randomised controlled of interventions in small renal masses. In addition bone metastases are amenable to in situ ablation. Recent alternatives that allow inducing cellular necrosis without operation (in situ ablation therapy) have been applied to solid tumours including kidney tumours or bone metastases i.e. ablative techniques using Cryotherapy, CRYO (freezing) or Radiofrequency, RFA (heating) energy. The main challenge, however, is the accuracy and quality assessment of the image guidance technique and thermal monitoring during treatment. In particular the use of 3T MRI as an alternative to CT or 1.5T requires evaluation and appropriate imaging protocols developed.

Key research Questions:

- What is the optimal image guidance and thermal monitoring protocol for in situ ablation of renal tumours and bone metastases at 3T MRI?
- What is the optimal imaging protocol for follow-up of such lesions at 3T MRI.
- Are there any outstanding safety issues for cryotherapy at 3T MRI?

Key references (up to five):

1. Goel RK, Kaouk JH et al. Probe ablative treatment fr small renal masses: cryo v RF ablation. Curr Opinion Urol (2008) 18:467-73.

2. Hinshaw JL Shadid AM, Nakada SY, Hedican SP, Winter TC, Lee FT. Comaprison of percutaneous and laparoscopic cryotherapy for the treatment of solid renal masses. Am J Roentgen (2008) 191:1159-68.

3. Huer R, Gill IS, Guazzoni G, Kirkali Z, Marberger M, Richie J, de la Rosette

JMCH. A critical analysis of the actual role of minimally invasive surgery and active surveillance for kidney cancer. *European Urology* 37 (2010) 223-232.

4. Hui GC, Tatli S, Morrison PR, Silverman SG. Comparison of percutaneous and surgical approaches to renal tumour ablation, meta-analysis of effectiveness and complication rates. *J Vasc Interv Radiol* (2008) 19:1311-1320.

5. Kundie DA, Uzzo R. Cryoablation or radiofrequency ablation of small renal mass: meta analysis. *Cancer* (2008) 113:2671-2680.