Single- and Multivoxel Proton Spectroscopy in Pediatric Patients With Diffuse Intrinsic Pontine Glioma.

Steffen-Smith EA, Venzon DJ, Bent RS, Hipp SJ, Warren KE.

Pediatric Oncology Branch, National Cancer Institute, Center for Cancer Research, National Institutes of Health, Bethesda, Maryland.

Abstract

PURPOSE: To determine the feasibility of two magnetic resonance spectroscopy (MRS) techniques for treating pediatric patients with diffuse intrinsic pontine gliomas (DIPGs) and to evaluate the relationship of metabolic profiles determined by each technique. Utility of each technique for improving patient management is also discussed.

METHODS AND MATERIALS: Children with DIPG (n = 36) were evaluated using single-voxel spectroscopy (SVS) and magnetic resonance spectroscopic imaging (MRSI) during the same imaging session. Patients were followed longitudinally (n = 150 total studies). Technical feasibility was defined by sufficient water and lipid suppression for detection of metabolites. Correlation of metabolic data obtained by SVS and MRSI was determined using the Spearman rank method. Metabolite ratios, including choline:N-acetyl-aspartate (Cho:NAA) and Cho:creatinine (Cho:Cr), were obtained from SVS and MRSI.

RESULTS: SVS and MRSI acquisitions were feasible in >90% of studies. Maximum Cho:NAA and Cho:Cr from MRSI analysis were strongly associated with Cho:NAA and Cho:Cr obtained by SVS (r = 0.67 and 0.76, respectively). MRSI Cho:NAA values were more heterogeneous than Cho:Cr values within the same lesion, and a strong linear relationship between the range and maximum Cho:NAA values was observed.

CONCLUSIONS: SVS and MRSI acquisitions were feasible, with a strong correlation in metabolic data. Both techniques may improve diagnostic evaluation and management of DIPG. SVS is recommended for global assessment of tumor metabolism before and after therapy. MRSI showed heterogeneous patterns of metabolic activity within these tumors and is recommended for planning and monitoring targeted therapies and evaluating nearby tissue for tumor invasion.

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