SFB 1389 UNITEGLIOBLASTOMA

FOCUS A – TUMOR INTRINSIC MECHANISMS | FOCUS B – TUMOR MICRO-ENVIRONMENT | FOCUS C – TECHNOLOGICAL INNOVATION | FOCUS D – UNITE CORES

C02 – RADIOMICS, RADIOGENOMICS AND DEEP-LEARNING IN NEURO-ONCOLOGY

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SUMMARY

The aim of this project is to validate and improve novel high-throughput analyses of medical imaging data with machine- and deep learning algorithms for predictive modelling, identification of molecularly, metabolically and immunologically distinct imaging phenotypes and automated tumour response assessment in patients with glioma. The project strives to improve and refine treatment delivery and non-invasive treatment monitoring of patients with glioma by generating prognostic and predictive imaging biomarkers.

TASK

Task 1 – Artificial neural networks for automated tumor response assessment and improved imaging biomarker discovery

(a) building a comprehensive annotated brain tumor MRI reference database for artificial neural network (ANN) training (EORTC-26101)
(b) prospective validation (N2M2, AMPLIFY-NEOVAC) & clinical integration
(c) quantitative imaging biomarker discovery

Task 2 – Radiomic signature discovery & validation

(a) radiomic signature discovery in clinical trial datasets (EORTC 26101)
(b) refinement & prospective validation (N2M2, AMPLIFY-NEOVAC)
(c) integrative predictive modeling with molecular and clinical data

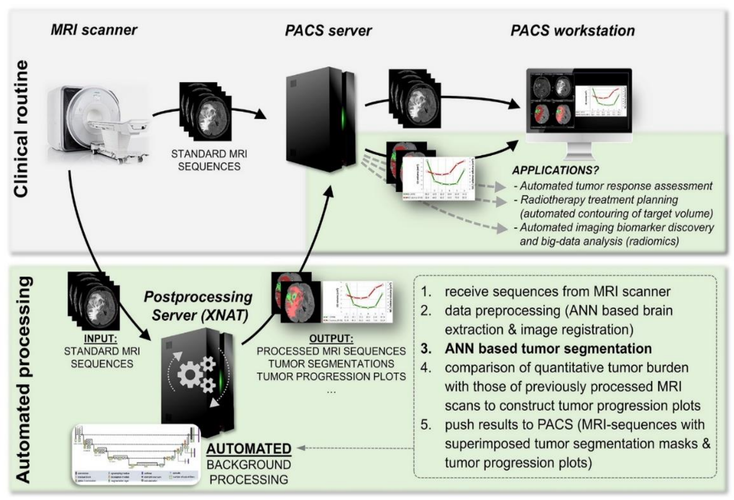
Task 3 – Non-invasive assessment of tumor vascularization, angiogenic escape and hypoxic transformation

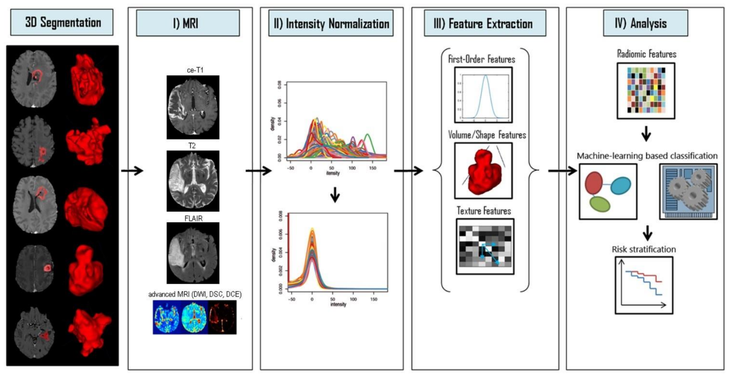
(a) mathematical modeling of DSC-MRI data
(b) non-invasive measurement of vascular normalization, efficacy of drug delivery and hypoxic transformation
(c) identification of subgroups with favorable vascular response to overcome evasive mechanisms of tumor cells

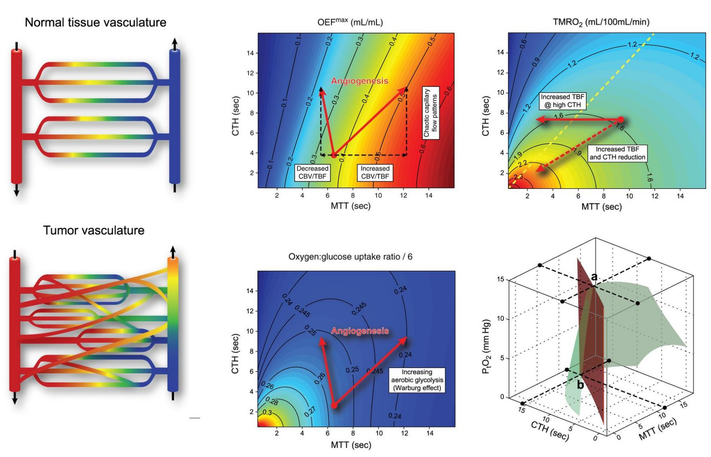
Task 4 – 3D chemical shift MRI for non-invasive treatment monitoring during IDH-directed therapies

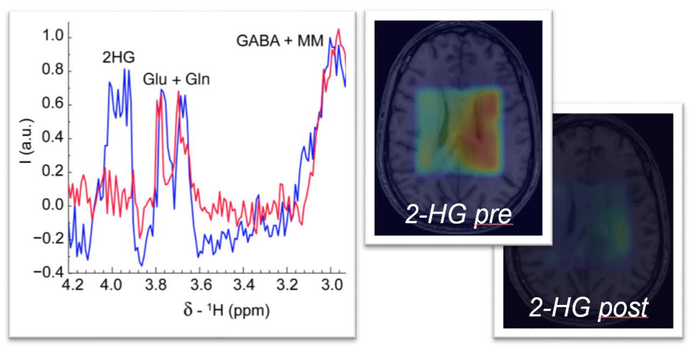
(a) implementation of 3D chemical shift imaging (3D-CSI)
(b) methodical validation by correlating 2HG concentrations of 3D-CSI with those from biopsy-guided tissue specimens
(c) non-invasive response monitoring of novel IDH inhibitors with 3D-CSI

VISUAL ABSTRACT









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