

Predictive therapeutic dosimetry and treatment evaluation using Deep Learning Neural Network

HOST INSTITUTION: ABX-CRO Advanced Pharmaceutical Services m.b.H.

ABX-CRO is an independent, full-service clinical research organization specialized in the conduct of clinical trials with particular emphasis on advanced imaging and therapy for drug development in oncology, neurosciences and imaging indications. A dedicated image core lab provides the infrastructure for image processing and software development for transmission and review of image data including dosimetry analysis for radionuclides used in the field of nuclear medicine.

Technische Universität Dresden (TUD) is the largest technical university in Germany and one of eleven German Universities of Excellence. The „Dresden International Graduate School for Biomedicine and Bioengineering“ (DIGS-BB) and the Biotechnology Center (BIOTEC) provide unique opportunities for interdisciplinary research and teaching in molecular bio-engineering. BIOTEC research groups comprise genomics, proteomics, biophysics, cellular machines, molecular genetics, tissue engineering, and bioinformatics.



DESCRIPTION OF THE PROJECT (ESR10 - Mahmood Nazari)

The ESR will design a new decision support tool for personalized IRT dose planning to improve prediction of individualized tumour response from calculated absorbed dose using additional multi-dimensional information available at the time of planning. More specifically, the ESR will a) define and outline relevant data for personalized dosimetry, b) specify guidelines for data acquisition to minimize variance for both, imaging and non-imaging data, c) design and train a Convolutional Neural Network (ConvNet) using PSMA & NET image data supplemented with available meta-data and the corresponding outcome, and d) validate the methodology with independent available retrospective data.

Within the course of this project, secondments to other ESR projects are planned to I) investigate the effects from low-counts statistics (Leuven), II) assess effects of tumour heterogeneity (Paris) and III) test study data format for a common platform approach (Munich).