Ausschreibung für eine Master- oder Projektarbeit an der Universitätsklinik für Radioonkologie
Anstellungsmöglichkeit in Kooperation mit ACMIT (FFG COMET Zentrum)

"Ultrasound-/EMT-guided optimization of implant quality for cervix cancer brachytherapy with the help of clinical reference data"

Background:

Treatment with intracavitary and interstitial (IC/IS) applicators is the gold standard for image-guided adaptive brachytherapy for cervical cancer. A well planned and inserted implant geometry is the major prerequisite for an optimal treatment plan, as misplaced or missing interstitial catheters cannot be compensated by optimizing the dwell time distribution in the remaining parts of the implant.

Implant design and placement are difficult and require a lot of experience and skill. Augmenting this process by additional tools like electromagnetic applicator tracking in live ultrasound images would help operators to pick up the technique more easily, thus improving the potential to treat patients with this highly efficient technique in different clinical settings world wide.

In mono- or multicentric studies on the implementation of MR-guided IC/IS BT (EMBRACEI and EMBRACEII) tumour and disease characteristics were collected as well as implant and dosimetric data, for a large number of patients. Such databases can be used to establish correlations between the high-risk-clinical target volume, the implanted applicator types and the amount of loading in the different part of the implant (intrauterine tandem, vaginal sources in ring or ovoids, and interstitial needles).

Aim of the project:

The aim of the project is to investigate whether BT applicator insertion with ultrasound can be facilitated with the use of clinical reference data from the local EMBRACE patient cohort. Ultrasound based target data and disease characteristics could be used to retrieve reference data indicating how many needles were used in comparable patients in the past, while the TRAK-volume relation could be used to predict an average expectable dose distribution for a given implant, in real time.

In this project we aim to develop tools for optimizing implant quality exploiting the potential of live ultrasound imaging, electromagnetic applicator tracking and clinical reference databases. This includes:

- Visualization of a 3D implant model on live ultrasound imaging during applicator insertion
- Prediction of a possible dose distribution based on clinical reference data
- Projection of predicted dose distribution in live ultrasound images during implantation
- Further implant optimization with interstitial needles

Who are we looking for?

We seek to hire one or two motivated physicists or biomedical engineers who will develop

i) a GUI to facilitate access to clinical reference data for implant optimization

ii) a dose prediction model based on data from clinical cases treated with the EMBRACEII protocol.

iii) A software module for visualization of predicted dose distributions in live ultrasound images

Requirements:

BSc in (medical) physics, biomedical engineering or similar. Strong interest in translational medical physics research. Very good programming skills. Ability to work in an interdisciplinary team of physicists, engineers and medical doctors. Ability to use both German and English as a working language.

We offer:

An opportunity to work in a well-renowned interdisciplinary team. Results of the project may be used for scientific publications and presentations, as well as for further implementation into the clinical workflow.

The successful applicant may perform this project in pursuit of a formal Master's degree (Master thesis) or as a research assistant. Part time employment is also possible.

Salary will be according to the current personnel cost rates of the Austrian Science Fund.

The project can be started immediately.

If you are interested, please contact the PI Assoc. Prof. Mag. Dr. Nicole Eder-Nesvacil at nicole.eder-nesvacil@meduniwien.ac.at .

We are looking forward to meeting you!

22.7.2025