# The 6th International Epilepsy Symposium

24-26 August, 2018
Tehran, Iran



## Abstract Book

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# Abstract Book of The 6th International Epilepsy Symposium

## 24-26 August, 2018, Tehran, Iran.

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## Oral Presentations

### O1

### Overview of Surgical Treatment for Epilepsy

***Jerome Engel***

Departments of Neurology, Neurobiology, and Psychiatry & Biobehavioral Sciences and the Brain Research Institute David Geffen School of Medicine at UCLA, Los Angeles, CA, USA

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): O1

Epilepsy is one of the most serious primary disorders of the brain, and pharmacotherapy is unsuccessful in controlling seizures in 30-40% of patients with this disease. It is estimated that four million people worldwide with pharmacoresistant epilepsy might be candidates for a surgical procedure that could stop disabling seizures in 60-80%. However, only a small proportion of these patients are referred for surgery, even in industrialized countries. Surgical treatment for epilepsy is arguably the most underutilized of all accepted therapeutic interventions in the field of medicine. Furthermore, when patients are referred for surgery, there is an average duration of over 20 years between onset and surgical referral in the United States, and this figure is not much different in other industrialized countries. In theory, for many of these patients, early surgical intervention could prevent a lifetime of disability. Two randomized controlled trials, and hundreds of uncontrolled surgical series confirm the safety and efficacy of surgical treatment for epilepsy, and a practice parameter, issued by the American Academy of Neurology in 2003, concluded that surgery is the treatment of choice for medically intractable temporal lobe epilepsy. Surgery is also effective for a number of other surgically remediable epilepsy syndromes with a known pathophysiology, a predictable natural history, and progressive features. These include epilepsies due to well-circumscribed resectable lesions, and epilepsies in infants and young children due to large or diffuse lesions limited to one hemisphere. Tremendous recent advances in presurgical evaluation, particularly in neuroimaging, as well as microsurgical techniques, have greatly improved outcome, increased the number of patients who could be considered surgical candidates, and made surgery feasible in countries with limited resources. Surgical procedures consist of standardized resections, tailored resections, disconnection surgery, stereotactic ablative surgery, most recently including laser ablation, and both continuous and responsive neurostimulation. Recent studies of outcome have focused not only on seizure freedom, but also the beneficial effects of surgery on quality of life, cognitive and social function, and reduced morbidity and mortality. Surgical complications are rare, compared with the adverse consequences of uncontrolled epileptic seizures.

### O2

### Epilepsy Lifetime Prevalence in Iran: A Population-Based National Study Survey

***Hossein Pakdaman****

Shahid Beheshti University of Medical Sciences, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): O2

Epilepsy is a worldwide, chronic, multifactorial neurological disorders affecting over 50 million people. The mean prevalence of active epilepsy in developed countries varies between 4 and 10 per 1000, higher prevalence has been reported in developing countries. Some studies that have been conducted in Iran, where small, assessed epilepsy in separate cities and had some disadvantage. Regard to development of Iran, frequent car accident and war victims it seems that the prevalence of epilepsy is high in the country. This is a cross-sectional population based nationwide study that has performed to estimate the lifetime prevalence of epilepsy in 70000 Iranian residences. Iran has the highest prevalence of long life, epilepsy that 2-3 more than the overall worldwide estimation. Partial seizure is the most common type in Iran. It seems a considerable portion of patients are under control. Overall prevalence is equal in both genders. In early life and middle is more common in males.

### O3

### Epilepsy and the Sensory Systems

***Peter Wolf****

Danish Epilepsy Centre Filadelfia, Dianalund, Denmark

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The relations of epilepsy and the sensory systems are numerous and deserve more attention than they have gotten so far. Epileptic seizures use sensory pathways causing not only momentary but also potentially long-lasting symptoms, and certain sensory functions such as olfaction may be affected in epilepsy by still insufficiently known mechanisms. However, altered sensory functions in patients with epilepsy may also be side effects of drug treatment. Nevertheless, several sensory systems may be strongly involved in seizure-generating mechanisms, with both excitatory and inhibitory effects. Recent research has made important contributions to the understanding of these processes.

## O3

### Epilepsy and the Sensory Systems

***Peter Wolf***

Danish Epilepsy Centre Filadelfia, Dianalund, Denmark

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The relations of epilepsy and the sensory systems are numerous and deserve more attention than they have gotten so far. Epileptic seizures use sensory pathways causing not only momentary but also potentially long-lasting symptoms, and certain sensory functions such as olfaction may be affected in epilepsy by still insufficiently known mechanisms. However, altered sensory functions in patients with epilepsy may also be side effects of drug treatment. Nevertheless, several sensory systems may be strongly involved in seizure-generating mechanisms, with both excitatory and inhibitory effects. Recent research has made important contributions to the understanding of these processes.

## O4

### Decision Making in Adult Epilepsy Surgery

***Jorg Wellmer***

Ruhr-Epileptology, Department of Neurology, University Hospital Knappschaftskrankenhaus Bochum, Ruhr-University Bochum, Bochum, Germany

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): O4

In case of pharmacoresistance of focal epilepsy, patients may benefit from surgical removal, deafferentiation or coagulation of the epileptogenic zone. The algorithm for identifying the epileptogenic zone and the application of different examination techniques have to be tailored for each individual patient. This lecture demonstrates the principles of presurgical work-up in adult epilepsy patients.

## O5

### Frontal Lobe Epilepsy

***Parviz Bahrami***

Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): O5

While frontal lobe epilepsy accounts for only 10-20% of patients in surgical series, the prevalence in non-surgical cohorts is probably higher. Frontal lobe epilepsy (FLE) probably represents 20-30% of partial seizures.

Clinical diagnosis:

The seizures which most of the time occur without warning, are often short and are followed by very rapid recovery. They frequently occur from sleep, and may occur in clusters of 5-6 or more per night, usually with partial recovery between, but status epilepticus is also common.

Seizure manifestation:

The seizure semiology is dependent on the area of cortex activated during a seizure and therefore can give important clues as to the presumed epileptogenic zone. Frontal lobe seizure semiology with predominantly positive motor symptoms can be grouped into three main categories:

Frontal clonic seizures

Bilateral asymmetrical tonic seizure

Complex motor seizure

Rarer seizure types include: seizures characterized by brief lapses of awareness, akinetic seizures, aphasic seizures or seizures characterized by early head version without loss of awareness.

Electroencephalography

Interictal EEG recordings are often challenging and it is reported that up to 40% of patients with FLE do not have Interictal epileptiform discharges. The yield of prolonged video EEG recordings and careful review of EEG samples with closely spaced midline electrodes may be of higher yield.

Imaging

CT scan, MRI, PET and SPECT are used for determination of the lesion or abnormality. MRI can detect small area of dysplasia and heterotopia.

Treatment

The pharmacological treatment of FLE is as for other focal epilepsies. There are no good comparative drug trials specific to FLE. Surgery is less successful than for TLE with complete remission after focal resection in only 20-40%, even in the most highly selected cases.

## O6

### Role of Neuroimaging in Epilepsy

***Elham Rahimian***

Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): O6

Epilepsy is a common and disabling neurological

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disorder initiated by the unpredictable EEG electrical discharges within the brain. Epilepsy management is most effective when the onset zone of the seizures can be exactly localized within the brain. Imaging is crucial in the evaluation and management of patients with epilepsy. MRI is the preferred imaging method for patients with seizures. Detection of structural abnormalities during preoperative investigations requires a dedicated epilepsy protocol for MRI studies. Sensitivity of MRI to find the localization of seizure onset zone has been improved by more advanced MRI technologies in recent years. Neuroimaging is central to the management of patients with medically refractory epilepsy and that play a crucial role for surgically resection process of epileptogenic zone.

## O7

### Epilepsy and Imaging (Outpatient and Presurgery)

***Jorg Wellmer***

Ruhr-Epileptology, Department of Neurology, University Hospital Knappschaftskrankenhaus Bochum, Ruhr-University Bochum, Bochum, Germany

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): O7

Cerebral structural imaging (CCT, MRI) frequently allows revealing the cause of first seizures or epilepsy and thereby the necessity or the option for causal treatment. However, on "standard brain" MRI scans requested by non-specialized physician's subtle epileptogenic lesions are frequently missed. This lecture 1) explains an epilepsy specific MRI protocol and points 2) to the importance of precise clinical focus hypothesis for the identification of epileptogenic lesions and 3) the experience of the MRI reader with the spectrum of epileptogenic lesions.

## O8

### Imaging in Children with Epilepsies

***Susanne Schubert-Bast***

Clinic for Children and Adolescent Medicine and Epilepsy Center, Department of Neuropediatrics, Goethe-University Frankfurt, Frankfurt, Germany

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): O8

Structural etiologies in children are different from adulthood. Furthermore, differentiation of malformation of cortical development might be limited due to brain development. This lecture will give an overview over applicable imaging techniques for children with epilepsies to distinguish structural etiologies.

## O9

### Management of MRI-Negative Epilepsy

***Babak Jalalian***

Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

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In the absence of a demonstrable epileptogenic lesion, epilepsy is often referred as nonlesional epilepsy. The term of MRI-negative epilepsy is used instead of nonlesional epilepsy, because histopathological examination of resected tissues has revealed lesion in 50% of nonlesional MRI patients. In general the chance of postoperative seizure freedom outcome from epilepsy surgery is less favorable in nonlesional MRI-negative patients. However thanks to advances in MRI technology, the sensitivity in detecting epileptic lesions improved dramatically over the last two decades. If MRI is negative, the definition of the epileptogenic zone has rely on localization information derived from methods such as semiology, EEG. SPECT. FDG PET and invasive evaluations. In MRI-negative patients when there was concordance among interictal scalp EEG, ictal scalp EEG, PET and siscom, 80% of the patients gained postsurgical freedoms, whereas the rate was only 45% when only two modalities were concordant. In this article I will discuss about step by step management of MRI-negative epileptic patients and the role of noninvasive and invasive studies in selection of these patients for epilepsy surgery.

## O10

### Psychic and Cognitive Presentations in Patients with Epilepsy

***Majid Ghaffarpour***

Iranian Center of Neurological Research, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran

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Psychic and cognitive presentations in patients with epilepsy can present as aura or as a symptoms/sign in cases with psychological morbidities as well as in some ictal or postictal phases of seizures, that may be mistaken with psychiatric disorders or psychogenic seizure. Psychic auras may be dysphasic, dysmnesic (flashback, hypermnesia, panoramic recall, amnestic syndrome, fabrication), perceptive/cognitive (depersonalization, derealization, forced thinking) or altered consciousness (dreamy or aneroid state, twilight, fugue or trance), illusion/hallucinations, palinopsia, autoscopy or mirror phantom as well as affective in nature. On the other hand, in some studies one third of epileptic patients had a history of major depression and an equal number had symptoms of anxiety, but psychotic symptoms were found only in 10% of patients. Schizophrenic-like syndrome was also reported. Behavioral alterations, cognitive inability, personality changes, tripled increased risk of suicide, diminished sexual interest and sleep disorders



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are other comorbidities in epileptic cases. Finally, some epileptic seizures (such as those arised from SSMA, fronto-orbital, temporal and cingulate gurus, eyelid myoclonia with absence or Jeavons syndrome) may have manifestations that can easily be confused with pseudo-seizure or other psychogenic disorders. In this lecture we will discuss this issues in details.

## O11

### Juvenile Myoclonic Epilepsy as A Spectrum Disorder

***Peter Wolf***

Danish Epilepsy Centre Filadelfia, Dianalund, Denmark

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In consequence of newer research juvenile myoclonic epilepsy (JME) is no longer seen as a homogeneous disease. The causes of the existing variance are only partially known yet. We discuss to what extent the phenotypical spectrum of this polygenetically determined disorder expresses genetically defined endophenotypes, or is due to mere quantitative differences in the expression of the core phenotype. Of the three common seizure types of JME, myoclonic, generalized tonic-clonic and absences, absences also occur independently and are strong candidates for an endophenotype. Focal features may in some patients be seen in clinical seizures or the EEG but rarely in both. They have no morphological correlates. In a system epilepsy, local manifestations are possible, and some are due to reflex mechanisms. Of the four reflex epileptic traits common in JME, photosensitivity and praxis induction appear related to basic mechanisms of the core syndrome, whereas language-induced orofacial reflex myocloni and eye closure sensitivity are also seen in other clinical contexts and therefore seem to represent endophenotypes. Cognitive abnormalities indicating slight frontal lobe dysfunction seem to be ubiquitous in JME and are also seen in unaffected siblings of patients. Cluster B personality disorder is found in 1/3 of patients, representing a more severe expression of the underlying pathology. Treatment response and prognosis seem to be affected by an interplay of the described factors producing the severest end of the JME spectrum. The spectrum appears to be due to an interaction of stronger or weaker expression of the core phenotype with various endophenotypes.

## O12

### Presurgical Evaluation in Pediatric Epilepsy Surgery

***Susanne Schubert-Bast***

Clinic for Children and Adolescent Medicine and Epilepsy Center, Department of Neuropediatrics, Goethe-University Frankfurt, Frankfurt, Germany

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epilepsy surgery can be curative in a selected group of children with focal epilepsies. Thorough presurgical evaluation of the epileptogenic zone is the formula to success for postoperative seizure freedom. Best practice in presurgical evaluation in children and postoperative outcome data of a large German cohort will be presented.

## O13

### Common Pitfalls in Pediatric Long-Term Video-EEG Monitoring

***Mahmoud Mohammadi***

Children's Medical Center Hospital, Tehran University of Medical Sciences, Tehran, Iran

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After introduction of electroencephalography as a real-time mean of study on human brain in early 20's, this technology has an important role in diagnosis, classification and management of epileptic disorders in pediatric age group. This role has been emphasized after introduction of Simultaneous Video-EEG monitoring in 60's. After that, our knowledge and attitude had been changed regarding epilepsy, especially in children and newborns. There are some important pitfalls in doing and reading video-EEG monitoring. Knowing and paying attention to these pitfalls will help us in better dealing with epileptic disorders in children. I my short talk, I will address to the following points;

• Having clear and measurable objective for doing VEEG
• Inadequate or inappropriate structure and/or equipment
• Inappropriate or inadequate job descriptions and unqualified personnel
• Only paying attention to "push-buttons"
• Being inattentive to "seizure semiology"
"every seizure has a clear scalp electrographic counterpart"
• Labeling patient as having "psychogenic seizures"
• Having no protocol for every patient as well as tapering AEDs.

## O14

### Epilepsy Surgery in the Pediatric Age

***Josef Zentner***

Department of Neurosurgery, University Hospital of Freiburg, Germany

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): O14

Surgery has proven to be a very useful option for the treatment of pharmacoresistant structural epilepsies in children and adolescents. Recent advances in diagnostic modalities and surgical techniques have widened the spectrum of epilepsies amenable to surgery, and progress in neuroanesthesia and critical care has

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rendered this treatment increasingly safe and viable, even in the first years of life. Focal cortical dysplasia, glioneuronal tumors, and porencephaly due to perinatal stroke are the most frequent etiologies in this age group. In contrast to adult cohorts, one-third of children and adolescents undergo multilobar or hemispheric procedures, whereas frontal or temporal corticectomies are performed at similar rates. The younger the patient, the larger the resection or disconnection: infants often require more extensive procedures than older children or adolescents. The poor specifity of electroclinical correlations and the challenging MRI interpretation due to the ongoing myelination still pose considerable obstacles to candidate selection in very young children who, however, benefit the most from the opportunity to compensate functional deficits due to the pronounced brain plasticity. Developmental retardation and psychiatric comorbidity do not contraindicate surgery. Overall, seizure freedom is achieved in two-third of the cases, with surgical success rates varying according to the underlying etiology and duration of follow-up. Global cognitive development remains stable or may improve after surgery. Individual developmental trajectories are determined by presurgical cognitive status, age at surgery, seizure control, and antiepileptic drug tapering. In all, epilepsy surgery in children and adolescents is no longer a treatment of last resort but may be considered "disease-modifying", particularly in the first years of life, considering the vulnerability of the immature brain to the ongoing processes of epileptogenesis.

## O15

### Lateralizing and Localizing Findings in Focal Epilepsies

***Mohammad Rezvani***

Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

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Refractory or drug resistant epilepsy develops in 20–30% of all patients diagnosed with epilepsy. The ILAE has suggested that a person be considered to have refractory epilepsy if they have failed to achieve sustained seizure freedom with two appropriate and tolerated antiepileptic drug (AED) regimens. Outcome studies have consistently shown response to the first AED to be a strong predictor of long-term outcomes. General principles of managing refractory epilepsy are 1. Review the diagnosis and classification 2. Review AEDs currently and previously used 3. Consider non-pharmacological treatments 4. Address co-morbidities and lifestyle issues 5. Optimize quality of life. Knowledge about lateralizing and localizing signs of seizure semiology and other clinical findings is necessary in the management process of patients with focal epilepsy, particularly with widespread use of surgery in the management of patients with refractory focal epilepsy. Video-EEG monitoring has permitted careful analysis of semiologic features of seizures and their correlation with simultaneous EEG activities. The availability of new imaging and functional studies could be considered as a revolution in localization of the epileptogenic zone. In my lecture, a list of well-documented lateralizing and localizing findings in focal epilepsies is presented briefly. Knowledge about these findings is practical tool for physicians to determine epileptogenic zone. While I include the correlated symptomatogenic zone and the possible mechanism in generating the finding in the context of a focal seizure, this lecture emphasizes how to localize the epileptogenic zone according to any given specific finding. More accuracy in detecting epileptogenic zone will increase the chance of seizure freedom after epilepsy surgery.

## O16

### Surgical Treatment of Epilepsies: What Has Changed over the last 25 Years?

***Josef Zentner***

Department of Neurosurgery, University Hospital of Freiburg, Germany

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Surgical procedures to treat severe epilepsies have gained general acceptance. Different approaches reflect not only different pathologies and pathophysiological conditions, but also the history of epileptological and surgical concepts. Despite of these differences between individual institutions, we can observe some fundamental conceptual changes over the last two or three decades that have found wide approval. Overall, there is a clear trend towards the treatment of children and adolescents. This is especially true, since negative consequences of seizures and pharmacotherapy on the immature brain are well known, and since favorable cognitive development can be expected from postoperative seizure control. In temporomesial epilepsies, there is a tendency to more circumscribed resections such as selective amygdalohippocampectomy, although no homogenous data are available indicating that preservation of lateral neocortical structures is advantageous with respect to neurocognitive functions. On the other hand, it has also not been shown that lateral or extended hippocampal resection may be necessary for seizure control. Extratemporal procedures usually require extensive presurgical diagnostics, but can be successfully performed even around areas of high functionality using modern techniques, including functional imaging, tractography, neuronavigation as well as intraoperative mapping and monitoring. In large hemispheric lesions, the classical Rasmussen technique of hemispherectomy has been left in favor of more sophisticated approaches such as the transsylvian

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or perisylvian hemispherotomy. These new techniques noticeably reduce blood loss and spare operation time which is important, since in particular young children are affected. Amongst functional methods, stimulation techniques have recently gained increasing interest. Possibly, local epilepsy therapy based on closed-loop intervention systems may introduce a new era of epilepsy therapy in future so far open questions such as methods for seizure prediction have been solved. Further improvement of presurgical techniques and operative approaches require the concentration of the epilepsy surgical program to specialised centers, where different competences and sufficient experience are available in order to successfully manage these complex problems.

## O17

### Potential Benefits of Surgical Intervention in Epilepsy

***Maryam Khaleghi Ghadiri***

Department of Neurosurgery, Westfalische Wilhelms-Universitat Munster, Munster, Germany

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Epileptic patients for whom optimal medical treatment fails may be candidates for surgical treatment. Surgical interventions in epilepsy could be used as a diagnostic method or therapeutic approach. Use of surgical intervention for epilepsy has been suggested as the most underutilized of all proven effective therapeutic methods in the medicine. Insertion of different surface or deep recording electrodes sometimes is essential to define the exact epileptogenic zone. Type of seizures determines the surgical procedure and complete resection of the epileptogenic focus or dissection of nerve pathways along which seizure activities spread usually leads to freedom from seizures. The outcome of epilepsy surgery is dependent on the etiology of the seizure, location of the epileptogenic zone, type of surgical procedure, and degree of tissue resection.

## O18

### Vague Nerve Stimulation

***Nasser Zangiabadi***

Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

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VNS indications
Epilepsy
VNS Therapy system is indicated for use as an adjunctive therapy in reducing the frequency of seizures in patients whose epileptic disorder is dominated by partial seizures (with or without secondary generalization) or generalized seizures that are refractory to antiepileptic medications.
Depression
VNS Therapy is indicated for the adjunctive long-term treatment of chronic or recurrent depression who are experiencing a major depressive episode and have not had an adequate response to four or more antidepressant treatments.
Mechanism of action
VNS definitely exerts an effect via the LC (norepinephrine) and the RN (serotonin)
These mechanisms of action are similar to those of medications through pharmacologic pathways
The LC and RN/DRN have been conclusively identified as:
Brain centers affected by VNS Therapy
Playing a role in suppressing seizures
Areas that must be intact for VNS Therapy to have an effect
VNS Safety Profile
More than 70,000 patients worldwide have been implanted with VNS Therapy
No known interactions with medications
No reported systemic neurotoxic effects, rash, renal impairment, or bone marrow suppression
No increase in sudden, unexpected death in epilepsy (SUDEP)1
Gestational outcomes
Animal study has shown no evidence of impaired fertility or harm to the fetus due to VNS Therapy2,3
Pregnancies have gone to term with VNS4,5
One of my challenging Cases which resulted in Vague Nerve Stimulation (VNS) therapy
53-year-old Right-handed gentleman with History of epilepsy since 1983 (due to being injured during war) in form of CPS and GTCs.
We implanted VNS for the first time in Khatam-Al-Anbia hospital about three months ago for this patient. The frequency of the patient's attacks has been decreased to about eighty percent till now.
No significant side effects have been reported except for mild hoarseness.

## O19

### Cellular Injury and Various Receptor Expression in the Epileptic Human Amygdala

***Maryam Jafarian[1], Sayed Mostafa Modarres Mousavi[1], Fatemeh Alipour[1], Maryam Khaleghi Ghadiri[2], Ali Gorji[1, 3, 4]***

[1]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran
[2]Department of Neurosurgery, Westfälische Wilhelms-Universität Münster, Germany
[3]Epilepsy Research Center, Westfälische Wilhelms-Universität Münster, Germany
[4]Department of Neuroscience, Mashhad University of Medical Sciences, Mashhad, Iran

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Mesial temporal lobe epilepsy (MTLE) is the most ordinary type of partial onset epilepsy. Despite several types of treatment, going therapies are insufficient about 20% to 30% of patients. For some, other therapeutic options are need. To achieve this goal, it is essential to develop more precisely the molecular and cellular mechanisms of the disease. This study was planned according to the role of excitatory and inhibitory roles of some important receptors in the amygdale complex as a major part of temporal lobe and effects of these changes on amygdala damage and function. We evaluated amygdala damage by tunnel staining correlate with alteration in GABAA (Rα1, Rβ3, and Rγ2), GABACRp2, GAD and GABAB (R1, and R2), also Glutamate receptors NMDA (NR2B, NR1, and mGluR1α) and AMPA (GluR1, GluR2) immonoreactivity to measure the expression and distribution of these receptors. The present data revealed an increased rate of Dark cells as a hallmark of cell damage as well as apoptotic cells as a marker for dell death, and decreased expression levels of several GABAergic receptor subunits and GAD65 in the amygdala obtained during epilepsy surgery compared to autopsy specimens. Furthermore, the increased occurrence of apoptotic cells in the amygdala was negatively correlated with the reduced expression of the studied GABAergic receptor subunits and GAD65. The present data indicate the importance of GABAergic neurotransmission in seizure-induced cell injury in the amygdala and suggest several GABA receptor subunits as potential candidates for preventive and therapeutic management to control epilepsy and its comorbid disorders, such as anxiety.

## O20

### Biomarkers for Epilepsy

***Jerome Engel***

Departments of Neurology, Neurobiology, and Psychiatry & Biobehavioral Sciences and the Brain Research Institute David Geffen School of Medicine at UCLA, Los Angeles, CA, USA

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A biomarker is defined as an objectively measured characteristic of a normal or pathologic biologic process. Identification and proper validation of biomarkers of epileptogenesis (the development of epilepsy) and ictogenesis (propensity to generate spontaneous seizures) might predict the development of an epileptic condition; identify the presence and severity of tissue capable of generating spontaneous seizures; measure progression after the condition is established; and determine pharmacoresistance. Such biomarkers could be used to create animal models for more cost-effective screening of potential antiepileptogenic and antiseizure drugs and devices, and to reduce the cost of clinical trials by enriching the trial population and acting as surrogate markers to shorten trial duration. Research to identify reliable biomarkers may also reveal underlying mechanisms that could serve as therapeutic targets for the development of new antiepileptogenic and antiseizure compounds. Target mechanisms for biomarkers include cell loss, axonal sprouting, synaptic reorganization, altered neuronal function such as gene expression profiles and protein products, neurogenesis, altered glial function and gliosis, inflammatory changes, angiogenesis, and altered excitability and synchrony. Potential biomarkers include hippocampal changes on MRI, interictal EEG spike features including BOLD patterns on fMRI, pathological high-frequency oscillations, excitability as measured by transcranial magnetic stimulation, AMT-PET imaging, and gene expression profiles. Identification of reliable epilepsy biomarkers is a high priority area of current research.

## O21

### Update and Future Directions in Poststroke Epilepsy

***Mojdeh Ghabaee***

Iranian Center of Neurological Research, Neurology Department, Tehran University of Medical Sciences, Tehran, Iran

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Concepts of latency and epileptogenesis form an important basis for clinical understanding of the early versus late seizures in stroke patients. Two models of epileptogenesis is postulated in stroke patients. First, loss of neurovascular unit integrity (BBB disruption) leads to local metabolic disturbances without disturbance in neuronal networks causes seizures immediately after a stroke. Late seizures may be secondary to gliosis and development of meningocerebral scarring. Changes in membrane properties, differentiation, selective neuronal loss, and collateral sprouting may result in hyperexcitability and neuronal synchrony sufficient to elicit seizures and predispose to epilepsy. These models of seizure carry different risks of seizure recurrence for post stoke epilepsy, early and late. Recent studies show effect of drugs in the processes of PSE. Statin with anti-inflammatory and antioxidant properties is postulated to have role in reduction of epileptogenecity in early post stroke epilepsy. LEV by inhibition of inflammatory responses and reduction of reactive gliosis in the hippocampus and piriform cortex in a rat model of epilepsy could be an important agent in the prevention of epileptogenesis far from as anti-epileptic drug. Future studies should aim to clarify the impact of AED treatment on vascular-risk profile and rehabilitation. Role of biomarkers and neuroimaging in prevention of PSE, reduction of brain damage and deterioration in neurological function, is going on.

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## O22

### Approach to Syndromic Epilepsy

*Bita Shalbafan*

Iran Social Security Organization, Labafinejad Hospital, Tehran, Iran

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Epilepsy can be observed during the course of many inborn errors of metabolism (IEMs) usually as part of a large clinical spectrum. However, several IEMs may manifest with inaugural epileptic seizures. Inborn errors of metabolism (IEMs) represent poorly known causes of epilepsy in adulthood. Although rare, these are important to recognize for several reasons:
1- some IEMs respond to specific treatments
2- some antiepileptic drugs interfering with metabolic pathways may worsen the clinical condition
3- and specific genetic counselling can be provided.
When should one suspect an IEM in an epileptic patient? In a patient with epilepsy, it should be stressed that several clinical, radiological or electrophysiological features suggest an IEM:
1-The epileptic syndrome does not match with any classical epilepsy syndrome i.e. atypical electro-clinical presentation, atypical response to antiepileptic drugs or mixture of generalized and partial epileptic manifestations (for example association of myoclonus and partial seizures in a given patient;
2-Progressive myoclonic epilepsy;
3- Association with other neurological impairments (cerebellar, pyramidal, etc.) or with unexplained mental retardation, or other organ disorders (eyes, muscles spleen, etc);
4-Familial history suggestive of a genetic disease;
5-Seizures related to the times of eating, fasting, protein-rich meal;
6-Inefficacy or worsening with classical antiepileptic drugs;
7-Unexplained status epilepticus;
8-Abnormalities on proton magnetic resonance spectroscopy: for instance, creatine deficiency or increased in lactate;
9-EEG showing slowing of the background activity or photo-paroxysmal responses during the photic intermittent stimulation at low frequencies (1–6 H).
To recognize the type of IEM, clinical history needs to be analyzed considering the following points;
(a) Age at onset
(b) clinical presentations
(c) Pattern of inheritance
(d) Key clinical symptoms and signs with special focus on sites of neuraxis and extra-neural involvement
(e) Course of the disease and
(f) Severity of impairment.

## O23

### Differentiation of Human Neural Stem-Like Cells Derived from Epileptic Amygdala Tissue into Motor Neurons

*Sepideh Ghasemi[1], Hadi Aligholi[2], Ali Gorji[1,3,4]*

[1]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran
[2]Department of Neuroscience, School of Advanced Medical Sciences and Technologies, Shiraz University of Medical Sciences, Shiraz, Iran
[3]Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[4]Epilepsy Research Center, WestfälischeWilhelms-UniversitätMünster, Germany

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Animal studies have increasingly shown that the potential for the stem cells to use in the treatment of motor neuron diseases, such as amyotrophic lateral sclerosis and spinal muscular atrophy. This might be achieved by using stem cells to replace cells, deliver nourishing substances or dampen down inflammation. The aims of the present study were to isolate and characterize the neural stem cells from human epileptic amygdala tissues and differentiate them to the motor neurons. Samples were collected from epileptic patients undergoing brain surgery. The tissue was dissociated enzymatically. Then, the single cells were cultured in neurosphere medium, including DMEM/F12 containing growth factors and supplements in non-coated flasks. For motor neuron-like cell induction, neural stem cells were exposed with DMED/F12 containing supplements, Sonic hedgehog, retinoic acid, brain-derived neurotrophic factor and glial-derived neurotrophic factor for two weeks. To characterize the isolated cells, immunocytochemistry was performed against nestin, Sox2, GFAP and MAP2 for neural stem cells and ChAT for evaluating the motor neuron-like cells. Primary neurospheres were appeared after 4-7 days. The number of spheres enhanced after each passage. Isolated cells expressed neural stem cell markers, nestin and sox2. The differentiated cells had positive immunoreactivity to motor neuron marker. The human amygdala tissue obtained from epileptic patients can be considered as a valuable source of adult neural stem cells for future investigations.

## O24

### Human Neural Stem/Progenitor Cells Derived from Epileptic Human Brain in a Self-Assembling Peptide Nanoscaffold Improve Traumatic Brain Injury in Rats

*Ali Jahanbazi Jahan-Abad[1,2], Sajad Sahab Negah[1,3], Hassan Hosseini Ravandi[1], Sepideh Ghasemi[1], Maryam Borhani-Haghighi[1], Walter Stummer[4], Ali*

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***Gorji*[1,3,4,5,6]*, Maryam Khaleghi Ghadiri*[4]

[1]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran
[2]Department of Clinical Biochemistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[3]Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[4]Department of Neurosurgery, Westfälische Wilhelms-Universität Münster, Münster, Germany
[5]Department of Neurology, Westfälische Wilhelms-Universität Münster, Münster, Germany
[6]Epilepsy Research Center, Westfälische Wilhelms-Universität Münster, Robert-Koch-Strasse 45, 48149 Münster, Germany

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Traumatic brain injury (TBI) is a disruption in the brain functions as a result of an external force. To date, the main problem is that no direct effective therapies exist for brain injury treatment. It is thought that stem Cell therapy may provide a promising treatment for TBI. The use of human-derived stem/progenitor cells seeded in three- dimensional (3D) micro-environments have shown as a promising novel method for cell replacement therapy in TBI. The project aims here were to investigate the effects of human neural stem/progenitor cells (hNS/PCs) derived from the resected mesial temporal lobe brain tissues and human adipose-derived stromal/stem cells (hADSCs) cultured in PuraMatrix hydrogel (PM) on brain function in animal models of TBI. By comparing the results of doubling time characteristics of hNS/PCs and hADSCs, revealed that hNS/PCs doubling time was significantly longer than hADSC. Transplantation of hNS/PCs and hADSCs seeded in PM after TBI does seem to improved functional recovery, decreased lesion volume, inhibited neuroinflammation, and reduced the reactive gliosis at the injury site in rats. The data suggest the hNS/PCs derived from epileptic human brain seeded in PM scaffold can be used for the potential cell therapy for neurological disorders, such as TBI.

## *Workshop Presentations*

### W1

#### Seizure Semiology of Focal Epilepsies in Infants

***Susanne Schubert-Bast***

Clinic for Children and Adolescent Medicine and Epilepsy Center, Department of Neuropediatrics, Goethe-University Frankfurt, Frankfurt, Germany

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): W1

lateralization or localization signs of seizures can be very subtle in small children. The semiology of focal onset seizures can be misinterpreted as generalized. Some focal phenomena like auras are doubtful to exist during early childhood, other discrete signs might easily be missed. This interactive video-lecture will demonstrate a variety of subtle seizure semiology signs in infancy and provide a training to focus on them thoroughly.

### W2

#### Psychodrama in Adults and Adolescents with Epilepsy

***Kaveh Moghaddam***

Art Therapist, Alle Taha University, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): W2

Introduction: Adults and adolescents with epilepsy suffer from emotional, cognitive, behavioral, motor and learning problems and these problems can have negative effects on their life. Well-being, self-esteem and self-confidence will be affected and also secondary psychological problems such as anxiety and depression will be observed in these clients. Art therapy and specially psychodrama which are a kind of psychotherapy can help to improvement of these problems. Conclusion: In psychodrama therapist can apply the projective techniques such as warm-up, empty chair and confrontation for better involvement of clients. Applying these techniques can help to integration of "ego" which is destroyed. Psychodrama techniques can be applied individual or in peer group. The goal of these techniques is to increase the self-esteem, self-confidence and self-actualization in these clients. Sometimes application of light music and theatre (drama) together can have the best outcomes in these clients.

### W3

#### Challenges in Nursing Care of Epileptic Patients

***Forouzan Ahmadi***

Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): W3

Procedures before LTM
Admitting the patient and introduce yourself, then explain how to do LTM and describe its aim
Doing MRI with epilepsy protocol
Washing the patient's hair
Preparing the instruments for starting the LTM
Measuring the head with 10-20 system and mark the spots with a red pen
Doing blood exam with doctor's order
Considering the patient's consciousness and speech
Procedures during LTM
Check the electrode's impedance and change the electrode if it is necessary and put some gel under the electrodes.
Select the abnormal changes like IED, seizure, subclinical and etc.

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Observe the brain waves and manage the nursing care
Make a friendly relationship with the patient and take care of her/him and protect the head box and the electrodes
Do the nursing test
Record the seizure and inform the doctor and perform his order
Procedures after LTM
After recording sufficient seizures, call the doctor and remove the electrodes from the patient's head, after 24 hours that the seizure ends, the patient can be discharged.

## Poster Presentations

### P1

**Invasive Recording and Nursing Care**

***Forouzan Ahmadi***

Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P1

Intracranial surgery is performed for tumors, trauma, congenital abnormalities, vascular diseases (aneurysms and vascular malformations) trigeminal neuralgia, and other disorders of the brain that are amenable to surgical treatment. Using the latest technology, state of the art image guided surgery is used in many cases to accurately locate lesions within the brain. In patients with refractory epilepsy, whose EEG-monitoring reveals focal epilepsy, after doing Brain MRI, SPECT, PET and neuropsychological assessment, the lesion, ictal onset zone and its function will be determined in one specific area and based on these findings lesion will be resected by surgery. If the specific ictal onset zone is not identifiable with Intracranial Recording, EEG-monitoring will be applied to determine the specific ictal onset zone during ictal phase (mostly in temporal lobes) before the surgery.
Indications are described as:
Confirmation of an anatomo-electro-clinical hypothesis, Attempt to record nodes in the epileptic network, takes into account the near propagation of ictal onset, and Implantation of electrodes also takes into account surgical resective margins of the given hypothesis.
Possible Markers of epileptogenicity are:
Still investigational: high frequency oscillations, single pulse stimulation induced late responses and microelectrode recording of micro seizures.
Intracranial recording has specific pattern, significant limitations, costs and risks. Implanted electrodes necessarily record from a small volume of cortex. Restrict the number of implanted electrodes to as few as possible without compromising the ability to detect the zone of seizure onset with sufficient precision to use in the determination of the epileptogenic area for subsequent surgery.

### P2

**Bumetanide as an Effective Adjunct Therapy in Intractable Epilepsy**

***Mahmoud Reza Hadjighassem, Maryam Gharaylou, Abbas Tafakhori***

Iranian Center of Neurological Research, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P2

Introduction: Reduced KCC2 expression and increased NKCC1 expression can shift Gamma-aminobutyric acid (GABA) responses toward excitation and generate seizures. Previous studies suggested that bumetanide, an inhibitor of NKCC1, might have antiepileptic effects. Here, for the first time, we assessed NKCC1 and KCC2 dysregulation and possible modifying role of bumetanide in living human subjects with drug-resistant TLE. Materials and Methods: Eligible patients with drug-resistant TLE were included. Peripheral blood mononuclear cells (PBMCs) were isolated from collected blood samples and used for polymerase chain reaction (PCR) and western blot analyses. Bumetanide treatment was initiated with the dose of 0.5 mg/day and then was weakly increased by 0.5 mg until a target dose of 2mg/day was achieved. Then, seizure frequency and drug safety were assessed at each monthly visit. Results: A total of 39 patients were evaluated and 27 patients were included. Overall, 70.4% were responders. The median seizure frequency reduced significantly from 9 (7-15) at baseline to 4 (2-11.67) at first three months ($P<0.001$), 2.67 (1-5.33) at last three months ($P<0.001$), and 3.33 (1.33-7.17) during the six months of treatment ($P<0.001$). The forward logistic regression showed eGFR (OR: 0.953, 95% CI: 0.912-0.996, $P=0.033$) as the only significant predictor of drug response. The level of NKCC1 and KCC2 gene transcripts and KCC2 protein did not significantly alter following treatment ($P>0.05$). However, we observed a significant reduction in NKCC1 protein levels after bumetanide treatment ($P=0.0156$). Conclusion: Altogether, it seems that bumetanide is an effective and relatively tolerable drug in patients with drug-resistant TLE. We confirm that KCC2 is significantly downregulated while NKCC1 is markedly upregulated in TLE patients. Bumetanide treatment led to a significant reduction of NKCC1 protein expression which we believe is the underlying reason for its antiepileptic efficiency.

### P3

**Review of Neurofeedback in Epilepsy**

***Amirsalar Tozihi[1], Mahsa Mehdizadeh[1], Ali Jahan[2]***

[1]Faculty of Rehabilitation, Tabriz University of Medical Sciences, Tabriz, Iran
[2]Tabriz University of Medical Sciences, Tabriz, Iran

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The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P3

Introduction: Evaluation of EEG Biofeedback efficacy in epilepsy patients with overview of published articles in PMC, PubMed, Science Direct and Neuroscience databases. Epilepsy is a central nervous system disorder (CNS) in which a person experiences repeated seizure due to a chronic underlying process. The incidence of epilepsy is approximately 3 up to 5 percent in different populations. There are numerous drug therapies for the treatment and control of epilepsy, but this method only contributes to 2/3 of the patients, which means that about 1/3 of the patients with epilepsy do not respond to antiepileptic drugs. Since the 1980s, neurofeedback has been introduced into clinical practice by a scientist, Sterman, as a therapeutic tool, thus reducing seizures by altering brain waves in mice and monkeys. Conclusion: Several studies have been carried out to show that the SMR waves (12-15 Hz) training in central regions of the brain hemispheres has led to a reduction in seizure rates and facilitate treatment. A meta-analysis study showed a significant reduction in the occurrence of seizure in treatment-resistant epilepsy by SMR enhancement protocol. Therefore, the neurofeedback was proposed as very good approach in drug-resistant epileptic patients. Also, the use of neurofeedback in children with partial seizures has had a positive effect. Neurofeedback had made considerable effects on the treatment of epilepsy. So that, during a study, in 80% of patients recovered. Neurofeedback is a good option for patients who do not respond to drug therapy. However, the exact mechanism of neurofeedback, as well as the best selective treatment protocol for patients with different epilepsy categories, is still unclear, and the duration of the treatment is debatable. Therefore, more in-depth studies are needed to find out hidden angles of epilepsy treatment with neurofeedback.

## P4

### The Role of Occupational Therapy on Improvement of Skills in Children with Epilepsy

***Aida Ravarian[1], Kaveh Moghaddam[2], Farhoud Saied Ershadi[3]***

[1]Pediatric Neuro-Rehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran
[2]Art Therapist, Alle Taha University, Tehran, Iran
[3]University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P4

Introduction: Rehabilitation is one of the sciences which can help to children with special needs. According to studies and researches most of the children with special needs experience seizure attacks or epilepsy and this issue can have negative effects on all of their skills development. Occupational therapy is one of the rehabilitation fields in which objective activities can be applied for improvement of clients. Occupational therapists can have an important role in improvement of problems related to epilepsy. Conclusion: In children with epilepsy a lot of problems such as emotional, behavioral, cognitive, learning and perceptual-motor can be observed and occupational therapists can have a comprehensive evaluation for survey of these problems. Also, they can apply objective cognitive, perceptual, sensory, motor and psychological activities for helping to these children and reinforcement of their skills. For better relationship with children with epilepsy occupational therapists can apply these activities via paly and the family members can be involved too.

## P5

### Evaluating Executive Functions in Patients with Juvenile Myoclonic Epilepsy Using Frontal Assessment Battery

***Vajiheh Aghamollaii***

Department of Neurology, Roozbeh Hospital, Tehran University of Medical Sciences, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P5

Introduction: It has been demonstrated that patients with juvenile myoclonic epilepsy (JME) have deficits in various aspects of executive functions. Frontal Assessment Battery (FAB) has proved to be a clinically useful tool for evaluating executive functions in patients with neurological disorders, particularly JME patients. In this research study, we intended to appraise the clinical utility of FAB for detection of deficits in executive functions in JME patients and its association with clinical and demographic features of JME patients. Materials and Methods: Thirty-one JME patients and 62 sex-matched healthy controls (HCs) were included in this study. Frontal Assessment Battery (FAB) has proved to be a clinically useful tool for evaluating executive functions in patients with neurological disorders, all included patients and healthy controls were first interviewed by an experienced neurologist and demographic and seizure-related characteristics were documented. In the next step, all of the six subtests of FAB were administered by a trained medical student. Then we analyzed the results and defined differences between two groups and appraised the clinical utility of FAB for detection of deficits in executive functions in JME patients and its association with clinical and demographic features of JME patients. Results: Compared to HCs, JME patients achieved lower scores in four domains of FAB consisting of conceptualization, mental flexibility, programming, and inhibitory control. JME patients on polytherapy had significantly higher scores in three domains of FAB including conceptualization, mental flexibility, and inhibitory control, as well as total FAB score. Patients with a seizure within less than week did not achieve

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higher or lower score than patients with a seizure in a week or more. Furthermore, mental flexibility score was correlated with disease duration in JME patients. Conclusion: Patients with JME have deficits in different aspects of executive functions and FAB is useful clinical tool for evaluation of executive functions in these patients. Different treatment approaches can significantly affect the cognitive functioning in JME patients. Antiepileptic drug (AED) Polytherapy regimens can improve the performance of JME patients in various domains executive functions.

## P6

### The Connection Between Epilepsy and Depression

*Sara Abdolahi, Robabeh Jafari*

Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P6

Introduction: Depression is the most common psychiatric problem in patients with epilepsy. These mood disorders in patients with epilepsy are often still remain unrecognized and untreated. The incidence of depression in epilepsy is significantly higher than that of the general population or patients with other neurological disorders. Depression may have an associated with on the quality- life of patients with epilepsy, sometimes even more than the seizures. The neuropsychiatric bases in epilepsy have attracted many researchers. The relationship between epilepsy and depression is not unidirectional, and some patients may have mood disorders before the onset of seizure. One of the reasons that may indicate a bidirectional relationship between depression and epilepsy, increased seizure risk following suicidal attempts. Several potential variables related to this issue for example: abnormal activity of several neurotransmitters including serotonin, noradrenalin, dopamine, GABA and glutamate and structural and functional abnormalities in temporal-and frontal-lobe. Conclusion: So far, psychotherapy for depression in epileptic patients has been used less. In the other hand, the efficiency of antidepressant drugs for depression in epilepsy is unknown. In epilepsy, in addition to stress, seizure-related states and depression and suicide events have also been reported. National psychiatric guidelines indicate that there are care models for stress management in these patients. The interaction between depression, seizures, treatment and psychosocial burden related to epilepsy, so neurologists play a key role in the treatment of epilepsy.

## P7

### The Role of Aquaporins in Synaptic Plasticity and Epilepsy

*Zeinab Najmi[1], Sayed Mostafa Modarres Mousavi[1, 2]*

[1]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

[2]Department of Nanobiotechnology, Faculty of Biological Sciences, Tarbiat Modares University, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P7

Introduction: One family of small integral membrane proteins called “aquaporins” have crucial role in water transport. Aquaporin-4 (AQP4), a double-sided water channel protein, shows the highest levels of AQP4 in the central nervous system. AQP4 binds to a subset of potassium channels such as Kir4.1 and Kir5.1, which can affect synaptic transmission. Conclusion: Thus, AQP4 have crucial role in alterations of synaptic plasticity and cognition which implicated in diverse neurological diseases such as epilepsy.

## P8

### Temporal Lobe Epilepsy and Mitochondrial Dysfunction

*Elham Shiri[1], Akram Shiri[2], Maryam Borhani-Haghighi[1, 3], Fatemeh Alipour[3]*

[1]Department of Anatomy, School of Medicine, Tehran University of Medical Science, Tehran, Iran

[2]Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, Iran

[3]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P8

Introduction: Epilepsy is a neurological disorder characterized by recurrence seizures resulting in disturbing effects on patients. Human temporal lobe epilepsy (TLE) is a common destructive neurological disorder described by recurrent seizures and selective susceptibility of hippocampal neurons in specific parts of the hippocampus. The emphasis was placed on the role of mitochondrial dysfunction in epilepsy, with the fact that epilepsy is often inherited with mitochondrial disorders, such as myoclonic epilepsy with ragged red fibers (MERRF) epilepsy and also it is related with encephalopathy in children. Damage to proteins, lipids, mitochondrial DNA is considered as evidence for consequences of mitochondrial dysfunction in different animal models of TLE. The mitochondrial oxidative stress has been considered as the leading cause of epileptic seizures. Mitochondria is one of the most important organelles in cells and control neuronal excitability by controlling adenosine triphosphate (ATP) production, oxidation of fatty acid, amino acid, and neurotransmitter biosynthesis regulation. The first place where reactive oxygen species (ROS) is produced in mitochondria. On the other hand, mitochondria are too susceptible to oxidative damage which controls neuronal excitability. Initial trauma associated with TLE induces complex molecular, biochemical, physiological, and structural

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changes in the brain mitochondria that contribute to epileptogenesis and the subsequent onset of spontaneous and recurrent seizures. Mitochondrial damage is shown in studies from human imaging and tissue analysis from TLE patients. The mitochondrial malfunction can be considered as a central factor for seizures. In addition, mitochondrial oxidative stress may have a pathologic role in temporal lobe epilepsy. Another reason which attributes mitochondrial oxidative stress to seizure generation in TLE is age-dependent epileptogenesis and increasing in mitochondrial oxidative stress with age. Conclusion: It is proposed mitochondrial dysfunction high relevance in seizure generation in temporal lobe epilepsy with Ammon's horn sclerosis. Furthermore, mitochondria should be regarded as a promising target for future neuroprotective strategies in epilepsy.

## P9

### Isolation and Culture of Adult Microglia Cells Derived from Epileptic Human Brain Tissue

***Sepideh Ghasemi[1], Sara Abdolahi[1], Ali Gorji[1, 2, 3]***

[1]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

[2]Epilepsy Research Center, WestfälischeWilhelms-Universität, Münster, Germany

[3]Department of Neuroscience, Mashhad University of Medical Sciences, Mashhad, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P9

Introduction: Temporal lobe epilepsy (TLE) is the most common form of drug-resistant epilepsy in adults and generally requires surgical therapy. Epilepsy surgery provides opportunities to isolate mixed glial cells, such as microglia. Microglia is the resident immune cells in the brain, although the role of these cells in epilepsy remains largely undiscovered. Isolation and characterization of human microglia from epileptic tissue may improve our understanding of their basic function. Materials and Methods: Following surgical resection, human brain biopsy tissue was dissociated by mechanical and chemical digestion. Cell pellets were resuspended and cultured to medium containing growth factors and supplements. After 24 hours, floating and weakly attached cells were removed and microglia culture media was added to the plate for one week. Finally, to characterize the isolated cells, immunostaining was performed. After confirming cell phenotype, immunocytochemistry was done. Results: Our procedure obtains microglia cultures of high yield from epileptic human brain tissue using a simple method. Isolated microglia express Iba1 marker. Conclusion: Microglia obtained from TLE surgery can be used for in vitro and in vivo investigation.

## P10

### Seizure and Cerebral Palsy in Children

***Sara Abdolahi, Zahra Aeini***

Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P10

Introduction: Cerebral palsy (CP) is a heterogeneous permanent neurological disorder that may cause by nonprogressive damage to the developing brain. CP is associated with a higher incidence of seizure disorders, in other words seizure can be seen in about one-third of childhood patients with CP. Seizures are prevalent among children with CP because CP is caused by a brain injury occurring before, during or shortly after birth. Brain injuries may increase the opportunity for abnormal nerve activity to happen within the brain, which can result in seizures. All seizure types can be found in CP but the partial complex and secondarily seizures are the most common types. seizure appears in 15-60% of patients with CP. In addition to seizures, several other neurological diseases are also associated with CP. A few studies have been conducted in recent decades that explore the epidemiologic characteristics of seizure and CP in a pediatric population. Because the consider CP a childhood disorder. So far, studies have not been conducted on the population of CP that has reached adulthood. Conclusion: According to studies, children with seizures were at increased risk for psychic health, developmental, and physical comorbidities, increasing needs for care coordination and specialized services. In the future, more studies are needed to: understand of epidemiology of seizure and cerebral palsy; health issues associated with these diseases and the development and evolution of these diseases over time.

## P11

### The Role of Aquaporin-4 Receotors in Mesial Temporal Epilepsy

***Zeinab Najmi[1], Sayed Mostafa Modarres Mousavi[1, 2]***

[1]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

[2]Department of Nanobiotechnology, Faculty of Biological Sciences, Tarbiat Modares University, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P11

Introduction: Aquaporin-4 (AQP4) express in glial cells and plays a crucial role in brain water and ion homeostasis during rapid neural activity. Only AQP-4 has been found in astrocyte, which is widely expressed throughout the brain, especially in the cerebrospinal fluid and cerebrospinal fluid (CSF) interface, which may have contributed to edema and CSF absorption. Mesial temporal lobe epilepsy (MTLE) is a chronic seizure disorder that is often refractory to epilepsy treatment. The main cause of MTLE is not fully understood, but the ability to hyperexcitability in neuronal networks is an essential feature. Loss of AQP4 from perivascular

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endfeet of sclerotic hippocampus contributes to increased seizure propensity in human MTLE. Conclusion: In conclusion, mislocalization of AQP4 in different regions of hippocampus may contribute to the epileptogenicity of the MTLE patients.

## P12

### Mitochondrial Dysfunction and Oxidative Stress in Epilepsy

***Elham Shiri[1], Akram Shiri[2], Maryam Borhani-Haghighi[1, 3], Fatemeh Alipour[3]***

[1]Department of Anatomy, School of Medicine, Tehran University of Medical Science, Iran
[2]Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, Iran
[3]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

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Introduction: Mitochondria have essential functions such as the generation of ATP, metabolite/neurotransmitter synthesis, fatty acid oxidation, calcium homeostasis, control of cell death and they are the primary source of reactive oxygen species (ROS) production. Mitochondrial dysfunction and oxidative stress play a pivotal role in several neurological disorders and recently the changes in mitochondria function have been shown in acquired epilepsies. An acute increase in mitochondrial oxidative stress and following damage to cellular macromolecules have been demonstrated in repeated seizures i.e. status epilepticus (SE). On the other hand, mitochondrial dysfunction and oxidative stress reported in other disorders such as hypoxic-ischemic insults, traumatic brain injury, viral infection, and hyperthermia which can lead to chronic acquired epilepsies. In addition, epilepsy has been seen in disorders led by mutations in mtDNA and nuclear genes. Mitochondrial dysfunction during chronic epilepsy is characterized by a decrease in ETC complex I and IV activity, increase in complex II activity, and a decline in mitochondrial membrane potential in the CA1 and CA3 regions of hippocampus one month after pilocarpine-induced SE. It can be proposed that inhibition of complex I in mitochondria can lead to a rise in ROS production and/or RNS (Reactive nitrogen species) which may cause not only neuronal injury demonstrated in a model of seizures but also epileptogenesis. In recent years, a paramount of fundamental research has been directed toward developing pharmacologic approaches to restore mitochondria function. Conclusion: Evaluation of mitochondrial damage in epilepsy and the specific targeting of mitochondrial oxidative stress, malfunction, and bioenergetics may be novel strategies for decreasing epileptogenesis and seizure initiation.

## P13

### Aquaporins Function as a Novel Therapeutic Strategy for a Variety of Cerebral Disorders

***Zeinab Najmi[1], Sayed Mostafa Modarres Mousavi[1, 2]***

[1]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran
[2]Department of Nanobiotechnology, Faculty of Biological Sciences, Tarbiat Modares University, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P13

Introduction: Some cells have specialized channels in their plasma membranes that allow water to be transported though the lipid bilayer much more expeditiously than by simple diffusion which said “aquaporins”. The aquaporins are a family of membrane proteins that perform as water channels in several cell varieties and tissues in which fluid transport is crucial, like the gastrointestinal tract, lung, secretory glands, and brain. A family of transmembrane molecules knowns as aquaporins facilitate the movement of water across cellular compartments. Conclusion: The critical role of Aquaporin-4 (AQP4) is in mediating water fluxes in response to neuronal activity and maybe in seizure-induced edema. Therefore, function or expression modulation of AQP4 in a variety of brain disorders including hydrocephalus, tumor, stroke, and epilepsy can be suggested as a new therapeutic strategy.

## P14

### Mitochondria as a Target for Drug Therapy in Epilepsy

***Elham Shiri[1], Akram Shiri[2], Maryam Borhani-Haghighi[1, 3], Fatemeh Alipour[3]***

[1]Department of Anatomy, School of Medicine, Tehran University of Medical Science, Iran
[2]Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, Iran
[3]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

The Neuroscience Journal of Shefaye Khatam, 2018; 6(S2): P14

Introduction: Epilepsy is one of the most common neurologic disorders, characterized by unprovoked, recurring seizures that interrupt the nervous system and can induce mental and physical dysfunction. Mitochondrial dysfunction and oxidative stress play a central role in several neurological disorders, and recently mitochondrial dysfunction has been shown in acquired epilepsies. Mitochondrial dysfunction in repeated seizures can cause neuronal cell death which is an important characteristic of the drug-resistant type of epilepsy. Mitochondria are considered as targeted neuroprotective plans for a limited number

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of neurodegenerative disorders with mitochondrial pathologies such as amyotrophic lateral sclerosis and Chorea Huntington. The creatine/phosphocreatine system, adjusted by mitochondrial creatine kinase, plays an essential role in conserving energy balance in the brain. The buffering of neuronal energy levels by systemic creatine administration has been proposed for treatment. The supplemented creatine has been shown protective effect not only on neurodegenerative disorders but also on hypoxia-induced or traumatic brain injury. It was observed that creatin can reduce hypoxia-induced seizures but had the negative effect on temporal lobe epilepsy. Recent researches suggest that protection of mitochondria and decrease of oxidative stress-related events represent hopeful therapeutic methods for the treatment of various disorders. Metabolic antioxidants such as lipoic acid, N-acetyl cysteine, CoQ10 were tested for a potential neuroprotective effect in epilepsy. ketogenic diets particularly showed an increase in mitochondrial glutathione levels. Thus, current progress in developing mitochondria-targeted antioxidants is a promising approach for new therapeutic methods not only in ischemia/reperfusion but also in human epilepsy. Conclusion: Treatment with compounds possessing antioxidant properties and targeting mitochondrial dysfunction may in the future provide therapeutic strategies for the successful treatment of epilepsies.

## P15

### Astrocyte Dysfunction in Epilepsy

***Maryam Borhani-Haghighi[1, 2], Fatemeh Alipour[1], Elham Shiri[2], Akram Shiri[3]***

[1]Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran

[2]Department of Anatomy, School of Medicine, Tehran University of Medical Science, Iran

[3]Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, Iran

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Introduction: Astrocytes play a pivotal role in epilepsy because of their malfunction in abnormal network excitability. Reactive astrocytes boost chemical signaling and interrupt equilibrium between water and potassium, which together increase local synchrony in microcircuits of hippocampus. Astrocytes play an important role in the processing of neural data and astrocyte processes enwrap the synapses to modulate neural activity by controlling neurotransmitter levels. neural activity is associated with rapid changes in the extracellular potassium concentration. Seizure activity results in increased concentrations of potassium out of the cell. The reduction of Kir channel expression in astrocytes was observed in human and experimental epilepsy. Reduced expression of EAAT1, EAAT2 transfer channels in the astrocytes of the human epileptic hippocampus has been reported. these channels control glutamate transferring and increasing the extracellular glutamate reduces the seizure threshold. Another factor that probably contributes to the increase in extracellular potassium concentration is astrocyte gap junction. Glutamate is converted to glutamine via glutamine synthase. In chronic epileptic hippocampus; reducing the activity of this enzyme reduces the secretion of glutamine, which leads to a decrease in the gamma-aminobutyric acid (GABA) in the interneurons and hyperactivity. AQP4 along with Kir channel in astrocytes also contribute to the regulation of extracellular potassium. It has been suggested that in mesial temporal lobe epilepsy, displacement of AQP4 channels along with decreasing the expression of kir channels in astrocytes may interfere with the regulation of extracellular potassium concentration and increase the tendency to seizure. It has been suggested that in mesial temporal lobe epilepsy, displacement of AQP4 channels along with decreasing the expression of kir channels in astrocytes may interfere with the regulation of extracellular potassium concentration and increase the tendency to seizure. According to what was said, disturbance in astrocyte causes hyperexcitation, neurotoxicity and the development or spread of seizure activity. Conclusion: Due to the central role of astrocytes in regulating normal brain function, the causative agent of epilepsy can be attributed to astrocyte dysfunction. Also, new findings suggest that astrocytes can be considered as a therapeutic goal for epilepsy.

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Shefa Neuroscience Research Center



Milad Tower, Tehran, Iran

**Administrative Office:**
**Shefa Neuroscience Research Center, Khatam Alanbia Hospital,**
**Valiasr St, Tehran, Iran**
**Tel.: +98 - 2183553910 Fax: +98 - 2183553920**

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