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# **The 6<sup>th</sup> Summer School of ASNER, The Romanian Society of Electrodiagnostic Neurophysiology**

**SDV2015, Eforie Nord, Romania  
10-11 July 2015**

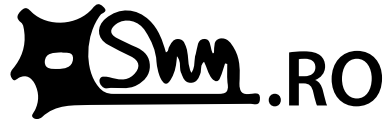
**Abstract book**



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THE SOCIETY FOR THE STUDY OF  
NEUROPROTECTION AND  
NEUROPLASTICITY



**International Federation of Clinical Neurophysiology**

Dear Friends,

It's again July, and that means it is again time for the Summer School in Clinical Neurophysiology. We are now starting this scientific event for the 6<sup>th</sup> time, so I suppose we are entitled to call it a tradition. Some of you have participated every year, many of you have attended this school a few times, and others are newcomers, but all of us have one thing in common, namely our passion for neurophysiology. We have prepared a scientific program that will contain a plenary session, and, workshops in EEG, EMG and transcranial magnetic stimulation. Again, we have important guests who have accepted our invitation for this event.

So we are expecting two days of intense scientific activity, in a beautiful environment, and maybe will take a few minutes to enjoy the beautiful beach and the sea, to chat, to make new friends.

Welcome to the 6<sup>th</sup> Edition of the Summer School in Clinical Neurophysiology !

Sincerely,

**Tudor Lupescu M.D. Ph.D.**

*ASNER President*

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*ASNER Vice-President*

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## Friday July 10<sup>th</sup>

12:00 Registration opens

**13.00 - 13:45 Welcome cocktail**

**13.45 - 14:00 Opening remarks**

**14:00 - 16:00 EMG case discussions**

**(Chair, Tudor Lupescu)**

Electroneuromyography – waveforms & discussions (Tudor Lupescu)

Electrodiagnosis of dropfoot (Ionela Codita)

Symptomatic neurophysiological cysts: Clinical and electrophysiological cases (Mircea Moldovan)

Atypical ALS- Case presentations (Ana-Maria Cobzaru).

***16:00 - 16:15 Coffee break***

**16:15 - 18:00 EEG case discussions**

**(Chair, Ionela Codita)**

Epilepsy: Case presentations (Ioana Mindruta).

Non-invasive ventilation in various neuromuscular diseases with respiratory failure-case presentations (Oana Deleanu).

Nocturnal epilepsy or parasomnia? (Floriana Boghez).

***19:00 Dinner***

## Saturday, July 11<sup>th</sup>

**9:00 - 10:45 Plenary session 1**

**(Chair, Mihai Moldovan)**

9:00-9:45 Intensive care unit neuro-myopathy (Werner J. Z'Graggen)

9:45-10:15 Pompe disease: diagnosis and treatment (Tudor Lupescu)

10:15-10:45 Respiratory failure pathophysiology in neuromuscular diseases - when and how to use Non-Invasive Ventilation (Oana Deleanu)

10:45-11:00 Axonal conduction failure (Mihai Moldovan)

***11:00-11:15 Coffee break***

**11:15 - 13:00 Plenary session 2**

**(Chair, Ioana Mindruta)**

11:15-12:00 Patterns of functional connectivity in epilepsy (Francesca Pittau)

12:00 – 12:20 Semiology of frontal lobe seizures and ictal EEG patterns (Ioana Mindruta)

12:20-12:40 Enhancing sleep: non-pharmacological modulation of brain rhythms (Irina Constantinescu)

12:40–13.00 A physiological structural-effective connectome of the human brain, based on intracranial electrical stimulation and diffusion spectrum imaging (Cristi Donos).

***13:00-14:00 Lunch***

**14.00 – 18.00 EEG workshop**

Practical demonstrations

**14:00 – 18:00 EMG workshop**

Practical demonstrations

**18.00 Closing ceremony**

## ITU neuro-myopathy

Prof. W. J. Z'Graggen, MD



Werner J. Z'Graggen

Werner.Z'Graggen@insel.ch

*Departments of Neurology and Neurosurgery,  
University Hospital, Bern, Switzerland*

Prof. W.J. Z'Graggen is consultant of neurointensive care at the University Hospital Bern, Switzerland. He was trained as neurologist with a special focus on intensive care and electrophysiology. Research interests are pathophysiology of critical illness polyneuropathy and myopathy, and improvement of diagnostics in myopathies.

Intensive care unit (ICU) acquired weakness is a frequent and severe complication in ITU-patients. Typically, these patients develop diffuse muscle weakness and failure to wean from mechanical ventilation. The two entities that variably contribute to ICU-acquired weakness are critical illness polyneuropathy (CIP) and critical illness myopathy (CIM). CIM seems to be much more heterogeneous than CIP and may occur independently of, or in association with CIP.

The pathogenesis of CIP and CIM is still a matter of debate. Some studies suggest that impaired microcirculation with consecutive bioenergetic failure causes the structural changes of muscle. There is also evidence that the toxic action of cytokines or disturbances in electrolyte gradients provokes muscle membrane dysfunction. The former is supported by findings, which show that  $TNF\alpha$  and other proinflammatory cytokines (IL-1, IL-6) lower the resting membrane potential in critical ill patients and influence the protein turnover of muscles.

It is not possible to detect nerve and muscle membrane dysfunction with conventional electrophysiological measurements. For that purpose, nerve and muscle excitability tests are necessary. Muscle membrane properties can be assessed in patients using multi-fiber velocity recovery cycles (VRC). In chronic CIM, muscle VRCs suggested that muscle fibers were depolarized, and/or that sodium channel inactivation was increased.

The median time from ICU admission to the development of conventional electrophysiological signs of CIM ranges from five to nine days (95% CI). In a pig model of experimental peritonitis with subsequent sepsis muscle VRC abnormalities occurred within 6 hours of peritonitis induction.

## Patterns of functional connectivity in epilepsy

Francesca Pittau



Francesca Pittau

francesca.pittau@gmail.com

*Presurgical Epilepsy Evaluation Unit, Neurology Department, University Hospital of Geneva, Geneva, Switzerland*

### CURRENT POSITION

January 2013 - Neurologist, Chef de Clinique Scientifique Unité d'EEG et exploration de l'épilepsie, Prof. M. Seeck, Service de Neurologie, H.U.G., Prof. P. Pollak

### RESEARCH FIELDS:

- Clinical epilepsy
- EEG-fMRI in focal and generalized epilepsy
- High density EEG
- Resting state fMRI functional connectivity

### CLINIC

- Out-patient consultation, standard and long-term EEG in adults and children, pre-surgical evaluation et non-invasive techniques (High-density EEG, Electric Source Imaging and EEG-fMRI) for localisation of epileptic focus in patients with pharmaco-resistant epilepsy

Focal epilepsies are associated to the dysfunction of a pathological cortical and sub-cortical neuronal network (epileptic network) rather than to a single epileptogenic region. Simultaneous electroencephalogram (EEG)-functional MRI (EEG-fMRI) is a whole-brain non-invasive technique that allows identification of hemodynamic epileptic networks associated with interictal epileptiform discharges. Resting state functional connectivity measures the signals correlation (e.g. electric or hemodynamic) recorded from different brain areas, in resting conditions. Recent studies have revealed that spontaneous brain activity shows continuous interaction among brain networks (physiological resting state networks) responsible for various classes of sensory/behavioral functions. Better understanding of interactions between physiological and epileptic networks is fundamental. Increasing evidences reveal that cognitive and psychiatric impairments observed in different epileptic syndromes are based on such interactions. In recent works we found that drug-resistant epilepsy involves a durable non-transient rearrangement of brain functional connectivity patterns that are present also in absence of visible scalp spikes. Another big chapter of functional connectivity literature concerns the physiopathogenesis of epileptic networks underlying generalized epilepsies and specific children epileptic syndromes.

**Electroneuromyography – waveforms & discussions**

**Tudor Dimitrie Lupescu**

**MD, Ph.D.**



Tudor Lupescu,

*Spitalul Clinic de Urgenta "Prof Dr Agrippa Ionescu"*

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The presentation consists of some interesting electroneuromyographic results and their correlation with the clinical examination, in order to provide examples of good clinical reasoning that leads to a correct evaluation and diagnosis. All the examples originate from the author's own clinical experience.

**Pompe disease: diagnosis and treatment**

Tudor Lupescu obtained his medical degree from "Carol Davila" University of Medicine in Bucharest, in 1989. After 3 years of training at Colentina Clinical Hospital he became Specialist in Neurology in 1994. Since 2006 he is running the Neurology Department at Agrippa Ionescu Hospital in Bucharest. 1998, he qualified as Consultant Neurologist. Since his early years of training in Neurology, Tudor Lupescu has shown a special interest in Clinical Neurophysiology. In 2000 he earned a Competence in Clinical Neurophysiology (EEG, EMG, and Evoked Potentials). 1997 he was the first to use Transcranial Magnetic Stimulation in Romania. This was also the subject of his PhD thesis presented in 2005. Since 2008, Tudor Lupescu is President of ASNER – Romanian Society of Electrodiagnostic Neurophysiology. He is also founding member and vicepresident of the the Romanian Society of Diabetic Neuropathy.

Dr Tudor Lupescu is associate member of the American Academy of Neurology, and associate member of the American Association of Neuromuscular and Electrodiagnostic Medicine. Between 2008 and 2014 he was also member of the Neurophysiology Subcommittee of ENS, and since 2015, he is member of the Neurophysiology Subcommittee of the European Academy of Neurology.

## Semiology of frontal lobe seizures and ictal EEG patterns

Ioana Mindruta<sup>1</sup>, Andrei Barbarica<sup>2</sup>, Mihai Malaia<sup>3</sup>, Cristian Donos<sup>4</sup>, Irina Popa<sup>5</sup>, Ana Ciurea<sup>6</sup>, Jean Ciurea<sup>7</sup>

<sup>1,3,5</sup>Neurology Department, “Carol Davila” University of Medicine and Pharmacy, Bucharest, Romania

<sup>2,4,6</sup>University of Physics, Bucharest Romania

<sup>7</sup>Bagdasar Arseni Hospital, Functional Neurosurgery Department, Bucharest Romania

Focal seizures are defined as occurring within networks limited to one hemisphere either very restricted or more widely distributed. The specific sequence of symptoms and signs that occur during the ictal events have a great relevance in localizing and lateralizing the seizure generators. This approach has a particular interest especially when we need to decide the pathological substrate, to differentiate between epileptic and non-epileptic events and for presurgical evaluation. Semiology of seizures generated in the frontal lobe usually are not associated with specific auras for this localization although we can frequently encounter somato-sensory symptoms and a large range of autonomic sensations.

Regarding the general motor pattern we can divide patients in four groups that are highly suggestive for localization of the epileptogenic zone: 1) focal elementary motor for seizures generated into the motor strip, 2) bilateral asymmetric tonic seizures for seizures with origin in the premotor cortex - supplementary sensory-motor area (SSMA) like and 3) complex partial seizures for prefrontal subdivisions that could manifest as dialeptic or with hypermotor behaviour.

Ictal EEG patterns associated with frontal seizures reflects the activation of a six layer neocortex displaying large baseline shifts and regional electrodecrement usually followed by repetitive epileptiform or paroxysmal fast activity or rhythmic delta.

Ana Ciurea a fost sustinuta cu finantare pentru acest proiect in cadrul POSDRU 159/1.5/S/133652

**Ioana Mindruta**

**Lecturer, MD, PhD**

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46-year old, neurologist, with competence in electrophysiology and special interest in epileptology, mainly presurgical exploration for epilepsy surgery. PhD thesis on “Sleep studies in epileptic syndromes” in 2006.

Current position at the University Emergency Hospital in Bucharest in the Epilepsy and Sleep Monitoring Unit and also hospital coordinator of the National Programs for Pharmacoresistant Epilepsy and Rare Disorders.

Academic affiliation - lecturer in neurology at the University of Medicine and Pharmacy “Carol Davila” of Bucharest.

Vicepresident of Romanian Association for Clinical Electrodiagnosis (ASNER) since 2009 and member in the board of Romanian Society of Neurology since 2013.

## Epilepsy: Case presentations



## **Axonal conduction failure**

Mihai Moldovan (1,2)

1) *Copenhagen University DK*; 2) *Carol Davila University, Bucharest, RO*

Myelinated peripheral axons are biological structures specialized in energy-efficient conduction of action potentials. Axonal conduction involves a complicated voltage-gated ion channel machinery comprised of several types of Na<sup>+</sup> channels (mediating the inward depolarizing currents), K<sup>+</sup> channels (mediating the outward rectifying currents) and hyperpolarization-activated cyclic nucleotide-gated channels (mediating the inward rectifying currents), as well as energy-dependent pumping mechanisms required to maintain the ionic concentration gradients across the membranes. Additionally, the spatial distribution of these channels is tightly controlled by axon-Schwann cell interactions.

Acute demyelination often leads to a focal impairment of conduction referred to as a conduction block. Identification conduction blocks has an important prognostic value and, as such, it is now an established aim of the routine electrodiagnostic workup. Nevertheless, a reduction in the safety factor for conduction can also occur due to a voltage-gated ion channel dysfunction, a process referred to as conduction failure.

It is increasingly recognized that during the progression of many neuropathies a functional, thus potentially reversible, conduction failure occurs long before the initiation of the irreversible axonal degeneration cascade. This raises hope for developing new therapeutic strategies for improvement of peripheral nerve function.

**Mihai Moldovan**

**Assoc. Prof., MD, Ph.D.**

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Mihai Moldovan obtained his medical degree from “Carol Davila” University Bucharest in 1999. Based on his research interests as a student, after graduation he was selected to work in the group of prof. Christian Krarup that continues the Copenhagen neurophysiology school founded by prof. Fritz Buchthal in the 60’ with the aim of translating experimental neurophysiology into clinical electrodiagnostic procedures for patients with nerve and muscle disease. Mihai Moldovan obtained his PhD degree in neurophysiology from Copenhagen University in 2004 where he continues his scientific career as associate professor. His research is focused on distinguishing the contribution of voltage-gated ion channel dysfunction to pathophysiology of neurodegenerative disorders, with particular emphasis on peripheral nerve excitability testing. While based in Copenhagen, Mihai Moldovan continued to collaborate with prof. Leon Zagrean at “Carol Davila” University, Department of Physiology and Neuroscience. In 2011, he founded the COMAEEG.RO international network, bringing together Romanian neuroscientists, clinicians and engineers dedicated to improving the monitoring of the comatose brain excitability. Emerging from these wide research interests are not only original publications and review articles in international journals but also educational chapters in neuroscience and neurophysiology textbooks in Romanian language. Mihai Moldovan has scientific duties in several international organizations including International Brain Research Organization (IBRO) and the European Federation of Neuroscience Societies (FENS). He is also founder and acting president of the National Neuroscience Society of Romania (SNN) and founder of the Romanian Society of Electrodiagnostic Neurophysiology (ASNER) for which he now serves as scientific director. For his activity he received several international and national prizes and he was recently appointed editorial board member for Clinical Neurophysiology, the official scientific journal of the International Federation of Clinical Neurophysiology (IFCN).

## **Electrodiagnosis of drop foot**

Ionela Codita

*Neurology Department of Elias University Emergency Hospital, Bucharest*

**Ionela Codita**

**MD, PhD**

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Foot drop or drop foot (interchangeable terms) is characterized by inability or impaired ability to raise the toes or raise the foot from the ankle (dorsiflexion).

The foot and ankle dorsiflexors include the tibialis anterior, the extensor hallucis longus and the extensor digitorum longus.

The nerve that innervates the muscles that lift the foot is the peroneal nerve.

Foot drop can result if there is injury of dorsiflexors or to any point along the neural pathways that supply them.

The differential diagnosis of spontaneous foot drop includes spasticity disorders, motor neuron disease, L5 radiculopathy, lumbosacral plexopathy, sciatic nerve palsy, compressive peroneal neuropathy, peripheral neuropathies, and some myopathies.

An electrodiagnostic test is useful in differentiating among these diagnoses and it can confirm the type of neuropathy by establishing the type of lesion involved.

Through this overview, I wish to emphasize the role of electromyography in differentiating various pathologies in which this symptom can be found, by presenting several cases, as it follows: one case with L5 radiculopathy, the second with peroneal neuropathy, another one with sciatic neuropathy and one case with ALS that has started with unilateral foot drop.

Ionela Codita is currently working as a Senior Neurologist in the Neurology Department of Elias University Emergency Hospital in Bucharest. She has graduated “Carol Davila” University of Medicine and Pharmacy in 1995 and became a specialist in Neurology in 2000.

She earned a Competence in Clinical Neurophysiology in 2005. During her practice, dr. Codita attended many courses and teaching programs in the field of Clinical Neurophysiology such as: scholarship in Neurophysiopathology field at Policlinical Institute of San Donato Milanese, Italy (2002-2004), training Course in EMG and Neurography Uppsala, Sweden (2009), International SFEMG and QEMG Course –Kobe, Japan (2010), VIREPA distance learning courses on “EEG in the diagnosis and management of epilepsy – Basic Course 6th edition” (September 2011- March 2012) and “EEG SCORE course-1st edition”( November 2012-March 2013), the international educational course “Dianalund Summer School on EEG and Epilepsy” (July 2012).

She also manifests interest in Epilepsy, Motor Neuron Diseases and Movement Disorders. Dr. Ionela Codita is a member of the Romanian Society of Neurology, affiliated to the ENFS (European Federation of Neurological Societies) and to the WFN (World Federation of Neurology) and since May 2013 she is the secretary of ASNER-The Romanian Society of Electrodiagnostic Neurophysiology.

**Respiratory failure pathophysiology in neuromuscular diseases - when and how to use Non-Invasive Ventilation**

Oana Deleanu

*The National Institute of Pneumology “Doctor Marius Nasta”, Bucharest (Romania)*

In neuromuscular disease with respiratory failure, neuromuscular system can be involved at all levels. The main determinants of respiratory muscle involvement related events are: inspiratory muscles, expiratory muscles and bulbar innervated muscles. The normal ventilation is given by the balance between ventilator drive, respiratory capacity and respiratory muscular function, all of these can be evaluated by several measures, using certain parameters. Consequences of the respiratory muscles weakness can lead to severe respiratory infections (preventable using cough and sputum assistance techniques), sleep related disorders (noninvasive ventilation=NIV is initiated) and respiratory failure. Neuromuscular patients have a higher risk of severe complications when intubation is required, which can be a difficult maneuver sometimes. NIV improves gas exchange, respiratory symptoms, lung function, polycythemia, right heart dysfunction, quality of life, or even morbi-mortality. The likelihood of intermittent NIV usage for 5 years is 81% for patients with neuromuscular diseases. The NIV indications are: hypercapnia, acute respiratory failure, nocturnal hypoventilation (without any closely defined criteria to schedule a polysomnography or the interpretation thereof). When NIV is initiating, several aspects are taken into account, as technical aspects but also related to home care possibilities, transport possibility and the lack of bulbar impairment (difficulty of swallowing) or cognitive impairment. NIV in neuromuscular diseases is a delicate subject, requiring multidisciplinary teams, with adequate equipment, and care and follow-up home network for these patients.

**Non-invasive ventilation in various neuromuscular diseases with respiratory failure-case presentations**

Central motor neuron disease (spinal cord injury), peripheral motor neuron disease (amyotrophic lateral sclerosis, polio and post-polio syndrome), neuromuscular junction disorders (myasthenia gravis), neuromuscular disorders - muscular dystrophies (myotonic dystrophy, Duchenne muscular dystrophy).

Oana-Claudia Deleanu, MD, PhD



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Senior Doctor (since 2011) in Pneumology at The National Institute of Pneumology “Doctor Marius Nasta”, Bucharest (Romania) and Assistant Professor (since 2008) at University of Medicine and Pharmacy Carol Davila Bucharest (Romania).

Research team member at The National Institute of Pneumology “Doctor Marius Nasta”, Bucharest (Romania), involved in few projects regarding sleep medicine (2007-2013).

European Somnologist-Expert in Sleep Medicine (2014). Competency in Somnology, level I (nr 34482) and level I II (nr 34492) given by Ministry of Health in basis of previous European trainings/courses (2013). Lecturer for Somnology Competency (2013).

President of Romanian Sleep Society (part of Romanian Society of Pneumology) (from 2013)

Member of the Scientific Committee and Organization for Sleep Medicine Courses and Conferences, Bronhology National Conference, National Congress of Pneumology, National Resident Physicians Conference (2008 - present).

Romanian Partner in European ESRS project "Wake Up Buss" for raising awareness among general public of the importance of sleepiness as one of the main causes of road accidents, in July-October 2013.

Founding member and secretary of Working Group for Pulmonary Cancer (from 2009). Founding and council member of Alpha-1 Antitrypsin Deficiency Working Group (from 2013).

MD Diploma (2000) "Clinical Manifestation at the Onset of Multiple Sclerosis", University of Medicine and Pharmacy “Carol Davila”, General Medicine Faculty, Bucharest (Romania).

PhD (2015) „Peculiarities Of Evolution Under CPAP Therapy In Patients With OSAS And Arterial Hypertension, Including Resitant”, University of Medicine and Pharmacy “Carol Davila”, Bucharest (Romania).

**Enhancing sleep: non-pharmacological modulation of brain rhythms**

**Irina Constantinescu**  
Assistant Professor, MD, PhD



Irina Constantinescu

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*Department of Neurology University of Medicine and Pharmacy “Grigore T. Popa” Iasi*

Current positions

Specialty exam in Neurology, Cluj-Napoca, April 2014

Assistant Professor in Neurology, Neurological department, University of Medicine and Pharmacy “Grigore T. Popa” Iasi, March 2014

Post-doctoral fellow, POSDRU program, University of Medicine and Pharmacy “Grigore T. Popa” Iasi, June 2014

Education

PhD in Neuroscience, University of Geneva, Switzerland. Thesis: “Influence of sleep-wake states on human memory and underlying neural plasticity: insights from EEG recordings and parasomnia”. Thesis advisors: Prof. S. Schwartz and Prof. M. Seeck, March 2011.

MD, University of Medicine and Pharmacy “Grigore.T.Popa” Iasi, Romania. Thesis: “Silent Cerebral Infarct - clinical study on a representative group of patients from the Neurological Department, Rehabilitation Hospital, Iasi”. Thesis advisor: Prof. C.D. Popescu, September 2005.

Competences

Certificate in Electroencephalography, Swiss Society of Clinical Neurophysiology, Geneva, Switzerland, November 2013

Certificate in “Sleep and its pathology”, Inter-University Diploma, University Pierre et Marie Curie Paris VI, Paris, France, October 2007

**Introduction:** The detrimental effects of a poor sleep are well known. There has been lately an increased interest to develop various strategies to externally impact sleep in humans and therefore potentially influence performance during wakefulness. The aim of the presentation is to highlight studies addressing non-pharmacological manipulation of brain rhythms in order to modulate sleep quality and subsequent neuroplasticity.

**Material and Methods:** One seminal study used electrical transcranial direct current stimulation to enhance slow oscillations during sleep and questioned a beneficial effect on memory functions. In our study, the ancestral rocking was mimicked via a swinging-bed during afternoon naps, to analyse the impact of low and repeated stimulation on sleep consolidation. Another study looked for a relationship between sleep spindles and sleep stability, in order to predict individual ability to maintain sleep in noisy conditions.

**Results:** Robust evidence has been brought in favour of a beneficial role of external manipulation on sleep-specific brain oscillations. Repetitive external stimulation may induce a synchronizing effect on brain circuits implicated in sleep, leading to a more profound sleep. It has been proven that increased spindle rate may hinder the transmission of sensory input from thalamus to cortex, thus preserving sleep stability. Furthermore, enhanced sleep patterns seem to favour cognitive enhancement, especially memory improvement.

**Conclusion:** Sleep provides a permissive condition for neuroplasticity mechanisms subtending brain functions. There is increasing evidence that sleep may be improved instrumentally and motivates the development of new non-pharmacological devices to help sleep and thus promote better wake performance..

Supported by : POSDRU/159/1.5/133377

### **Atypical presentations of ALS- Case presentations**

Ana-Maria Cobzaru

*Neurology Department, “Carol Davila” University of Medicine and Pharmacy, Bucharest, Romania*

Sometimes the diagnosis of amyotrophic lateral sclerosis is difficult. There are multiple reasons for that: -in the beginning of the disease, just one segment is clinically affected; -even with electrophysiological exam the definite diagnosis of ALS is impossible; -time is the key element but also it's against the patient;-some peculiarities of clinical, electrophysiological and other laboratory findings may divert us from the true diagnosis. I will present few cases of ALS with some atypical features which did more challenging the process of diagnosis.

Ana-Maria Cobzaru

MD

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Neurologist with competence in electrophysiology and special interest in clinical neurophysiology working in the University Emergency Hospital in Bucharest as general neurologist and in private sector as neurophysiologist.

### **Nocturnal epilepsy or parasomnia?**

Floriana Boghez\*, Ioana Mindruta

*\*Clinica Academica, Bucharest, Romania*

An epileptic seizure is a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain. Parasomnias are undesirable physical events or experiences that occur during entry into sleep, within sleep (NREM or REM), or during arousal from sleep. There are some forms of epilepsy in which seizures occur mainly or exclusively during sleep and in these situations the differential diagnosis with parasomnia can be challenging. The most frequent form of such epilepsy is the nocturnal frontal lobe epilepsy, with more than 90% of seizures coming during the night sleep. These seizures can range from paroxysmal arousals to hypermotor seizures and epileptic nocturnal wandering and they can resemble with parasomnia episodes (sleepwalking, confusional arousals or nocturnal terrors). In almost 50% of patients with nocturnal epilepsy, the ictal and interictal EEG might be normal and in almost 40% of patients with parasomnia, the EEG can record epileptiform activity. The different diagnosis of nocturnal epilepsy and parasomnia can be complicated and challenging and the history of the patient, the video-recordings of events, the electroencephalography and polysomnography are mandatory in these cases.

Floriana Boghez

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Neurologist with competence in electrophysiology and special interest in clinical neurophysiology working in the Clinica Academica.

### **A physiological structural-effective connectome of the human brain, based on intracranial electrical stimulation and diffusion spectrum imaging**

Cristian Donos<sup>1</sup>, Mihai Dragos Malii<sup>2</sup>, Ioana Mindruta<sup>2,3</sup>, Irina Popa<sup>2</sup>, Mirela Ene<sup>1</sup>, Ana Ciurea<sup>4</sup>, Andrei Barborica<sup>1,5</sup>

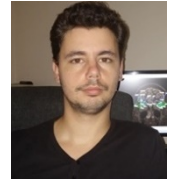
<sup>1</sup>Physics Department, University of Bucharest, Bucharest, Romania <sup>2</sup>Neurology Department, University Emergency Hospital, Bucharest, Romania <sup>3</sup>Neurology Department, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania <sup>4</sup>Neurosurgery Department, Bagdasar-Arseni Hospital, Bucharest, Romania <sup>5</sup>FHC Inc, Bowdoin ME, USA

**Background:** In the context of the human brain, the term “connectivity” can refer to structural, functional or effective connectivity. We propose a method that maps the effective brain connectivity referring to the influence one brain region exerts over another, over the structural connectivity. The effective connectivity revealed by the electrical stimulation of non-epileptogenic brain structures, is combined with the structural connectome (SC) obtained from a Diffusion Spectrum Imaging (DSI) atlas, to form a physiological structural-effective connectome (PSEC).

**Methods:** 24 patients with refractory epilepsy were implanted with depth electrodes for presurgical evaluation. Single pulse electrical stimulation (SPES), using biphasic pulses with 3ms pulse duration and current intensity in the 0.25-5mA range were applied to each pair of adjacent contacts and responses evoked by stimulation were recorded from other contacts located in remote brain areas. Responses of the stimulation-activated contacts, quantified by the normalized mean RMS value over the 10-110ms interval after each stimulation pulse, were weighted by the epileptogenicity of each area and averaged for each patient, resulting a patient-level effective connectome (EC). The population level EC is computed by once again averaging the connections of the individual ECs, on a structure by structure basis. A fiber activation factor is defined and used to weight the number of fibers connecting a pair of structures in the SC with its corresponding normalized RMS value from the EC. The PSEC is obtained by using the fiber activation factor to measure the connection strength of two structures.

**Cristi Donos, PhD**

[cristidonos@yahoo.com](mailto:cristidonos@yahoo.com)



2008 Graduated from University of Bucharest, Bucharest, Romania, Physics

2011 Ph.D. in Exact Sciences (Physics)

#### Positions and Employment

2009-2011 Web Designer, University of Bucharest, Bucharest, Romania

2012-present Research Assistant, University of Bucharest, Bucharest, Romania

2013 Software Developer, Comsys, Bucharest, Romania

2014-present Physicist, Freiburg University Hospital, Freiburg, Germany

**Results:** PSEC consists of 70 brain structures from both hemispheres. The correlation between the number of fibers extracted from the DSI Atlas and the normalized RMS responses to SPES was statistically significant, as revealed by Pearson’s ( $r=0.16$ ,  $p<0.001$ ) and Spearman’s ( $\rho=0.21$ ,  $p<0.001$ ) correlation coefficients.

**Conclusions:** The physiological structural-effective connectome is a whole brain atlas that can be used as a complimentary tool to study propagation pathways and altered brain connectivity in epileptic patients.

**Symptomatic neurophysiological cysts: Clinical and electrophysiological cases**

Mircea Moldovan, Ionela Codita

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Cysts are sacs or capsules that form in the skin or inside the body. They may contain fluid or semisolid material. Although cysts can appear anywhere in the body, most frequently they live in the skin, wrists, knees ovaries, breasts, kidneys, arachnoid. A cystic formation outside the nervous system is described by physician William Morrant Baker in 1877. It is the result of synovial fluid accumulation in the gastrocnemius muscle semimembranosus bursa herniation of the synovial membrane of the knee by posterior region of the capsule. Associated nerve lesions are rare. We present the case of a patient diagnosed with sural nerve lesion secondary to compression by a Baker cyst length of 8.8 cm in the left popliteal fossa, proximal which communicates with gastrocnemius-semimembranosus bursa. Orthopedic surgery with favorable evolution. Another cystic formation, relatively common in comparison with other rological cysts, is Tarlov cyst - type II innervated meningeal cysts. Affecting about 5 % of general population, the condition is more common in women, in the lower nerve roots of the spine. Most of them without clinical manifestations, are often detected incidentally during MRI or CT scans performed for presumption of other medical conditions. Symptoms of tarlov cysts are lower back pain, sciatica, urinary disorders. Furthermore, we present four symptomatic cases: Case 1 is a 59-year-old w with a history of low back pain who developed cauda equina syndrome. Initially symptoms mimicking as an Elsberg syndrome, but is not confirmed at EMG investigation. Later by symptoms fluctuations and recurrency it was considered secondary to degenerative disc compression lumbosacral root. After the discovery of a radicular cyst left sacral S2 17/14/10 mm which causes slight enlargement of the sacral canal, intermittent events were considered in the context of volume variation of the cysts. Cases 2 /50 y old W, had low back pain in buttock and leg in sitting positions. MRI show intervertebral disc protrusion without radicular conflict, sacral cysts S2-S3, S3-S4 left 1,3 cm and S2-S3 right 8,3mm. EMG minimal denervation S1 left. Cases 3 70 old W had clinical symptoms and spine MRI examinations revealed protruzii discale etajate a perineural sacral cysts associated bilateral S2, with max diameter of 19/10 mm from right, and 26 / 17.5 mm from the left with bone scaloping - EMG denervation S1 active

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Dr. Mircea Moldovan, graduate of the “Carol Davila” University Bucharest, Doctor of Medical Sciences, MD is a neurologist at the Hospital “Elias” Bucharest since 1968. Throughout his career, he had a continuous interest for clinical neurophysiology. In the 80s, his main interest was the EEG and evoked potentials under the guidance of Prof Dr V Voiculescu. In the 90s, his interest expanded to the peripheral conduction studies and EMG. During his pioneering work in Romanian clinical neurophysiology, Mircea Moldovan advocated the diagnostic importance of clinical neurophysiology for neurological practice through talks at national scientific meetings and scientific publications. Most importantly, however, through his wealth of practical experience and didactic spirit, he helped initiate in clinical neurophysiology generations of young neurologists. During the last decade, with the transformation of “Elias” hospital neurology into a university department and re-formalizing his skills in EMG (2003) and EEG (2004), Dr. Mircea Moldovan developed his preoccupation for clinical neurophysiology teaching. Together with Dr. Ionela Codita he carries out practical demonstrations of post-graduate courses organized by Professor Dr. Panea EMG. In addition, Dr. Mircea Moldovan contributed to re-launch of the clinical neurophysiology society in Romania as founding member of ASNER 2009.

Case 4: 2 75 old W Tarlov cysts root S2 and S3 large, bilateral, Max 3 cm with normal electrophysiological examination. All Cases Conservative treatment

Conclusions: Becker’s cyst must be considered in the differential diagnoses of patients who present with neuromuscular dysfunction in the calf and leg.

Perineural cysts cause symptoms in less than 1% of occurrences, and even when there are symptoms, it is similar to other spinal lesions such as disc herniation, so it is difficult to differentiate with only the symptoms. Conservative treatment and surgical treatment can be performed for perineural cysts; however, it is unclear which is more effective, and there is still much debate.

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