Baseline Neuropsychological Profiles in Youth with Pediatric-Onset Multiple Sclerosis with Comparison to Normative Datasets

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Background
Compared to adult-onset patients, youth with pediatric-onset multiple sclerosis (POMS) are at higher risk for early cognitive impairment. Domains that are commonly affected include attention, memory, visual-spatial processing, and intelligence. The field lacks reliable measures to identify those children at highest risk of cognitive impairment. A better understanding of cognitive impairment in youth with POMS is critical for next-step investigations of predictive measures and interventions.

Methods
We conducted a retrospective assessment of youth with POMS that completed clinical neuropsychology testing within 2 years of their baseline visit for our prospective Pediatric MS Walking Study (N=36). Variables of interest included intellectual functioning (Vocabulary and Matrix Reasoning subtests from the Wechsler Abbreviated Scale of Intelligence – 2nd Edition (WASI-2)), auditory attention/working memory and processing speed (Digit Span and Coding subtests from the Wechsler Intelligence Scale for Children – 5th Edition (WISC-5)) and switching/set-shifting (Trail Making subtest from the Delis-Kaplin Executive Function System (D-KEFS)). One-sample t-tests were used to understand baseline differences in cognition between POMS participants and normative data. Linear regression models were used to identify correlations between z-scores for the Simple Digit Modality Test (SDMT) (a common, clinic-administered cognitive screening test for MS patients) and the variables of interest.

Results
Compared to normative datasets, youth with POMS exhibit dimished performance on the Digit Span Forward ($t = -5.10$, $df = 34$, p-value = < 0.001) and Digit Span Total ($t = -6.08$, $df = 34$, p-value = < 0.01) tests. Performance on the Coding component of the WISC-5 was significantly decreased in participants with a disease duration of ≤1 year compared to both normative data ($t = -2.82$, $df = 22$, p-value = 0.01). Additionally, SDMT z-scores correlate with the Coding variable based on linear regression modeling, and it was seen that for every one unit increase in SDMT z-score, the participant's score on the Coding performance score increased by 0.741 units. (SE=0.334, p = 0.033).

Discussion
The data shows that youth with POMS have lower neuropsychological assessment scores, compared to normative data, specifically in the domain of auditory attention/working memory and processing speed. This highlights the importance of developing metrics that can identify small declines in the most commonly impaired domains to identify patients who may benefit from intervention sooner. Further analysis of the dataset is pending.