IN VIVO MR SPECTROSCOPY IN THE HUMAN CERVICAL SPINAL CORD AT 1.5 AND 3 TESLA

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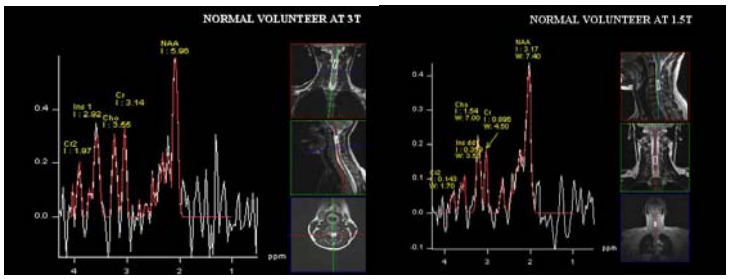
PURPOSE: Obtaining spectra from the spinal cord at 3 T is challenging because of cord pulsation, field inhomogeneity and small structure of the cord. There are few reports in the literature of normal MR spectroscopic values for in vivo evaluation of the cervical cord. We compare metabolite ratios from the human cervical spinal cord at 1.5 and 3 Tesla.

MATERIALS AND METHODS: We investigated 20 control subjects on a 1.5T MAGNETOM Avanto™ (Siemens Medical Solutions, Erlangen, Germany) and on a 3T MAGNETOM Trio™. The ^{1}H SVS protocol uses a modified PRESS* sequence, allowing a minimum voxel size of 5 mm, pulse/ECG triggering as well as outer volume saturation. Measurements were acquired with TE = 30 ms, 256 averages, voxel size = 5 x 7 x 30 mm, weak water suppression, a vector size of 256, and pulse triggering, with a TR = 590 ms. Some of the measurements were performed with outer volume saturation slabs. After positioning a small voxel in the target region of the upper cervical spinal cord (posterior to the C3 vertebral body) an automated shim was performed, followed by manual shimming if needed. As expected metabolite peaks in the pulse triggered spectra were narrower than corresponding peaks in the non triggered spectra and yielded adequate resolution for the calculation of metabolite ratios.



RESULTS: The average calculated relative ratios of metabolites at 3T and 1.5T are as follows: The NAA/Cr ratios are 1.73 ± 0.63 and 2.08 ± 0.35 (p=0.28); Cho/Cr ratios are 1.05 ± 0.25 and 1.24 ± 0.36 (p=0.39); Ins/Cr ratios are 0.73 ± 0.37 and 0.75 ± 0.43 (p=0.96); and the Cho/NAA are 0.63 ± 0.12 and 0.62 ± 0.24 (p=0.94).

CONCLUSION: Using a modified pulse triggered PRESS sequence, relative metabolite ratios from MRS of the human cervical spinal cord are comparable and reproducible at 1.5T and 3T. Quality of the data was improved by selection of an appropriate voxel size and by accurate positioning relative to the cord thickness and surrounding vertebrae, as well as by using pulse triggering.

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REFERENCES:

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