

293 NRTMS-BASED DTI FIBER TRACKING FOR LANGUAGE-RELEVANT SUBCORTICAL FIBER TRACTS: FEASIBILITY OF THE PROBABILISTIC ALGORITHM

C. Negwer, I. Rautu, N. Sollmann, S. Ille, B. Meyer, S. Krieg. *TU Munich, Germany*

Objective: Preservation of language function in patients with perisylvian brain tumors is an important aspect in modern neurooncological treatment. For preservation of subcortical structures nrTMS-based diffusion tensor imaging fiber tracking (DTI FT is a helpful method for preoperative planning and intraoperative application. Most published protocols use a deterministic algorithm, so the main objective of our study is the feasibility and applicability of a probabilistic FT algorithm in the clinical routine when nrTMS provides the functional data to the tractography as a purely structural modality.

Methods: Twenty patients, suffering from perisylvian space-occupying lesions, could be prospectively included between 01/2018 and 09/2018. Every patient received nrTMS language mapping preoperatively. The nrTMS data were then exported to our tractography software (MRtrix). A probabilistic algorithm then was performed for DTI FT using 77 different settings of minimal fiber length and fractional anisotropy thresholds.

Results: The probabilistic algorithm was eligible in 100% of our patients. Language-relevant fiber tracts, such as the arcuate fascicle and the superior longitudinal fascicle could be portrayed in every patient using nrTMS data as seeding points.

Conclusion: Probabilistic nrTMS-based DTI FT is feasible in 100% of our patient cohort and delivers good results regarding the portrayal of subcortical white matter tracts. A comparison study should evaluate the benefits against the deterministic approach.

Keywords: DTI, fiber tracking, glioma, language

298 ABNORMAL FUNCTIONAL FRONTAL ASYMMETRY AND BEHAVIORAL CORRELATES IN ADULT ADHD: A TMS-EEG STUDY

A. Avnit^{1,2}, U. Alyagon^{1,2}, S. Zibman^{1,2}, A. Zangen^{1,2}. ¹Department of Life Sciences, Ben-Gurion University of the Negev, Israel; ²Zlotowski Center for Neuroscience, Ben-Gurion University of the Negev, Israel

Abnormal functional brain asymmetry and deficient response inhibition have been implicated as central to attention deficit hyperactivity disorder (ADHD). We investigated the relations between these factors in adults with ADHD and whether altered frontal excitability and/or compromised interhemispheric connectivity may mediate frontal asymmetry abnormalities in this disorder. To this end, frontal asymmetry of the stop-signal N200 event-related potential (ERP) component— which is lateralized to the right hemisphere and related to response inhibition— was compared between groups of 52 ADHD and 43 non-clinical adults. We additionally examined group differences in (1) response inhibition performance; (2) TMS-evoked potential (TEP) in the right frontal hemisphere— indicative of local cortical excitability; and (3) frontal right-to-left interhemispheric signal propagation (ISP)— reversely indicative of interhemispheric connectivity. Relations between N200 frontal-asymmetry and these measures were also examined. The ADHD group demonstrated reduced N200 right-frontal-asymmetry, weaker TEP and stronger ISP than that of controls. Moreover, N200 right-frontal-asymmetry was positively correlated with response inhibition performance and with TEP in the ADHD group, while no similar relation was observed for ISP. Our results indicate that abnormal frontal asymmetry is related to a key cognitive deficit in ADHD and may be subserved by reduced right-frontal excitability.

Keywords: ADHD, EEG, Asymmetry, TMS

299 MOTOR CORTEX FACILITATION: AN INATTENTION MARKER IN ADHD CO-OCCURRENCE IN AUTISM SPECTRUM DISORDER

E. Pedapati¹, L. Mooney², S. Wu¹, J. Sweeney¹, C. Erickson¹, D. Gilbert¹. ¹Cincinnati Children's Hospital Medical Center, USA; ²UC Davis, USA

Objectives The neural correlates distinguishing youth with Autism Spectrum Disorder (ASD) and ASD with co-occurring Attention Deficit/Hyperactivity Disorder (ASD+) are poorly understood despite significant phenotypic and prognostic differences.

Methods Cohort study of ASD (n=20), ASD+ (n=30), and control (TDC) (n=21) youth. One-way ANOVA was used to compare TMS measures including intracortical facilitation (ICF; 10 ms ISI), short interval cortical inhibition (SICI; 3 ms ISI), cortical silent period (CSP), and active (AMT) and resting (RMT) motor thresholds and clinical ratings. Conditioning pulse was delivered at 60% of RMT and test pulse at 120% RMT.

Results Groups were matched by age (mean = 16; SD = 2.9) and gender (1 female per group). ASD and ASD+ groups did not differ by IQ or social functioning, however, ASD+ had significantly higher inattention and hyperactivity scores. ICF in ASD+ (Mean 1.0, SD 0.19) was less than ASD (1.3 +/- 0.36) or TDC (1.2 +/- 0.22) (F_{2,68} = 7.4, p = 0.001). Less robustly, CSP in ASD (0.05 msec +/- 0.04) was shorter than ASD+ (0.06 msec +/- 0.05) or TDC (0.08 +/- 0.04) (F_{2,68} = 3.1, p = 0.05). No differences were found between groups for SICI or age corrected AMT/RMT. Across all ASD youth, ICF was inversely correlated with worse inattention (Conners-3 Inattention (r = -0.35; p = 0.013) and ADHD-IV Inattention percentile (r = -0.394, p < 0.005)) and Executive Function scores (r = -0.372; p = 0.008).

Conclusions ICF remains intact in ASD but is diminished in ASD+. ICF is associated with inattention and executive function across ASD. Previous studies have shown ICF to be impaired in youth with ADHD. Taken with the present findings, ADHD may have a distinct electrophysiological “signature” in otherwise typical or ASD youth. ICF may represent an emerging biomarker to study the physiology of ADHD in ASD which may align with disease prognosis or treatment response.

Keywords: Autism ADHD biomaker ICF

300 OXIDIZED PHOSPHATIDYLCHOLINES AS A PREDICTIVE FACTOR OF TREATMENT RESPONSE TO REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION IN MAJOR DEPRESSIVE DISORDER

H. Stirton¹, B. Meek², A. Edel², M. Modirrousta², A. Ravandi². ¹University of Manitoba, Max Rady College of Medicine, Canada; ²St. Boniface Hospital Albrechtsen Research Centre, Canada

Background: Repetitive Transcranial Magnetic Stimulation (rTMS) is increasingly being used in the treatment of Major Depressive Disorder (MDD). However, given that not all patients respond to rTMS, it would be clinically useful to have reliable biomarkers that accurately predict treatment response. Lipidomics represents a promising approach to identify new diagnostic biomarkers. Oxidized phosphatidylcholine (OxPC) is an important plasma biomarker of oxidative stress and inflammatory processes. Not only is depression associated with oxidative stress, but rTMS has been shown to have anti-oxidative effects.

Objective: To investigate whether baseline OxPC levels could predict treatment response in patients with treatment-resistant MDD.

Methods: Fifty-one patients undergoing rTMS treatment for MDD were recruited and blood was drawn immediately prior to treatment and again upon completion. Nine healthy control subjects were also recruited to provide baseline blood samples without undergoing treatment. OxPCs were extracted and analyzed through high performance liquid chromatography coupled with mass spectrometry. Depression symptoms were assessed using the Hamilton Depression (Ham-D) scale. Patients with a Ham-D score < 7 post-treatment were defined as having entered remission.

Results: MDD patients who entered remission following rTMS were found to have significantly higher baseline levels of total OxPCs, fragmented OxPCs and a specific fragmented OxPC, 1-palmitoyl-2-oxononanoyl-sn-glycero-3-phosphocholine (PONPC), compared to non-remitters and controls (all one-way ANOVAs, p < 0.05). However, no significant change in OxPC levels were found as a result of rTMS, regardless of treatment response (p > 0.05).

Conclusion: These results suggest that certain categories of OxPCs may be useful as a predictive factor for response to rTMS treatment in MDD. Given that elevated oxidized lipids may indicate higher levels of oxidative stress and inflammation in the brain, patients with this particular phenotype of depression may be more receptive to rTMS treatment.