

# Multiparametric Imaging in Radiotherapy Planning

**HOST INSTITUTION:** Rigshospitalet, University of Copenhagen

Rigshospitalet, founded in 1757, is the most highly specialized hospital in Denmark with more than 100 departments. With 1,120 beds, Rigshospitalet and its 8,000 personnel has responsibility for 65,000 inpatients and approximately 420,000 outpatients annually. The ESR is affiliated with the Department of Clinical Physiology, Nuclear Medicine and PET at Rigshospitalet, Copenhagen - one of the largest PET-departments in Europe. The equipment of the department includes 2 cyclotrons, 7 PET/CT scanners, 1 high resolution Brain PET scanner and 1 PET/MR (Siemens mMR installed with GE SPINlab MR Hyperpolarizer) as well as extensive animal imaging facilities. The department performs 10.000 PET examinations annually and is characterized by a strong interdisciplinary collaboration with a large physics group. We have a strong collaboration with our clinical colleagues, especially at the Department of Oncology and Radiotherapy. The ESR is enrolled at The University of Copenhagen, Faculty of Health.



## DESCRIPTION OF THE PROJECT (ESR13 - Sahar Ahangari)

Modern radiotherapy (RT) can be delivered with increasingly high precision, thus, making it possible to specify different doses not only to different tumours within the same patient but also to different areas within the same tumour – also known as dose painting. This study is based on the hypothesis that multiparametric imaging (MPI) can improve our ability to characterize tumours and tumour response following RT, as well as, ultimately, RT target definition. The project aims to demonstrate that MPI can be integrated in a clinical radiotherapy workflow and thus potentially translating the benefits of improved RT efficiency and evaluation of treatment to improved patient survival.

The ESR will be part of an interdisciplinary research group investigating the feasibility, technical challenges and potential clinical value of multi-parametric imaging for dose painting in radiotherapy planning and early response evaluation. Focus will be on PET/MR and PET/CT data of patients within the field of whole-body oncology (e.g. cervical cancer, lung cancer and head-and-neck cancer).

## Publications

Ahangari S, Hansen NL, Olin AB, Nøttrup TJ, Ryssel H, Berthelsen AK, Löfgren J, Loft A, Vogelius IR, Schnack T, Jakoby B, Kjaer A, Andersen FL, Fischer BM & Hansen AE (2021) Toward PET/MRI as one-stop shop for radiotherapy planning in cervical cancer patients. *Acta Oncol.*

Aug;60(8):1045-1053. doi: <https://doi.org/10.1080/0284186x.2021.1936164>

Valladares A, Ahangari S, Beyer T, Boellaard R, Chalampalakis Z, Comtat C, DalToso L, Hansen AE, Koole M, Mackewn J, Marsden P, Nuyts J, Padormo F, Peeters R, Poth S, Solari E, and Rausch I (2019) Clinically Valuable Quality Control for PET/MRI Systems: Consensus Recommendation From the HYBRID Consortium. *Front. Phys.* **7**, 136. doi: [10.3389/fphy.2019.00136](https://doi.org/10.3389/fphy.2019.00136)

You can find a summary of this publication [here](#).