

Abstract Preview - Step 3/4

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Topic: Pathology and pathogenesis of MS - Imaging

Title: Correlation between brain volume change and T2 relaxation time in patients with clinically isolated syndrome

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Text: **Background and objective:** Regional volumetric studies have suggested that reversible brain volume changes (pseudoatrophy) are mostly confined to the white matter, where inflammatory infiltrates, glial activation and vasogenic oedema are more prominent compared to grey matter. The aim of this study is to correlate pseudo-T2 values (a measure of brain hydration status) with brain volume changes in patients with clinically isolated syndrome (CIS).

Materials and methods: 96 patients with CIS were included (62 women; median age, 33 years; age range, [19, 49]; EDSS mean, 2; EDSS range, [0, 4.5]; mean disease duration, 3.78 months). Baseline and 12 months proton density (PD), T2-weighted, and 3D magnetization-prepared rapid gradient-echo (MPRAGE) sequences were acquired on a 3.0T. The dual-echo sequence was used to produce pseudo-T2 maps [$pT2 = (TE_2 - TE_1) / \ln(S_1/S_2)$], where S_1 and S_2 were the measured image intensities at each echo time, TE_1 and TE_2 . Pseudo-T2 values, which are a simple measure that reflects brain water content, were evaluated in regions of normal appearing white matter drawn on PD-weighted images using Jim 6.0 software. The images acquired with the MPRAGE sequence were used to obtain white and grey matter fractions using SIENAX (FSL). Changes between month 12 and baseline studies in pT2, white and grey matter fractions were then evaluated. Statistical analysis include Spearman rank correlation test to evaluate the relation between changes in pT2 and changes in white and grey matter fractions.

Results: A significant, although weak positive correlation ($r=0.276$, $p=0.006$) between changes in pT2 and changes in white matter was found. Changes in grey matter did not correlate with changes in pT2 ($r=-0.002$, $p=0.982$).

Conclusions: The results obtained support the concept that white matter volume changes in patients with multiple sclerosis can be partially explained by fluctuations in brain water. Our results also support the value of pseudo-T2 measures to assess white matter water changes, and its potential role in distinguishing reversible from irreversible brain tissue loss (atrophy).

Disclosure: F. X. Aymerich has nothing to disclose

C. Auger has received speaking honoraria from Biogen, Stendhal and Novartis

M. Alberich has nothing to disclose

D. Pareto has received speaking honoraria from Novartis and Genzyme

J. Sastre-Garriga has received compensation in the last 12 months for speaking or participation in advisory boards from Novartis, Biogen and Merck and grants from Genzyme.

M. Tintore has received compensation for consulting services and speaking honoraria from Bayer Schering Pharma, Merck-Serono, Biogen-Idec, Teva Pharmaceuticals, Sanofi-Aventis, Novartis, Almirall, Genzyme, and Roche.

X. Montalban has received speaking honoraria and travel expenses for participation in scientific meetings, has been a steering committee member of clinical trials or participated in advisory boards of clinical trials in the past years with Almirall, Bayer, Biogen, Genzyme, Merck, Novartis, Receptos, Roche, Sanofi-Genzyme and Teva Pharmaceutical

A. Rovira serves on scientific advisory boards for Biogen Idec, Novartis, Genzyme, and OLEA Medical, has received speaker honoraria from Bayer, Genzyme, Sanofi-Aventis, Bracco, Merck-Serono, Teva Pharmaceutical Industries Ltd, OLEA Medical, Stendhal, Novartis and Biogen Idec, and has research agreements with Siemens AG.

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