

HIGHLIGHTS FROM INTERNATIONAL NEUROSCIENCE MEETINGS

4th Annual Saudi Epilepsy Society Conference & the First Saudi International Stereotactic and Functional Neurosurgery Conference Riyadh, Saudi Arabia November 26-27, 2014

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The Saudi Epilepsy Society's Annual Meeting is the premiere meeting for epilepsy and other seizure disorders. The Annual Meeting is an international forum for the exchange of current findings in epilepsy research. Information is communicated and disseminated through symposia, lectures, scientific exhibitions, posters, and platform presentations. The Annual Meeting attracts attendees from throughout the world and provides educational and networking opportunities for the academic and practicing neurologist, epileptologist, neurophysiologist, neuroscientist, neurosurgeon, internist, pediatrician, pharmacist, nurse, social worker, and other professionals. In 2014, the Saudi Epilepsy Society Annual Meeting was held together with the First Saudi International Stereotactic and Functional Neurosurgery Conference, the following syllabus provides highlights from this meeting.

Meeting Highlights

Pupillary response to sparse multifocal stimuli in epilepsy patients

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Objectives: To illustrate the safety and study the form of defects of multifocal objective pupil perimetry (mfPOP) in epilepsy patients. **Methods:** A cross-sectional open-labeled, study examined 15 successive patients with epilepsy (3 of them had photosensitivity) and 15 patients without epilepsy during their routine EEG testing in the neurophysiology laboratory in the Canberra hospital, Canberra, Australia. The main endpoints were seizure development, a photo-paroxysmal response (PPR), or augmented spike-and-wave activity on the EEG. Secondary endpoints included the study of the mfPOP reactions according to response time-to-peak and regular amplitude (AmpStd). **Results:** All patients stood mfPOP testing without difficulties. No subject had an epileptic aura or clinical seizure during (or shortly after the test) testing. There was no proof of a PPR or activation of spike-and-wave activity found on EEG. For subjects with generalized epilepsy pupils showed augmentation of pupillary responses AmpStd by 2.40 times in contrast to controls (95% CI: 1.26 to 3.31 times). Use of anti-epileptic medications

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caused decreased AmpStd. Delays in time-to-peak of 24.9 ± 10.2 milliseconds were noticed in subjects with complex partial seizure. **Conclusion:** Joining EEG during mfpOP examination produced a powerful clue to its safety in epilepsy patients. It is the first experiment to test and illustrate the pupillary reaction in epileptic patients during the inter-ictal phase.

Quality of life of patients with epilepsy, King Fahd Specialist Hospital, Dammam experience.

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Background: Epilepsy is one of the most common disorders that can greatly affect the quality of life of patients due to many reasons such as its chronicity, need for regular medications, prejudices, and social consequences. Epilepsy affects patients overall health status, and decreases their quality of life. In addition to frequency of seizure, seizure types, disruption in daily living activities, the presence of depression, and social and family life displeasure have been recognized as issues touching the quality of life of the epilepsy patients. Physical risks due to seizures, such as falls, drowning, and burns should also be considered. Patients may practice social separation, stigmatization, lack of understanding, and unemployment and the risk of suicide are increased in patients with epilepsy. We need to determine the quality of life in epilepsy patients within our society. **Aim:** To study the quality of life of epilepsy patients in our society. This will aid to estimate the current facilities delivered to these patients, and help in future health planning. **Methods:** A prospective study including 67 patients with epilepsy who completed a questionnaire during inpatient and outpatient visits. The questionnaire planned to assess the diverse sides of quality life. The data was analyzed using SPSS. They could cope well with their illness, and managed to help their children by all means. Anxiety and depression are common, mainly due to stigma. In our society, we still need to work hard by conducting awareness campaigns to help our community to deal with this chronic illness.

Microarray based analysis of novel copy number variants of a cohort of epileptic patients in Saudi Arabia

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Background: Specific genetic anomalies or non-genetic factors could lead to epilepsies, but in various cases the underlying cause is unknown. Novel technologies, such as array comparative genomic hybridization (CGH), may reveal the copy number variants (CNVs), established as significant risk factor for epilepsies. **Methods:** A genome wide study of CNVs in epileptic patients was performed using high-density array CGH technology for the identification of novel chromosomal aberrations. For this purpose, a cohort of 60 patients suffering with epileptic disorders was recruited. A CGH array was carried out for the detection of their chromosomal aberrations. The attained results were analyzed by microarray data analysis software PARTEK, and the novelty of CNVs was checked by using the Database of Genomic Variants (DGV). Then, array CGH results amplification and deletions were confirmed by quantitative real time polymerase chain reaction (PCR). **Results:** It showed CNVs including the amplifications, deletions, and amplifications plus deletions in different chromosomal regions in the patients. Amplifications were observed in the chromosomal regions 1p21.3, 2p21, 5p14.3, 5q23.2, 6p12.1, 7p15.2, and 19p13.13 whereas the deletions were observed in the chromosomal regions 5p14.3, 7q32.3, and 19p13.13. Amplifications plus deletions were observed in 5p14.3, and 19p13.13. Moreover, the array CGH results were also validated by quantitative real

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time PCR. **Conclusions:** We found some of the novel genes for the first time in a Saudi population in the study. Further analysis of the observed deleted and duplicated genes by array CGH were confirmed using quantitative real time PCR. Hence, it is recommended that array CGH as well as quantitative real time PCR can be used for the screening of novel epileptic genes. For the first time, numerous potential CNVs/genes implicated in epilepsy in the Saudi population were described. A genetic variation in epilepsy was discussed, which will enable us to understand the critical genome regions that might be involved in the development of epilepsy in the Saudi population.

The adverse effect of thalamotomy and deep brain stimulation on speech in patients with movement disorder. A systematic review and meta-analysis

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Background and Objective: Thalamic surgery has been used for several decades to treat different forms of movement disorders. Ablative and non-ablative procedures are some therapeutic modalities that have been used. The former comprises the creation of thalamic lesions whereas the latter involves the nondestructive modulation of brain activity. Advancements in imaging and lesioning techniques have led to resurgence of interest in thalamotomy using different surgical techniques. The risk of developing speech difficulties after thalamotomy and deep brain stimulation of the thalamus for movement disorder varies widely in the literature. The goal of this review is to evaluate factors that are associated with higher risk, and summarize the available data. **Methods:** A systematic review and meta-analysis were used in this study. We searched the following databases: Medline, Medline in process, Embase, PsycInfo, CINAHL, Web of Science, Cochrane Library, Cochrane Methodology Register, Health Technology Assessment, Database of Abstracts of Review of Effects Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, we also checked cross references for some important articles by searching citing and cited articles, and retrieved studies between 1960 through September 2014. Two authors independently extracted the data. In case of disagreement a consensus was reached by review with a third author. **Results:** This review shows that the overall event rate of any type of speech difficulty after thalamotomy regardless of the laterality or the technique is 0.191 (CI: 0.142-0.251). Subgroup analysis by speech type showed that hypophonia was the most common speech disorder 0.277 (CI: 0.065-0.679). Unilateral procedures showed lower risk of speech impairment; with event rate of 0.1214 (CI: 0.086-0.175) and 0.397 (CI: 0.282-0.524) in the bilateral group. A subgroup analysis for the hemispheric side of the lesion was carried out. Left sided procedures showed higher risk of speech impairment post thalamotomy. Right-sided procedures showed an event rate of 0.146 (CI: 0.089-0.23) and left sided 0.469 (CI: 0.296-0.651). An analysis of the subgroup was carried out by disease; the highest risk for speech impairment was in the mixed group. The event rate was 0.177 (CI: 0.096-0.30) followed by PD, then dystonia, then ET. A subgroup analysis by thalamotomy technique in the unilateral group was made. Mixed technique series showed 0.289 event rate of speech difficulty (CI: 0.089-0.628), followed by radiofrequency lesioning 0.122 (CI: 0.074-0.194) and Gamma knife was the lowest with 0.046 (CI: 0.023-0.088). After bilateral DBS, the risk of speech difficulty is 0.36 (CI: 0.23-0.51) while after unilateral the risk is 0.14 (CL: 0.10 -0.20). The most commonly reported speech disorder after thalamic DBS is stimulation related dysarthria. In unilateral procedures, the reported dysarthria risk is 0.16 (CI: 0.10-0.25) followed by dysphasia 0.098 (CI: 0.042-0.216) then by hypophonia 0.071 (CI: 0.018-0.244). **Limitations:** This study is limited by the retrospective nature of the studies included and the heterogeneity among these studies. **Conclusion:** There are several factors that carry higher risk of developing speech difficulty after thalamotomy, including bilateral, left sided procedures, and some older lesioning techniques. The most commonly reported speech complication after thalamic DBS for movement disorder is stimulation related dysarthria, which is higher after bilateral procedures and mostly reversible.

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A role for the non-dominant motor area during movement planning. *Deficits in Parkinson's disease*

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Objectives: To determine whether abnormal beta activity in motor areas plays a role in the genesis of Parkinson's disease (PD) bradykinesia. Recordings of basal ganglia activity during electrode implant have repetitively shown that slowness and difficulty in movement onset in PD might be linked to increased drive in the beta frequency range. In previous high-density (hd)-EEG studies, it has been shown that the higher the degree of beta desynchronization before target presentation, the faster the reaction time (RT). **Methods:** High-density-EEG was recorded in 14 patients with PD (H&Y stage 2-3; mean age \pm SD: 62 \pm 10) and in 11 age-matched controls during a choice-RT motor task in which subjects reached for unpredictable targets with their right dominant hand. For each subject, we analyzed the activity of the electrodes showing maximal desynchronization in beta power (13-30 Hz) during movement over the left and right motor areas. Average imaginary phase coherence between the 2 areas (ImCoh) in the beta range was also computed. **Results:** Both groups showed significant beta desynchronization in both areas starting before target appearance and peaking during movement. However, in PD, beta desynchronization was lower compared with controls in the right area during movement planning. The degree of beta desynchronization in the right was correlated with RT and PD duration ($p < 0.05$). In both groups, ImCoh between the areas increased just before target appearance; however, in controls, it stayed high throughout motor planning, while in PD it decreased to baseline values just after target appearance. The ImCoh significantly correlated with movement time, peak velocity, and acceleration ($p < 0.05$). **Conclusions:** Beta desynchronization over the right motor area during motor planning is decreased in PD proportionally to disease duration. Also, in PD, connectivity between the 2 motor areas, which is crucial for programming movement duration and velocity modulation, is not sustained during planning. This might produce movement initiation deficits.

Autoimmune encephalopathy and refractory seizure with the presence of 2 autoantibodies specific for the neuronal cell surface

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Background: An increasing number of autoantibodies are being described in epilepsy and other seizure-related disorders. A pathogenic role of autoantibodies in epilepsy has been suggested based on observations of the efficacy of immunotherapy. **Objective:** To report a new case of autoimmune-mediated encephalopathy and seizure caused by autoantibodies to voltage-gated potassium channels (VGKC) and voltage-gated calcium channels (VGCC) (P/Q-type) and the response to immunotherapy. A case report in a tertiary care center was described. An 18-year-old female with new onset encephalopathy and refractory seizure was treated for 5 days with intravenous methylprednisolone (IVMP) and intravenous immunoglobulin (IVIG). **Results:** After treatment with IVMP and IVIG, she showed a significant clinical improvement and did not exhibit any seizures during the one-month follow-up period. **Conclusions:** This is a rare case of an autoimmune encephalopathy and seizure associated with the presence of 2 surface neuronal autoantibodies. This report highlights the importance of early diagnosis of autoimmune epilepsy, as early immunomodulating treatments improve the outcome.

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Electrode–brain interface in globus pallidus internus deep brain stimulation

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Introduction: Deep brain stimulation (DBS) is a well-established treatment for movement disorders. The benefit of DBS is related to the application of an electrical field that distributes symmetrically in all direction around a specific electrode contact. Here, we analyze the electrode-brain interface (EBI) in the globus pallidus internus (GPI) and the estimated electrical field density geometry and radial extension required to induce an internal capsule and optic tract clinical response. **Methods:** A total of 104 electrode contacts implanted in the GPI were analyzed. The anatomical location of each individual electrode contact was extrapolated using pre- and post- implantation image fusion. The anatomical distance between the center of each contact and the optic tract was measured on the MRI. Monopolar electrical stimulation was applied on each electrode contact with different frequencies and current amplitudes to elicit a clinical response from the internal capsule and optic tract. The threshold-distance data for the estimated electrical field ET (V/mm) and clinical response threshold were calculated. **Results:** Five electrode contacts were excluded due to relatively high impedance. The electrodes have a diameter of 1.27 mm and consist of 4 contacts with a contact length of 1.5 mm, and an inter-contact distance of 1.5 mm. Each electrode contact is 6 mm². The mean distance between the distal contact and optic tract was 1.84 mm, and the mean distance from the electrodes' nearest contacts to the internal capsule was 3.4 mm. The DBS stimulation parameters were at 60 us, 130 Hz, and monopolar mode. The clinical response threshold was 0.8 V/mm for optic tract, and 1.2 V/mm for the internal capsule reflecting the electrical density radial extension. The overall estimated isolevel of the electrical field that activated a clinical response around each contact was 2.4 mm at 1 volt stimulation. **Conclusion:** This study revealed the extent of the electrical field delivered from a cylindrical electrode contact. Utilizing an electrode with multiple small contacts to steer the electrical field toward the target can minimize the unintended stimulation side effects.

SUPPLEMENTS

- * Supplements will be considered for work including proceedings of conferences or subject matter covering an important topic.
- * Material can be in the form of original work or abstracts.
- * Material in supplements will be for the purpose of teaching rather than research.
- * The Guest Editor will ensure that the financial cost of production of the supplement is covered.
- * Supplements will be distributed with the regular issue of the journal but further copies can be ordered upon request.
- * Material will be made available on the Neurosciences website (www.neurosciencesjournal.org)