

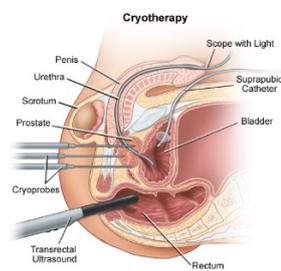
MSc project “Tracking Cryoablation”

Background

Cryoablation is an emerging focal ablation modality for the treatment of localized prostate cancer. Cryoprobes are positioned inside the tumor lesion under MR-Ultrasound fusion guidance, such that the cryogenic freezing process will remove heat from the cryoprobe tips, and by extension from the surrounding tissue.

In current clinical practice, the cryoablation process is monitored in real-time, by temperature probes placed near critical structures that should not be ablated (e.g. urethra, rectum, bladder), as well as live ultrasound imaging in which the iceball size can be seen during the repeated freeze-thaw cycles. This dynamic aspect is ignored during the cryoablation planning, which takes into account the anticipated ablation zone for single tested cryoprobe setting, as published by the manufacturer of the cryoprobe.

In attempt to advance the accuracy of cryoablation planning and monitoring, Philips has developed a biophysical modelling for cryoablation procedures, capable of calculating the evolution of temperatures in the volume surrounding the cryoprobes.



Prostate cryoablation



Ablation zone modelling



Ultrasound iceball appearance

Overall goal of the project

The overall goal of the project is to investigate the potential of using image-based tracking of ice formation to support clinical procedures and to validate the biophysical modelling.

Research scope

The MSc research will consist of:

- Inventory of the state-of-the-art of prostate cryoablation monitoring.
- Selection and implementation in software of the most promising methods.
- Evaluation of the selected methods.
- Reporting of the evaluation outcome: MSc thesis, final presentation, potentially a conference or journal publication.

Expected outcome

Ample insight into the applicability of image-based tracking of ice formation to monitor cryoablation procedures, consolidated in a prototype algorithm and reported in an MSc thesis, presented in a 30 min final presentation, and potentially a paper submission to a scientific conference or journal.

Required expertise and capabilities

- Knowledge of heat transfer and thermodynamics.
- Knowledge of state-of-the-art in image analysis algorithms.
- Experience in programming (MatLab, preferably also basics of C, C++ or C#).
- Fluent English speaking and writing.
- Good communication skills.

- And: highly motivated, independent, analytical, systematic, good planner.

Hosting group & supervision

Philips Research
Oncology Solutions
Eindhoven, The Netherlands

Supervisors: prof.dr. Marcel Breeuwer and dr. Gilion Hautvast

Start date & duration

Start date: after summer 2018

Duration: minimally 9 months full-time

Contact

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