ALTERED INTERVAL TIMING AS A NOVEL MARKER OF COGNITIVE FLUCTUATIONS IN LEWY BODY DEMENTIA

1Brain and Mind Centre, University of Sydney, Camperdown, NSW, Australia; 2School of Social Sciences and Psychology, University of Western Sydney, Sydney, NSW; Australia

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Introduction Cognitive fluctuations are a core clinical feature of Dementia with Lewy Bodies (DLB), characterized by marked spontaneous variations in cognitive abilities and alertness. There is a paucity of objective measurements of fluctuations in the clinical setting. Altered time awareness represents a potential clinical marker of fluctuations and/or their severity. In this study we aimed to investigate qualities of interval timing in patients with DLB.

Methods 25 patients with probable DLB and 14 older controls underwent testing using a simple time perception paradigm testing probing different aspects of interval timing including time estimation (retrospective estimation of interval length), time production (prospective determination of an interval) and time pacing (explicit timing of an interval). Intervals of 10 to 90s were randomized between trials. Self/carer-reporting of fluctuations were measured using the clinician assessment of fluctuation (CAF) and one-day fluctuation (OFS) scales.

Results We found significant differences in interval timing between controls and DLB for time estimation and time production. Overall, DLB patients estimated less time which was significant at 90 seconds (proportion of interval = 0.92 vs 0.69; p = 0.03). DLB produced less time (proportion of 90s interval = 0.58 vs 1.0; p < 0.001). Errors in time estimation at 90 seconds correlated with fluctuation presence according to the CAF (r = 0.47; p = 0.009) whilst errors in time pacing at 90s correlated strongest with fluctuation severity according to the OFS (r = 0.65; p < 0.001). ROC analysis identified time production (90s) as a good test to distinguish DLB from controls (AUC = 0.8, 95% CI 0.75–0.98).

Conclusion We demonstrate objective evidence for altered temporal processing in DLB and suggest abnormal interval timing as a novel and clinically useful bedside marker of cognitive fluctuations.

SUBTHALAMIC NUCLEUS DEEP BRAIN STIMULATION EVOKED RESONANT NEURAL ACTIVITY PREDICTS CLINICAL RESPONSE TO DBS

1,3San Son Xu*, 1,4Nicholas C Sindair, 1,3,5Kristian I Bulluss, 1,2Thushara Perera, 1,2Wee-Lih Lee, 1Hugo J McDermott, 1,3,6,7Wesley Thevathasan. 1Bionics Institute, East Melbourne, VIC, Australia; 2Department of Medical Biowis, The University of Melbourne, Parkville, VIC, Australia; 3Department of Neurology, Austin Health, Melbourne, VIC, Australia; 4Department of Neurology, Austin Hospital, Heidelberg, VIC, Australia; 5Department of Neurology, Austin Hospital, Heidelberg, VIC, Australia; 6Department of Neurosurgery, Austin Hospital, Heidelberg, VIC, Australia; 7Department of Neuroscience, St Vincent’s Hospital, Fitzroy, VIC, Australia; 8Department of Neurology, Royal Melbourne Hospital, Parkville, VIC, Australia; 9Department of Medicine, The University of Melbourne, Parkville, VIC, Australia

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Introduction DBS can improve motor deficit in Parkinson’s disease (PD) patients. Existing devices have limitations due to electrode positioning errors, fallible manual programming and delivery of continuous ‘open-loop’ stimulation despite fluctuating patient state. This results in partial efficacy, adverse effects and increased cost. One solution is to use an electrical feedback signal or ‘biomarker’ recorded from DBS electrodes. The most widely studied signal has been spontaneous local field potentials (LFPs), particularly beta band (13–30 Hz) and high frequency oscillations (HFO) (200–400 Hz). Here, we report a novel biomarker in the form of a large amplitude, evoked potential, with a characteristic oscillatory decay, termed evoked resonant neural activity (ERNA).

Methods LFPs and ERNA were recorded in 14 patients with PD (28 hemispheres) undergoing STN DBS surgery. The four contacts in each electrode array were ranked according to ERNA amplitude, beta power, HFO power and proximity to the anatomically ideal stimulation location. At least 3 months after surgery, motor scores (UPDRS III, reaction time) were measured. We identified a threshold for the magnitude of ERNA amplitude, beta power, HFO power and proximity to the anatomically ideal stimulation location. The threshold was determined to be significant at p < 0.05, with a correlation coefficient r >0.7. We then compared the threshold results to the clinical response to DBS, measured using the change in the UPDRS III score from the preoperative to the postoperative period. The results were analyzed using a paired t-test and linear regression analysis.

Results We identified a significant correlation between the threshold results and the clinical response to DBS. The threshold results were able to accurately predict the clinical response to DBS with a sensitivity of 95% and a specificity of 85%. The linear regression analysis revealed a strong correlation between the threshold results and the change in the UPDRS III score from the preoperative to the postoperative period (r = 0.85, p < 0.001).

Conclusion We have developed a method that objectively quantifies time from commencing therapy to its full effect. Time to full effect varies among therapies.

THERAPEUTIC LAG IN RELAPSING MULTIPLE SCLEROSIS

1Azzane Ross*, 1Frederico Frascoll, 1Jeanette Lechner-Scott, 1Pamela McCombe, 3Richard Macdonell, 1Helmuth Butzkueven, 3Charles Malpas, 1Tomas Kalincik, 1CQHE Unit, Department of Medicine, University of Melbourne, Melbourne, VIC, Australia; 2Department of Neurology, Royal Melbourne Hospital, Melbourne, VIC, Australia; 3Department of Mathematics, Swinburne University of Technology, Faculty of Science, Engineering and Technology, Melbourne, VIC, Australia; 4School of Medicine and Public Health, University of Newcastle, Newcastle, NSW, Australia; 5Department of Neurology, John Hunter Hospital, Hunter New England Health, Newcastle, NSW, Australia; 6Department of Neurology, Royal Brisbane and Women’s Hospital, Brisbane, QLD, Australia; 7Department of Neurology, Austin Health, Melbourne, VIC, Australia; 8Flory Institute of Neuroscience, Melbourne, VIC, Australia; 9Department of Neuroscience, Central Clinical School, Monash University, Melbourne, VIC, Australia; 10Department of Neurology, Alfred Hospital, Melbourne, VIC, Australia

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Introduction In multiple sclerosis (MS), treatment start or switch is prompted disease activity, often represented by relapse occurrence. There is a paucity of objective measurements of fluctuations in the clinical setting. Altered time awareness represents a potential clinical marker of fluctuations and/or their severity. In this study we aimed to investigate qualities of interval timing in patients with DLB.
evaluated off-DBS and during stimulation delivered through each electrode contact in a randomised order.

**Results** ERNA amplitude, beta power and contact proximity to the anatomically ideal stimulation location predicted magnitude of therapeutic response to DBS. However, after exclusion of covariance, ERNA amplitude remained the only significant predictor of DBS response.

**Conclusion** ERNA is a readily recordable, large amplitude signal that accurately correlates with motor response to DBS. It holds significant potential as a biomarker for guiding electrode implantation, ideal contact selection, automated parameter fitting and delivery of closed-loop DBS.

**REFERENCE**


**004 VESTIBULAR EVENT MONITORING IN THE EMERGENCY DEPARTMENT**

1,2Benjamin Nham*, 1Nicole Reid, 1Emma Argaet, 1Allison Young, 3Kendall Bein, 1Gabor M Halmagyi, 1Miriam S Welgampola. Institute of Clinical Neurosciences, Royal Prince Alfred Hospital, Sydney, NSW, Australia; 2Central Clinical School, University of Sydney, Camperdown, NSW, Australia; 1Emergency Medicine, Department of Emergency Medicine, Royal Prince Alfred Hospital, Camperdown, NSW, Australia

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**Introduction** Acute vertigo is often accompanied by ictal-nystagmus which may assist with diagnosis. We examine the merits of a structured assessment combined with vestibular event-monitoring in the Emergency Department (ED).

**Methods** We undertook a structured clinical assessment and video-nystagmography in 220 non-consecutive patients presenting to a public-hospital ED with acute vertigo, during a 10-month period. The records of 115 consecutive vertiginous patients who underwent standard-assessment were compared.

**Results** For the structured assessment group: 54% presented with acute vestibular syndrome (AVS), 24% with episodic spontaneous vertigo (EVS), and 20% with recurrent positional-vertigo (RPV).

For AVS (n=119), most common diagnoses were vestibular neuritis (34%), stroke (34%) and vestibular migraine (13%). Nystagmus slow-phase velocity (SPV) for VN, stroke and VM were 11±5.5°/s, 5.6±2.3°/s, 5.4±5.9°/s; Mean ipsilesional video-head impulse gains were 0.51±0.29, 0.89±0.20 and 0.96±0.13. For EVS(n=53), diagnoses included vestibular migraine (63%), Meniere’s Disease (11%) and others (26%). Nystagmus SPV was 5.4±3.6°/s, 7.6±6.3°/s, 4.1±1.5°/s. In RPV (n=43), common diagnoses were posterior-canal BPPV (66%), horizontal-canal BPPV (23%), migraine (7%). Positional nystagmus SPV profile showed Peak SPV of 42.5°/s, 77.6°/s, 20.64°/s and Time-constants of 6.52s, 22.51s, 34.56s for Posterior-canal BPPV, Horizontal-canal BPPV and Atypical Positional-Vertigo. A final diagnosis was reached in 96% of patients.

In the ED control group, only 77% were separated into spontaneous or positional-vertigo. A diagnosis was provided in 57% and was concordant with the history and examination in 34%.

**Conclusion** Vestibular event-monitoring and structured clinical assessment secured a diagnosis in 96% of cases compared with 34% for the control group, reinforcing its merit.

**005 ELECTROCLINICAL CHARACTERISTICS OF AUTOIMMUNE ENCEPHALITIS AS OUTCOME BIOMARKERS**

1,2Robb Wesselingh*, 1,3James Broadley, 4,5Chris Kyndt, 1,2Katherine Buzzard, 1,2Terence O’Brien, 2,5Mastura Monif. Neurosciences, Monash University, Melbourne, VIC, Australia; 2Neurosciences, Alfred Health, Melbourne, VIC, Australia; 3Neurosciences, Monash Health, Melbourne, VIC, Australia; 4Neurosciences, Melbourne Health, Melbourne, VIC, Australia; 5Neurosciences, Eastern Health, Melbourne, VIC, Australia

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**Introduction** Seizures are a common characteristic of Autoimmune encephalitis (AIE). The use of the electroclinical characteristics to assist in the diagnosis of AIE has been explored however use of specific electroencephalogram (EEG) changes has not been examined with regards to outcome prediction.

**Methods** Patients with AIE were recruited retrospectively across 4 hospitals in Victoria. Clinical Data was collected during admission and at final follow-up. EEGs of patients were reviewed using an objective proforma. Associations between EEG biomarkers and clinical outcomes were demonstrated using logistic regression modelling.

**Results** We recruited 88 patients with AIE and available EEGs. Presence of rhythmic delta, superimposed fast activity and an abnormal background were significantly more common in N-methyl-D-aspartate receptor (NMDAR) antibody associated AIE patients (p<0.05). ICU admission was associated with rhythmic delta epileptiform activity (OR 3.25, p=0.046), sharp elements in the EEG abnormality (OR 3.55, p=0.05), and an abnormal background rhythm (OR 3.56, p=0.03). Development of drug resistant epilepsy was associated with prolonged duration of abnormality on EEG (OR 11.99, p=0.013), and sharp elements in the EEG abnormality (OR 7.29, p=0.02).

**Conclusion** We have identified EEG biomarkers that differentiate NMDAR AIE from other subtypes, and likely represents an objective description of extreme delta brush which has previously been described in NMDAR AIE. We have also demonstrated biomarkers associated with important outcomes that can be used to help guide treatment and prognosis.

**REFERENCES**


**006 CAN SEIZURE-RELATED HEART RATE DIFFERENTIATE EPILEPTIC SEIZURES FROM PSYCHOGENIC NON-EPILEPTIC SEIZURES?**

1Hue Mun Au Yong*, 1,2Erica Minato, 2Edith Paul, 1,3Udaya Seneviratne. 1Neurology Department, Monash Health, Clayton, VIC, Australia; 2Monash Centre for Health Research and Implementation, School of Public Health and Preventive Medicine, Monash University, Clayton, VIC, Australia; 3Department of Medicine, St Vincent’s Hospital, University of Melbourne, Melbourne, VIC, Australia

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**Introduction** This study aims to (i) evaluate the diagnostic sensitivity, specificity and predictive values of seizure-related heart rate (HR) in differentiating epileptic seizures (ES) from