Dokumenttyp: journal article

Autor(en) des Beitrags: Tóth, V; Förschler, A; Hirsch, NM; den Hollander, J; Kooijman, H; Gempt, J; Ringel, F; Schlegel, J; Zimmer, C; Preibisch, C


Abstract: Hypoxia plays a central role in tumor stem cell genesis and is related to a more malignant tumor phenotype, therapy resistance (e.g. in anti-angiogenic therapies) and radio-insensitivity. Reliable hypoxia imaging would provide crucial metabolic information in the diagnostic work-up of brain tumors. In this study, we applied a novel BOLD-based MRI method for the measurement of relative oxygen extraction fraction (rOEF) in glioma patients and investigated potential benefits and drawbacks. Forty-five glioma patients were examined preoperatively in a pilot study on a 3T MR scanner. rOEF was calculated from quantitative transverse relaxation rates (T2, T2*) and cerebral blood volume (CBV) using a quantitative BOLD approach. rOEF maps were assessed visually and by means of a volume of interest (VOI) analysis. In six cases, MRI-targeted biopsy samples were analyzed using HIF-1α-immunohistochemistry. rOEF maps could be obtained with a diagnostic quality. Focal spots with high rOEF values were observed in the majority of high-grade tumors but in none of the low-grade tumors. VOI analysis revealed potentially hypoxic tumor regions with high rOEF in contrast-enhancing tumor regions as well as in the non-enhancing infiltration zone. Systematic bias was found as a result of non-BOLD susceptibility effects (T2*) and contrast agent leakage affecting CBV.
Histological samples demonstrated reasonable correspondence between MRI characteristics and HIF-1α-staining. The presented method of rOEF imaging is a promising tool for the metabolic characterization of human glioma. For the interpretation of rOEF maps, confounding factors must be considered, with a special focus on CBV measurements in the presence of contrast agent leakage. Further validation involving a bigger cohort and extended immuno-histochemical correlation is required.

Zeitschriftentitel / Abkürzung: J Neurooncol

Jahr: 2013

Band: 115

Heft / Issue: 2

Seiten: 197-207

Sprache: eng


Print-ISSN: 0167-594X

TUM Einrichtung:
Abteilung für Neuroradiologie; Neurochirurgische Klinik und Poliklinik; Institut für Allgemeine Pathologie und pathologische Anatomie

Occurences:
- Einrichtungen > Fakultäten > Fakultät für Medizin > Kliniken und Institute > Institut für Allgemeine Pathologie und Pathologische Anatomie > 2013
- Einrichtungen > Fakultäten > Fakultät für Medizin > Kliniken und Institute > Institut für Radiologie > Fachgebiet Neuroradiologie (Prof. Zimmer) > 2013

entries: