Sodium MR imaging

Sodium-MR imaging may substantially contribute to the characterization of tumors because it reflects the functional status of the sodium potassium pump and sodium channels.

Sodium-MR imaging data of patients with treatment-naïve glioma WHO grades I-IV (n = 34; mean age, 51.29 ± 17.77 years) were acquired by using a 7T MR system. For acquisition of sodium-MR images, Biller et al. applied density-adapted 3D radial projection reconstruction pulse sequences. Proton magnetic resonance spectroscopic imaging data were acquired by using a 3T whole-body system.

Biller et al. demonstrated that the initial sodium signal of a treatment-naïve brain tumor is a significant predictor of isocitrate dehydrogenase (IDH) mutation status ($P < .001$). Moreover, independent of this correlation, the Cox proportional hazards model confirmed the sodium signal of treatment-naïkve brain tumors as a predictor of progression ($P = .003$). Compared with the molecular signature of IDH mutation status, information criteria of model comparison revealed that the sodium signal is even superior to IDH in progression prediction. In addition, sodium-MR imaging provides a new approach to noninvasive tumor classification. The sodium signal of contrast-enhancing tumor portions facilitates differentiation among most glioma types ($P < .001$).

The information of sodium-MR imaging may help to classify neoplasias at an early stage, to reduce invasive tissue characterization such as stereotactic biopsy specimens, and overall to promote improved and individualized patient management in neurooncology by novel imaging signatures of brain tumors [1)].

1)
Biller A, Badde S, Nagel A, Neumann JO, Wick W, Hertenstein A, Bendszus M, Sahm F, Benkhedah N, Kleesiek J. Improved Brain Tumor Classification by Sodium MR Imaging: Prediction of IDH Mutation Status and Tumor Progression. AJNR Am J Neuroradiol. 2015 Oct 22. [Epub ahead of print] PubMed PMID: 26494691.