neuropsychological evaluation can aid in assessing cognitive decline and quality of life pre- and post-treatment. In light of the tumors' progressive nature and potential presence in precarious brain locations, it is imperative that the functional burden of the various presentations of glioblastomas be understood. Given the limited data on cognitive presentations of glioblastomas, we present a case study describing a neuropsychological and neuroradiologic profile of a Grade 4 astrocytoma in a patient with a left temporal glioblastoma.

Participants and Methods: The patient signed consent for clinical evaluation and research. At the time of evaluation, he was 68 years old with a master's degree and was working at multiple start-up companies. He began noticing subtle cognitive functioning changes approximately two months prior with difficulty understanding information. His challenges progressed to difficulty composing emails, word-finding issues, and some slurring and mispronunciations. He was diagnosed with a brain tumor after an emergency MRI was performed. He participated in a neuropsychological evaluation just prior to surgery. The evaluation included a battery of neuropsychological tests examining attention, processing speed, executive functioning, learning and memory, language functioning, visuospatial functioning, motor functioning, and mood.

Results: The imaging results revealed a non-enhancing intra-axial mass in the left superior temporal lobe with surrounding edema. Also noted were rare scattered nonspecific T2 hyperintensities. The scores showed variable motor functioning and deficits within attention for complex information, executive functioning abilities (i.e., motor planning and sequencing, phonemic fluency), language functioning, visuospatial functioning, and learning and memory of information relative to his premorbid level of functioning, indicating total brain involvement consistent with imaging findings of edema.

Conclusions: Taken together, the results of the evaluation and imaging were suggestive of a level of cognitive decline that is more than expected with normal aging. Moreover, there was a lack of evidence representative of a lateralized profile. Notably, the evaluation was conducted before resection surgery, and therefore, the patient continued to experience significant brain edema due to the tumor. Although medication may have contributed to dysfunction, particularly with motor and cognitive slowing, it is not likely that it explained his presentation entirely. As such, the evaluation results were suggestive of neurocognitive dysfunction, which was partially attributable to the tumor and edema displacing neuronal tissue. Given the potential for improvement following tumor resection and secondary decline resulting from recurrence or treatment, it is crucial to have a baseline and the ability to map out higher order functioning, including frontal and temporal lobe functioning. Ultimately, as the field continues to look toward long-term survival for patients with currently lethal brain tumors, the goal is to achieve maximum resection with minimal neurocognitive loss.

---

52 Open Access, Normative Morphometric Software Indicate Neurodegeneration Associated with Episodic Memory Dysfunction in Amnestic MCI

Stephanie Fountain-Zaragoza[1], Olivia Horn[1], Kathryn E. Thorn[1], A. Zarina Kraal[2], Andreana Benitez[1]
[1]Medical University of South Carolina, Charleston, SC, USA. [2]Columbia University, New York City, NY, USA

Objective: Neurodegeneration in Alzheimer's disease (AD) is typically assessed through brain MRI, and proprietary software can provide normative quantification of regional atrophy. However, proprietary software can be cost-prohibitive for research settings. Thus, we used the freely available software NOrmative Morphometry Image Statistics (NOMIS) which generates normative z-scores of segmented T1-weighted images from FreeSurfer to determine if these scores replicate established patterns of neurodegeneration in the context of amnestic mild cognitive impairment (aMCI), and whether

these measures correlate with episodic memory test performance.

Participants and Methods: Patients with aMCI (*n* = 25) and cognitively normal controls (CN; *n* = 74) completed brain MRI and two neuropsychological tests of episodic memory (the Rey Auditory Verbal Learning Test and the Wechsler Logical Memory Tests I & II), from which a single composite of normed scores was computed. A subset returned for follow-up (aMCI *n* = 11, CN *n* = 52) after ~15 months and completed the same procedures. T1-weighted images were segmented using FreeSurfer v6.0 and the outputs were submitted to NOMIS to generate normative morphometric estimates for AD-relevant regions (i.e., hippocampus, parahippocampus, entorhinal cortex, amygdala) and control regions (i.e., cuneus, lingual gyrus, pericalcarine gyrus), controlling for age, sex, head size, scanner manufacturer, and field strength. Baseline data were used to test for differences in ROI volumes and memory between groups and to assess the within-group associations between ROI volumes and memory performance. We also evaluated changes in ROI volumes and memory over the follow-up interval by testing the main effects of time, group, and the group X time interactions. Lastly, we tested whether change in volume was associated with declines in memory.

Results: At baseline, the aMCI group performed 2 SD below the CN group on episodic memory and exhibited smaller volumes in all AD-relevant regions (volumes 0.4 – 1.2 SD below CN group, *p*s < .041). There were no group differences in control region volumes. Memory performance was associated with volumes of the AD-relevant regions in the aMCI group (average rho = .51) but not with control regions. ROI volumes were not associated with memory in the CN group. At follow-up, the aMCI group continued to perform 2 SD below the CN group on episodic memory tests; however, change of performance over time did not differ between groups. The aMCI group continued to exhibit smaller volumes in all AD-relevant regions than the CN group, with greater declines in hippocampal volume (17% annual decline vs. 8% annual decline) and entorhinal volume (54% annual decline vs. 5% annual decline). There was a trending Group X Time interaction such that decrease in hippocampal volume was marginally associated with decline in memory for the aMCI group but not the CN group.

Conclusions: Normative morphometric values generated from freely available software demonstrated expected patterns of group differences in AD-related volumes and associations with memory. Significant effects were localized to AD-relevant brain regions and only occurred in the aMCI group. These findings support the validity of these free tools as reliable and cost-effective alternatives to proprietary software.

Categories: Neuroimaging
Keyword 1: mild cognitive impairment
Keyword 2: normative data
Correspondence: Olivia Horn, Medical University of South Carolina, horno@musc.edu

---

53 Change in Cerebral Metabolite Concentrations Following Bariatric Surgery

Sarah Bottari[1], Ronald Cohen[1], Jeffrey Friedman[1], Eric Porges[1], Alexa Chen[1], John Gunstad[2], Adam Woods[1], John Williamson[1]
[1]University of Florida, Gainesville, FL, USA.
[2]Kent State University, Kent, Ohio, USA

Objective: Obesity is associated with adverse effects on brain health, including increased risk for neurodegenerative diseases. Changes in cerebral metabolism may underlie or precede structural and functional brain changes. While bariatric surgery is known to be effective in inducing weight loss and improving obesity-related medical comorbidities, few studies have examined whether it may be able to improve brain metabolism. In the present study, we examined change in cerebral metabolite concentrations in participants with obesity who underwent bariatric surgery.

Participants and Methods: 35 patients with obesity (BMI ≥ 35 kg/m^2) were recruited from a bariatric surgery candidate nutrition class. They completed single voxel ^{1}H-proton magnetic resonance spectroscopy at baseline (pre-surgery) and within one year post-surgery. Spectra were obtained from a large medial frontal brain region. Tissue-corrected absolute concentrations for metabolites including choline-containing compounds (Cho), myo-inositol (mI), N-acetylaspartate (NAA), creatine (Cr), and glutamate and glutamine (Glx) were determined using Osprey. Paired t-tests were used to examine within-subject change in metabolite concentrations, and correlations were used to