

Joint project between ICCAS and OncoRay

SONORAY - Tumor therapy combined by MR-guided focused ultrasound and radiation therapy

6.2mil. Euro; Oct. 1, 2016 – Sept. 30, 2019

The two Centers

The **Innovation Center Computer Assisted Surgery (ICCAS)** (www.iccas.de) was founded in 2005 in Leipzig at Germany's oldest acting medical faculty (1415). It is one of six ZIK Centers for Innovation Competence. It has been funded by the German Ministry of Education and Research (BMBF) through grants of 20mil. Euro.

OncoRay (www.oncoray.de) was founded in 2005 at University Dresden. This institute is a leading Research Center for Radiation Oncology in Germany including an active Proton Therapy Center. It has been supported by the German Ministry of Education and Research, the Saxon Ministry of Science and the Fine Arts and the European Regional Development Fund.

The project

The multidisciplinary project SONORAY combines noninvasive image-guided therapy approaches of focused ultrasound and radiation therapy to improve efficiency for cancer treatment. The project investigates the effects of both temporal and spatial adjustable and controllable radiation technologies for directed focal energy into tumor tissue. Physical and biological effects are investigated and the synergy of the radiation approaches are quantified in simulation, cell, and small animal studies. The work is accompanied by the development of multimodal planning and information systems to provide a seamless integration into the clinical workflow. The project aims at developing a proof-of-concept system and workflow for the translation into clinical use.

The challenges:

FUS-RT stands for combined treatment comprising MR- and US-guided robotic assisted focused ultrasound (FUS) and radiation therapy (RT). This approach is to be used to combine thermal and non-thermal effects of focused ultrasound on malignant cells to enhance percutaneous radiotherapy. The aim of FUS-RT is to harness the synergistic effect of heat and the mechanical effects of both sound and ionizing radiation to improve the effects of the radiooncological treatment of malignant solid tumors and metastases and reducing side effects at the same time.

The key issues are:

- i) to develop the technology and application
- ii) to examine cell biological principles
- iii) to create computer-assisted modeling and simulation
- iv) to evaluate the potential of the future clinical applications through preclinical validation using FUS-RT combination therapy

The research group

The research group is part of a joint project between the ZIK OncoRay in Dresden and the ZIK ICCAS in Leipzig (leadership). The group will be responsible for setting up and managing an interdisciplinary research area concentrating on focused ultrasound in Leipzig. This involves clinical, biological and physical sciences combined with engineering and computer sciences.

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