Over 4400 participants attended the 65th American Epilepsy Society (AES) annual meeting 2011. The scientific coverage of the meeting was broad to include quality educational sessions targeted at diverse interests among professionals dedicated to the study and treatment of epilepsy. An important addition to this year’s program was the Epilepsy Specialist Symposium. This session focused on integrating the Epilepsy Benchmarks, creating emphasis on translational research, and creating an opportunity for both clinical providers and researchers to collaboratively take a look at what is needed to achieve these objectives. Also, new this year was a special limited attendance skills workshop on Setting-up Clinical Trials, Epilepsy Surgery, and Update on Setting-up an EEG Monitoring Unit. The following highlights include interesting abstracts from the 65th AES annual meeting 2011:

Abstracts

Basic Research

In vivo imaging of the long term evolution of seizure induced dendritic injury
D. Guo, N. Rensing, M. Wong, Washington University, St. Louis, MO, USA

Dendritic injury from brief seizures usually recovers within 2 weeks; whereas status epilepticus induced injury only partially reverses. These studies demonstrate that seizures of all durations may trigger at least transient neuronal injury.

Imaging changes in network connectivity during post traumatic epileptogenesis
K. Lillis, G. Q. Zhao, J. L. Raymond, M. A. Kramer, K. J. Staley, Neurology, Massachusetts General Hospital, Charlestown, MA; Neurobiology, Stanford University, Stanford, CA; Mathematics and Statistics, Boston University, Boston, MA, USA

They hypothesize that reconnection of severed axons to a limited number of target neurons produces a hyper connected, epileptic neuronal network. While the slicing used to produce organotypic cultures represents an extreme example of traumatic brain injury (resulting in epileptogenesis in 100% of hippocampal slice cultures), they propose that axonal sprouting following injury in vivo fosters epilepsy by a similar principle.

Altered cardiac conduction in epilepsy: a candidate mechanism in sudden unexplained death in epilepsy
E. Anderson, R. Searle, S. Wang, M. Valderrábano, J. S. Baker, Y. Qian, Yi Chen Lai, Pediatrics, Baylor College of Medicine, Houston, TX; Cain Foundation Laboratories, Texas Children’s Hospital, Houston, TX; DeBakey Heart &
Under baseline conditions, no discernible differences in cardiac structure and function were observed between epileptic and sham animals. However, subtle alterations of cardiac conduction were observed in epileptic animals as reflected in the surface EKG. Under stimulated conditions, the myocardium of the epileptic rats exhibited increased arrhythmogenicity, likely exacerbated by the underlying conduction abnormalities. Together, these findings recapitulate clinical observations and further support cardiac arrhythmia as a cause for sudden death in individuals with epilepsy.

A mouse hippocampus kindling model of catamenial epilepsy
D. S. Reddy, J. Gould, O. Gangisetty, Neuroscience and Experimental Therapeutics, Texas A&M Health Science Center College of Medicine, College Station, TX, USA

The findings demonstrate that endogenous neurosteroids protect against seizure susceptibility and their withdrawal such as that occurs during menstruation leads to exacerbation of seizure activity, providing a potential mouse model that has features of human catamenial epilepsy.

Long term behavioral consequences of prenatal valproic acid exposure
S. Scahill, O. Miller, J. M. Smith, B. K. Krueger, Elizabeth Powell, University of Maryland School of Medicine, Baltimore, MD; Morgan State University, Baltimore, MD, USA

Mice that received in utero valproic acid demonstrated similar behavioral phenotypes to children of epileptic mothers. Current experiments are investigating methods to define molecular mechanisms of valproic acid developmental disruptions.

Clinical Research

Seizure semiology and ictal EEG features of frontal lobe seizures in childhood

Frontal lobe seizures in childhood occur most commonly during nocturnal sleep. Motor features, especially tonic and versive seizures are prominent in children with frontal lobe epilepsy similar to adults. However, hypermotor seizures and secondarily generalized tonic clonic seizures are relatively rare in children compared to adults with frontal lobe epilepsy. Malformations of cortical development are the first cause in our symptomatic cases. Of note, in our series the second most common cause is brain injury due to perinatal insult whereas in the current literature, tumors are the second cause in pediatric series.

Epilepsy in adult patients with Angelman syndrome
R. Antony, A. Alareddy, M. Faulkner, S. P. Singh, Creighton University School of Medicine, Omaha, NE, USA

This study shows that epilepsy in adult patients with Angelman syndrome is characterized by seizures and EEG characteristics that are distinct from the pediatric patients with Angelman syndrome and epilepsy. The study also
indicates that adult patients with Angelman syndrome who have epilepsy can be expected to have a good outcome in terms of seizure control.

**Reflex seizures in Dravet syndrome**  
**R. P. Morse, D. A. Gardner, S. E. Gaelic, J. J. Filiano, G. L. Holmes, Children’s Hospital at Dartmouth, Dartmouth-Hitchcock Medical Center, Lebanon, NH, USA**

Reflex seizures have been reported in around 40% of children with Dravet syndrome; in our cohort they were present in 50% (excluding hyperthermia-associated seizures). Dravet syndrome associated mutations in the neuronal sodium channel SCN1A are mainly expressed in inhibitory interneurons, which modulate afferent stimuli and help determine the degree of cortical excitability. In experimental models of reflex seizures, cortical hyperexcitability appears to be a necessary substrate, but studies have clearly demonstrated the role of subcortical networks as well. Dravet syndrome provides a useful model for studying reflex seizures in the human brain. The observation that some reflex seizures can be provoked by emotion and interrupted by distraction/redirection suggests novel approaches to treatment of these medically-resistant seizures.

**Long term analysis of post operative hippocampal volume on non epileptic side using magnetic resonance volumetry in patients with mesial temporal lobe epilepsy**  
**K. Iida, J. Katayama, K. Kagawa, T. Nishimoto, M. Katafiri, A. Hashizume, Y. Kiura, R. Hanaya, K. Arita, K. Kurisu, Neurosurgery, Hiroshima University Hospital, Hiroshima, Radiology, Hiroshima Chuo Kenshin Sho, Hiroshima, and Neurosurgery, Kagoshima University Hospital, Kagoshima, Japan**

Decreases in the non-epileptic hippocampal volumes occurred in patients with anterior temporal lobectomy during postoperative 1 and >2 years, although seizures were terminated. The findings suggest that achieving a good seizure control with surgery may not completely halt further progressive hippocampal damage, although excessive seizures have once affected the non epileptic hippocampus for an extended period before surgery. However, the extent of the volume decreases was not enough to affect the neuropsychological findings in this study.

**The clinical characteristics of sustained refractory status epilepticus in children**  
**E. Crawford, O. Bennett-Back, E. Donner, J. Hutchison, C. Hahn, The Hospital for Sick Children, Toronto, ON, Canada**

This large single center case series confirms prior reports that acute symptomatic etiologies were the most common cause of sustained refractory status epilepticus in children. However, nearly half of the children also had a prior history of epilepsy. Despite aggressive therapy, seizures frequently remained difficult to control, and the need for ventilatory and inotropic support was common. Although only 28% were seizure free at pediatric intensive care unit discharge, 57% were seizure free by hospital discharge. Younger age and remote symptomatic with acute precipitant etiology were associated with freedom from seizures at hospital discharge. Long term follow up studies are required to better characterize long term outcomes and their relationship to etiology and therapy.
Outcome following hypothalamic hamartoma treatment in adults
C. Drees, K. Chapman, E. Prenger, L. Baxter, H. Rekate, A. Shetter, M. Bobrowski, J. Kerrigan, Barrow Neurological Institute, Phoenix, AZ; Phoenix Children’s Hospital, Phoenix, AZ, and the Chiari Institute NSLIJ, Great Neck, NY, USA

Surgical or gamma knife procedures in adults with hypothalamic hamartoma provided seizure freedom in a third of patients. The only significant favorable prognostic factor was the absence of mental retardation. The intervention also tended to improve memory and behavior in the majority of patients. Overall mortality was high at 10%, affecting those patients who had undergone a surgical resection, as opposed to gamma knife, and still had seizures. Other important morbidities were persistent hormonal disturbances and weight gain.

Antiepileptic drug combinations - have newer agents altered clinical outcomes?
K. Kelly, L. J. Stephen, M. Forsyth, M. J. Brodie, Epilepsy Unit, Western Infirmary, Glasgow, United Kingdom

These results imply that patients taking AED polytherapy regimens are more likely to have improved outcomes with drug substitution rather than addition. In the last decade, when used as adjunctive therapies, new agents have not impacted importantly on seizure outcomes. An alternative approach to AED development may be required to change this disappointing situation.

Attention deficit hyperactivity disorder in different seizure types; preliminary study
G. H. Kim, B. Eun, S. Eun, J. Byeon, J. Kim, Department of Pediatrics, Korea University College of Medicine, Seoul, Republic of Korea

Contrary to previous reports, the prevalence of attention deficit hyperactivity disorder (ADHD) in patients with well-controlled epilepsy and without significant developmental delay is not higher than in the general pediatric population. And the predominant type of ADHD in epileptic children is the combined type, which is the same as in the general pediatric population. Our results also indicate a greater likelihood of ADHD in absence epilepsy even when seizure free.

Neuropathological study of resected cerebral tissue from patients with 3 Tesla MRI-negative refractory epilepsy
S. Pati, A. Deep, E. N. Husu, M. Liu, G. Kiyota, H. S. Eddeine, S. Chung, Barrow Neurological Institute, Phoenix, AZ, and the University of Arizona, Phoenix, AZ, USA

This study suggests that MRI-negative but PET-positive patients have a high percentage of hippocampal sclerosis on neuropathological findings. In MRI-negative and PET-negative patients, hippocampal sclerosis was far less common, and a large percentage of them had no clear pathological findings. In addition, PET-positive patients had significantly better postsurgical seizure outcomes compared to PET-negative patients.
Seizure outcomes after interventional or conservative management of brain arteriovenous malformations: prospective, population-based cohort study

C. B. Josephson, J. J. Bhattacharya, C. E. Counsell, V. K. Papanastassiou, V. Ritchie, R. C. Roberts, R. Sellar, C. P. Warlow, R. A. Salman, Division of Neurology, Dalhousie University, Halifax, NS, Canada; Institute of Neurological Sciences, Southern General Hospital, Glasgow, United Kingdom; Division of Applied Health Sciences, University of Aberdeen, Aberdeen, United Kingdom; Faulhouse Health Centre, Faulhouse, United Kingdom; Department of Neurology, Ninewells Hospital and Medical School, Dundee, United Kingdom, and Division of Clinical Neurosciences, Centre for Clinical Brain Sciences, University of Edinburgh, Western General Hospital, Edinburgh, United Kingdom

Interventional treatment does not seem to influence the 5-year risk of seizures in adults with an arteriovenous malformation, and further confirmation of these findings is awaited from an ongoing randomized controlled trial.

Predictors of seizures, and their influence in outcome, in patients with ischemic stroke: A large Canadian multicenter study

J. G. Burneo, J. Fang, G. Saposnik, The University of Western Ontario, London, ON; University of Toronto, Toronto, and the Institute of Clinical Evaluative Sciences, Toronto, ON, Canada

Occurrence of seizures at onset of stroke and after it was a poor predictor of outcome. We also identified other clinical characteristics seen more frequently in patients with seizures after stroke.

Scalp correlates of intracranial high frequency oscillations in epilepsy

R. Zelmann, K. Kerber, A. Schulze-Bonhage, J. Gotman, J. Jacobs, Montreal Neurological Institute, McGill University, Montreal, QC, Canada, and the University Hospital Freiburg, Freiburg, Germany

When averaging the scalp EEG that corresponds to a large number of intracranial high frequency oscillations (HFOs), similar time frequency (TF) characteristics are observed on the scalp in two-thirds of the patients. This suggests that some of the intracranial HFO events can be observed simultaneously on scalp and on subdural contacts because they have common characteristics. The possibility of observing individual HFOs on the scalp are uncertain however, as it depends on the signal to noise ratio and the spatial extent of the intracranial event. Finding correlates on the scalp of intracranial HFOs opens the possibility of detecting HFOs noninvasively (on scalp EEG). Scalp HFOs could be valuable to evaluate large patient populations, to predict surgical outcome, and to plan electrode implantation.

Direct current (DC) shifts and high frequency oscillations in mesial temporal lobe epilepsy patients

S. Wu, H. Kunhivedu, H. Lüders, Case Western Reserve University Hospital, Cleveland, OH, USA

Direct current (DC) shifts and high frequency oscillations (HFOs), can be recorded using depth electrodes and are observed in all patients and most of the clinical seizures. The information from both DC shifts and HFOs complements and strengthens the “traditional” EEG findings in confirming the location of the epileptogenic area. Traditional EEG seizure onsets, DC shifts, and HFOs do not occur simultaneously indicating that they are an expression of different neurophysiological phenomena occurring during an epileptic seizure onset.
Language lateralization in temporal lobe epilepsy patients: a comparative study
J. M. P. Ripollès, M. Falip, M. Juncadella, D. López-Barroso, A. Vilà-Balló, D. Cucurell, R. Diego-Balaguer, J. Marco-Pullarés, A. Rodriguez-Fornells, Epilepsy Unit, Hospital Universitari de Bellvitge; Cognition and Brain Plasticity Group, Bellvitge Biomedical Research Institute IDIBELL, Neuropsychology Unit, Hospital Universitari de Bellvitge, and the Department of Basic Psychology, University of Barcelona, L’Hospitalet de Llobregat, Spain

In patients with left temporal lobe epilepsy (TLE) candidates for resective epilepsy surgery, unlike those with right TLE and controls, the language fMRI allows to identify a greater superior temporal lobe activation contralateral to the damaged hemisphere.

Frontal lobe activity during memory encoding in temporal lobe epilepsy

Word encoding: controls and right hippocampal sclerosis (HS) patients activated the left prefrontal cortex (PFC) and left hippocampus (HC). Patients with left HS showed bilateral HC activations and significant additional right PFC activations greater than in controls and the right HS group. Younger age at onset of epilepsy in the left HS group was associated with right PFC activations whereas later onset correlated with increased left PFC activations. Successful word recognition correlated with activation in the left PFC. Face encoding: controls showed right lateralized PFC activation and bilateral HC activations. Patients with left HS activated the right HC and right PFC. The right HS group activated the left HC and bilateral PFC. Significantly greater left PFC activation was seen in the right HS group compared to the left HS.

The diagnostic utility of routine electroencephalogram (EEG) in memory impairment
L. Steinberg, New York-Presbyterian/Cornell, New York, NY

The EEG is useful in the diagnostic workup of patients presenting with memory impairment, but caution should be exercised. This caveat is especially important in the elderly population given the evidence of a high background rate of EEG abnormalities in healthy individuals, such as slowing of background alpha and intermittent temporal slowing. While the EEG is useful for separating normal from abnormal cortical functioning, it is nonspecific. The EEG has a high sensitivity but low specificity in elucidating the etiology of memory impairment, but larger studies are needed.

Occurrence of different patterns of high frequency oscillations (HFOs) depend on seizure onset in patients with focal cortical dysplasia
K. Kerber, M. Dümpelmann, P. LeVan, R. Korinchenberg, A. Schulze-Bonhage, J. Jacobs, Department of Neuropediatrics; Epilepsy Centre; and Department of Medical Physics, University of Freiburg, Freiburg, Germany

High frequency oscillations (HFOs) are significantly correlated with the seizure onset zone (SOZ) in patients with focal cortical dysplasia (FCD). The HFO patterns occurring in channels with non-oscillating baselines (pattern 2) were more closely linked to the SOZ than those occurring in continuously oscillating baselines (pattern one). Our results suggest that pattern one predominantly represents physiological activity whereas pattern 2 reflects epileptogenicity. The radial basis function (RBF) neural network has greater difficulty in detecting HFO in channels with pattern one most likely due to the smaller difference in amplitude between HFOs and baseline than in
channels with pattern 2. Regarding the distribution of HFO patterns in the SOZ we assume that pattern one has a smaller impact for the identification of the SOZ and deficits in detecting HFOs in this pattern are of lesser clinical relevance. Further studies are needed to investigate whether the occurrence of HFO patterns is restricted to FCD or can be seen in other causes of epilepsy.

Low vitamin D levels are common in patients with epilepsy

D. Teagarden, K. J. Meador, D. W. Loring, Emory University, Atlanta, GA

Vitamin D deficiency is common in patients with epilepsy treated with antiepileptic drugs (AEDs). Although vitamin D deficiency is more frequent in those patients on enzyme-inducing AEDs (EIAEDs), it is also common in patients on non EIAEDs. Monitoring of vitamin D should be considered as part of the routine management of patients with epilepsy.

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)