

## Cognitive diagnostic criteria lead to distinct patterns of functional connectivity in Secondary Progressive MS.

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Resting state functional MRI(rsfMRI) is an established tool for investigating cognitive impairment(CI) (affecting 40-70% dependent on criteria) in Multiple Sclerosis(MS). This study used rsfMRI to investigate the pattern of functional connectivity (FC) in cognitively impaired(CI) and cognitively preserved(CP) secondary progressive MS(SPMS) patients based on criteria.

70 SPMS subjects (age $54\pm 7.1$ , disease duration  $22\pm 9.1$  years, EDSS 6.0 (range 4.0-6.5), progression duration  $8.03\pm 5.2$  years) were recruited locally. Cognition was assessed by a battery of neuropsychometric tests and defined using the conservative criteria (z-score of -1.96 standard deviations (SD) on  $\geq 2$  tests) and lenient criteria (z-score of -1.5SDs on  $\geq 2$  tests). RsfMRI obtained using a 3T Philips scanner was pre-processed and underwent Independent Component Analysis(ICA) to identify the Resting State Networks(RSNs). Dual regression compared group-specific maps(i.e. CI vs CP according to criteria).

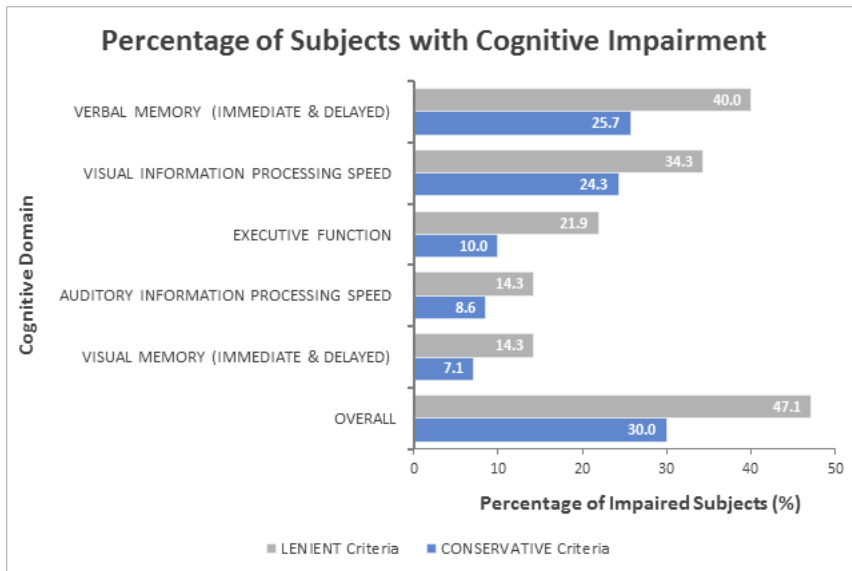
We found that the proportion of SPMS-CI changes by 17.1% when using the more stringent conservative(30%) versus the lenient(47.1%) criteria. Overall, 14 RSNs were identified. The greatest FC differences between CI and CP patients within RSNs occurred with the conservative criteria. Independent of the CI criteria used, the left ventral attention network(LVAN), involved in attention processing, is overall the most impaired network in SPMS-CI suggesting that pathological changes in this RSN may underpin global cognitive problems in SPMS.

### References:

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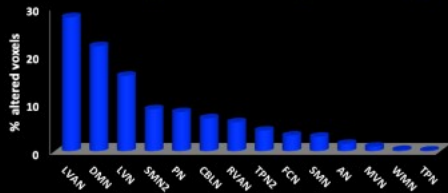
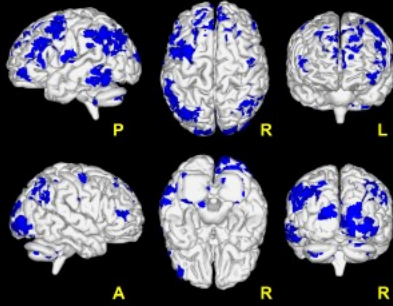
**Figure 1.** Percentage of overall SPMS and individual cognitive domains classified as impaired using conservative and lenient criteria respectively; Visual memory 7.1% versus 14.3%, auditory information processing speed 8.6% versus 14.3%, executive function 10% versus 21.9%, visual information processing speed 24.3% versus 34.3% and verbal memory 25.7% versus 40%.



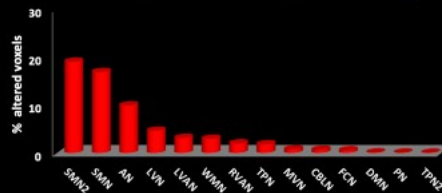
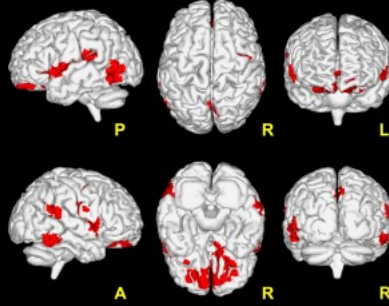
**Figure 2.** Areas of reduced FC (in blue) and increased FC (in red) in the 14 RSNs comparing SPMS-CI and SPMS-CP classified using the conservative criteria (a-b) and the lenient criteria (c-d).

## Conservative criteria

CP > CI

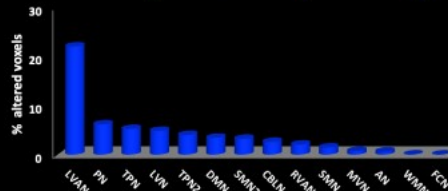
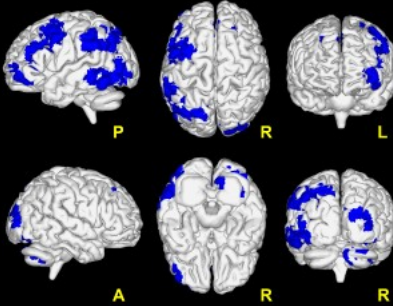


CI > CP



## Lenient criteria

CP > CI



CI > CP

