

Magnetization transfer imaging of the whole spinal cord in multiple sclerosis patients

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Topic: 27: MRI & PET

Abstract text: **Context:** Magnetization transfer ratio (MTR) has shown promise to assess tissue microstructure modification in MS patients. To date, such exploration has been limited to the brain and the cervical spinal cord (SC) portions of the central nervous system (CNS). Studying the MTR abnormalities in the whole SC could provide a better association with ambulatory disability in MS patients.

Objectives: i) to compare mean MTR values in MS patients and healthy controls (HC) according to the SC level; ii) to describe the link between MTR measurements at the cervical and thoracic SC levels; iii) to evaluate the link between MTR measures and disability according to the spinal cord level.

Methods: 21 relapsing remitting MS (RRMS; median EDSS=2.5), 10 progressive MS patients (PMS; median EDSS=5.25) and 13 HC were scanned on a 3T Siemens MRI scanner. The imaging protocol included 3 MT imaging acquisition slabs to cover the whole SC. For each subject, MTR maps and vertebra labeling were computed using the SCT toolbox. MTR means were computed in semi-automatic delineated SC for the following vertebral levels: C4 to C6, T4 to T6, T9 to T10. Group differences as well as correlations with lesions in the whole SC and EDSS were assessed controlling for age.

Results: Evidence of group difference was only found in the cervical SC (C4C6; mean MTR=41.7pu, 39.4pu, 35.4pu for HC, RRMS and PMS resp.; $p < .001$). No evidence for group difference was found in the thoracic SC. A positive association was found between the mean MTR in the cervical SC and in the thoracic SC ($r = .45$, $p = .01$ for T4T6 and $r = .54$, $p = .002$ for T9T10) in MS patients. We observed negative associations between mean MTR in the cervical SC and the EDSS score ($r = -.51$, $p = .004$) and between mean MTR in the cervical SC and the SC lesion load ($r = -.6$, $p < .001$), while no clear evidence of correlation was found between SC lesion load and EDSS score ($r = .35$; $p = .084$). No evidence of correlation was found between mean MTR in the thoracic cord and EDSS score.

Conclusions: The microstructural damage in the SC of MS patients seems to be predominant in the cervical SC and is linked to the lesion load and the disability. In our sample data, the added value of exploring thoracic SC in addition to cervical SC using MTR to explain disability in MS patients seems limited. Potential explanations could be the presence of higher variabilities in MTR measurement in the thoracic SC or the preferential location of MS lesions in the cervical SC.

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Travel Grant / Young Scientific Investigators' Sessions: I will not apply for Travel Grant or Young Scientific Investigators' Session

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