network may be an important factor in optimizing cognitive health in MS.

Categories: Multiple Sclerosis/ALS/Demyelinating Disorders
Keyword 1: multiple sclerosis
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30 Hippocampal Internal Architecture Subfield Volumes Associated with Systematic Inflammatory Biomarkers in Multiple Sclerosis

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Objective: Multiple Sclerosis (MS) affects up to 500,000 adults in the United States, with cognitive impairment present in 45%-65% of people. Studies showed hippocampal atrophy in MS, but the underlying mechanisms remain unknown. Inflammation has been proposed to play a significant role, and associations between systemic inflammatory biomarkers and hippocampal atrophy have been shown in other neurological conditions. However, research exploring serum biomarker and volumetric associations in MS are lacking. Given that conventional imaging methods lack resolution for hippocampal internal architecture (HIA), new protocols were developed. We used the High-Resolution Multiple Image Co-Registration and Averaging (HR-MICRA) method to visualize the HIA subfields. We investigated the relationship between subfield volumes generated from HR-MICRA scans and systemic serum biomarkers in MS.
Participants and Methods: Patients with MS were recruited (N= 34, mean age= 54.6, 35.3% Black) underwent Magnetic Resonance Imaging (MRI), and serum biomarkers were obtained, specifically chosen for their potential role in MS. Inflammatory biomarkers included; granulocyte colony stimulating factor (G-CSF), interleukin-10 (IL-10), matrix metalloproteinase-9 (MMP-9), tumor necrosis factor- α (TNF- α), and growth factors; vascular endothelial growth factor (VEGF); insulin-like growth factor-1 (IGF-1), and brain derived growth factor (BDNF). Imaging was performed in a Siemens Prisma 3T scanner with a 64-channel head coil using the HR-MICRA method. Hippocampal subfields were calculated using the Automated Segmentation of Hippocampal Subfields (ASHS) package. We used the Magdeburg Young Adult 7T Atlas for sub-hippocampal structures and Penn Temporal Lobe Epilepsy T1-MRI Whole Hippocampus ASHS Atlas for general hippocampal structure and segmentation. Pearson's product-moment analyses provided correlations between biomarkers and hippocampal subfield volumes for each cerebral hemisphere. A statistical significance level of $p < 0.05$ was used for all analyses.
Results: Correlations emerged between left hemisphere Cornu Ammonis (CA) 2 and G-CSF ($r = –.384$; $p = .025$); IL-10 ($r = –.342$; $p = .048$); VEGF ($r = –.371$; $p= .031$); and CA3 with IL-10 ($r = –.488$, $p = .003$); G-CSF ($r = –.386$; $p= .024$); VEGF ($r = –.352$; $p= .041$). Dentate gyrus correlated with MMP-9 ($r =.416$; $p=.014$); IL-10 ($r = –.365$; $p =.034$). BDNF was correlated with right hemisphere CA1 ($r = –.417$, $p = .014$), CA2 ($r = –.497$; $p= .003$) and CA3 ($r = –.451$; $p=.007$).
Conclusions: In our sample of persons with MS, left hemisphere hippocampal subfield volumes were negatively correlated with inflammatory biomarkers, supporting previous reports linking inflammation to reduced brain volumes in other neurological conditions. In the right hemisphere, we found negative correlations between HIA and BDNF, suggesting a neuroprotective function for BDNF in this neurodegenerative disease. These findings in a representative sample of patients with MS highlight the need for further research exploring

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the relationship between HIA and systemic serum biomarkers in MS.

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31 Finding the Link Between Inflammatory Biomarkers and Cognitive Functioning in People with Multiple Sclerosis

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Objective: To investigate the relationship between systematic inflammatory biomarkers and cognition in patients with Multiple Sclerosis (MS).
Participants and Methods: We recruited 36 patients diagnosed with MS (31 with relapsing-remitting and 5 with progressive) who presented for treatment at the University of Alabama at Birmingham (UAB). Patients underwent a comprehensive neuropsychological battery, and serum blood samples were collected. Cognitive data was divided into an overall Cognitive Composite score and seven cognitive domains (i.e., Attention, Verbal Memory, Visual Memory, Visuospatial Ability, Language, Processing Speed, and Executive Function) using z-score averages. Pearson's product-moment correlations were conducted to determine the relationship between cognitive performance and 14 inflammatory biomarkers specifically chosen for their potential role in MS.
Results: Granulocyte Colony Stimulating Factor (G-CSF) was significantly correlated with Executive Function (r= -.355; p=.039) and Processing Speed (r= -.528; p= .001) scores. Additionally, Interleukin-10 (IL-10) was significantly correlated with Visual Memory (r= -.346; p= .041) scores. Finally, Tumor Necrosis Factor (TNF-α) was significantly correlated with Visual Memory (r= -.347; p= .041).
Conclusions: Studies investigating associations between inflammation and cognition in MS are lacking. In our sample of persons with Multiple Sclerosis, G-CSF biomarkers were negatively correlated with Executive Function as well as Processing Speed. In addition, IL-10 and TNF-α biomarkers were negatively correlated with Visual Memory scores. These findings in a representative sample of patients with MS highlight the need for further research exploring the relationship between systematic inflammatory biomarkers and cognition in MS.

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32 Impacts of Multiple Sclerosis on Verbal Learning and Memory in Aging

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Objective: Multiple sclerosis (MS), an inflammatory autoimmune disease of the central nervous system, is characterized by damage to white matter via myelin degeneration with resulting sclerotic plaques and lesions. Upwards of 70% of people with MS show cognitive changes in multiple domains including verbal memory. Advances in disease-modifying therapies have increased the expected lifespan of people with MS, making aging with MS a critical emerging area of study. Memory declines during normal aging, yet the specific impact of MS on verbal memory in aging is inconclusive and understudied. To address this gap in knowledge, we examined whether MS was associated with verbal learning slope, total learning, delayed recall, and recognition performance in older adults. We further explored whether MS disease severity influenced these memory operations.

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