



**UMF**  
UNIVERSITATEA DE  
MEDICINĂ ȘI FARMACIE  
IULIU HAȚIEGANU  
CLUJ-NAPOCA



FACULTY of MEDICINE  
DEPARTMENT of  
NEUROSCIENCES



# ELECTRONEUROGRAPHY AND ELECTROMYOGRAPHY SEMINARS MODULE 1/

## SEMINARII DE ELECTRONEUROGRAFIE ȘI ELECTROMIOGRAFIE MODUL 1

**MAY 31<sup>TH</sup>-JUNE 1<sup>ST</sup> 2014/31 MAI-1 IUNIE 2014**

**RONEURO - INSTITUTE FOR NEUROLOGICAL RESEARCH AND DIAGNOSTIC/  
INSTITUTUL RONEURO - CENTRUL DE CERCETARE SI DIAGNOSTIC AL BOLILOR NEUROLOGICE  
CLUJ-NAPOCA | ROMANIA | MIRCEA ELIADE 37**



# WELCOME ADDRESS

It is a pleasure to welcome you to the 13th Seminar, "Electroneurography and Electromyography Seminars Module 1", May 31<sup>th</sup>-June 1<sup>st</sup>, 2014. The seminar is hosted by the Department of Neurosciences, Faculty of Medicine, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca and "RoNeuro" Neurological Disorders Research and Diagnosis Center.

This seminar aims to establish itself as a highly useful framework that will enable local specialists to benefit from the expertise of our invited speakers who are part of associated international faculty of our Department of Neurosciences Cluj-Napoca, Romania and RoNeuro Science network. Our scope is to flourish over years and set up an educational vector aiming to meet our junior and senior specialists' needs.

In contrast to large international conferences, the intention behind these seminars is to create an informal and intimate setting, which hopefully will stimulate open discussions. As organizers, we would therefore be deeply grateful if you participate and share your time with us.

We are looking forward to your active participation in this educational event!

With consideration,

Prof. Dr. Dařin F. Mureřanu,  
Chairman Department of Neurosciences, Faculty of Medicine,  
University of Medicine and Pharmacy "Iuliu Hatieganu", Cluj Napoca, Romania



# ORGANIZERS



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"Iuliu Hatieganu",  
Cluj Napoca, Romania



Faculty of Medicine  
University of Medicine and Pharmacy  
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FACULTY of MEDICINE  
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Faculty of Medicine  
Department of Neurosciences  
Cluj-Napoca, Romania



Foundation for the Study of  
Nanoneurosciences and  
Neuroregeneration



RONEURO  
Institute for Neurological  
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# ORGANIZATORI



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Universitatea de Medicină și Farmacie  
"Iuliu Hatieganu"  
Cluj-Napoca, România



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Universitatea de Medicină și Farmacie  
"Iuliu Hatieganu"  
Cluj-Napoca, România



FACULTY of MEDICINE  
DEPARTMENT of  
NEUROSCIENCES

Facultatea de Medicină  
Departamentul de Neuroștiințe  
Cluj-Napoca, România



Fundația pentru studiul  
Nanoneuroștiințelor și  
Neuroregenerării



Institutul  
RONEURO  
Centrul De Cercetare si  
Diagnostic al Bolilor Neurologice

**SPEAKER/ LECTOR**



# SPEAKER

Dr. 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. In 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 vice-president of 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 2013 he was also member of the Neurophysiology Subcommittee of ENS.



**TUDOR  
LUPESCU**  
/ROMANIA

# LECTOR

Dr. Tudor Lupescu a absolvit Universitatea de Medicină "Carol Davila" din București în anul 1989. După 3 ani de formare la Spitalul Clinic Colentina, a devenit medic specialist în neurologie în 1994. Din 2006 activează în cadrul Departamentului de Neurologie al Spitalului "Agrrippa Ionescu" din București. În 1998 a obținut titlul de Consultant în Neurologie. Din primii ani de formare în neurologie, Tudor Lupescu a manifestat un interes deosebit pentru domeniul Neurofiziologiei Clinice. În anul 2000 obține Competența în Neurofiziologie Clinică (EEG, EMG și Potentiale Evocate). În 1997 a fost primul care a folosit Stimularea Magnetică Transcraniană în România, acest domeniu fiind subiectul tezei de doctorat în anul 2005. Din 2008, Tudor Lupescu este președintele ASNER – Asociația Societatea de Neurofiziologie Electrodiagnostică din România. De asemenea, este membru fondator și vice-președinte al Societății de Neuropatie Diabetică din România.

Dr. Tudor Lupescu este membru asociat al Academiei Americane de Neurologie și membru asociat al Asociației Americane de Medicină Neuromusculară și de Electrodiagnostic. Între 2008 și 2013 a fost, de asemenea, membru al Subcomitetului de Neurofiziologie al ENS.



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SCIENTIFIC PROGRAM/  
PROGRAM ȘTIINȚIFIC



# SCIENTIFIC PROGRAM

**SATURDAY, MAY 31<sup>TH</sup> 2014**

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9.00 – 9.15

Introduction: neurophysiology - techniques, methods, clinical application

9.15 – 9.30

Electromyography machine

9.30 – 10.30

Electroneurography 1

- Basic physics, accessories, clinical use
- Nerve conduction studies: motor and sensory
- F wave
- H reflex

10.30 – 11.00

Break

11.00 – 13.00

Electroneurography 2

- Nerves to be examined
- Demo, hands-on
- Questions

13.00 – 14.00

Lunch break

14.00 – 16.30

Electromyography

- Basic physics, accessories, clinical applications
- Insertional and spontaneous activities
- MUAP
- Recruitment, interferential pattern
- Muscles to be examined

16.30 – 17.00

Break

17.00 – 19.00

- Clinical case
- Electromyographic evaluation in different pathological conditions
- Discussions



# PROGRAM ȘTIINȚIFIC

**SÂMBĂȚĂ, 31 MAI 2014**

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9.00 – 9.15

Introducere: Neurofiziologia - tehnici, metode, aplicații clinice

9.15 – 9.30

Electroneuromiografie - aparat

9.30 – 10.30

Electroneurografie 1

- Principii fizice, accesorii, aplicații clinice
- Conducerea motorie
- Conducerea senzitivă
- Unda F
- Reflexul H

10.30 – 11.00

Pauza

11.00 – 13.00

Electroneurografie 2

- Nervi examinați
- Demo, hands-on
- Întrebări

13.00 – 14.00

Prânz

14.00 – 16.30

Electromiografie

- Principii fizice, accesorii, aplicații clinice
- Activitatea spontană
- PUM
- Recrutarea
- Mușchi examinați

16.30 – 17.00

Pauză

17.00 – 19.00

- Cazuri
- Evaluarea electroneuromiografică: pattern-uri patologice
- Discuții

# SCIENTIFIC PROGRAM

**SUNDAY, JUNE 1<sup>ST</sup> 2014**

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9.00 – 11.00

Electroneuromyography in clinical practice: major types of affections

11.00 – 11.30

Coffee break

11.30 – 13.00

Hands-on

13.00 – 14.00

Lunch

14.00 – 15.15

Transcranial magnetic stimulation

- Principals and parameters
- Methodology
- Clinical applications

15.15 – 15.45

Coffee break

15.45 – 16.45

- Demo
- Hands-on session

16.45 – 17.00

Conclusions



# PROGRAM ȘTIINȚIFIC

**DUMINICĂ, 1 Iunie 2014**

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9.00 – 11.00

Electroneuromiografia clinică: principalele tipuri de patologie

11.00 – 11.30

Pauză

11.30 – 13.00

Hands-on

13.00 – 14.00

Prânz

14.00 – 15.15

Stimularea magnetică transcraniană

- Principii, parametri
- Metodologie
- Aplicații clinice

15.15 – 15.45

Pauză

15.45 – 16.45

- Demo
- Hands-on

16.45 – 17.00

Concluzii

# ABSTRACT/ REZUMAT



# ELECTRONEUROGRAPHY AND ELECTROMYOGRAPHY SEMINARS

## MODULE 1

Electrodiagnostic testing encompasses a range of specialized tests, including nerve conduction studies (NCS), needle electromyography (EMG) and transcranial magnetic stimulation (TMS).

The first part will deal with nerve conduction studies which give data on peripheral nervous system (PNS) function which may be used to provide: diagnosis, description of disease state (old/new; dynamic/static pathophysiology), longitudinal monitoring of disease with multiple studies, advice on prognosis and management based on tests results and disease detected.

Nerve conduction studies may be diagnostically helpful in patients suspected of having almost any PNS disorder including disorders of nerve roots, peripheral nerves, muscle and neuromuscular junction. Cranial nerves and spinal cord function may also be assessed.

Nerves may be stimulated through the skin with surface stimulators, or via a needle placed close to a nerve or a nerve root. Spinal root and cerebral stimulation may also be carried out using TMS dealt with elsewhere in this issue. Thus the full length of the motor pathway may be assessed from cortex to cord, root, neuromuscular junction, and the contractile apparatus.

Standard nerve conduction studies typically include motor nerve conduction, sensory nerve conduction, F waves, and H reflexes.

Sensory and motor nerve conduction studies involve analysis of specific parameters, including latency, conduction velocity, and amplitude which will be further discussed along with the different pathological conditions where these are modified.

The second part will deal with needle EMG which is used to assess both nerve and muscle function. A small-diameter monopolar pin or coaxial needle is placed into a muscle to evaluate insertion activity, resting activity, voluntary recruitment, morphology, and size of motor units, as well as motor unit recruitment. The needle electrode examination provides valuable information about the electrical characteristics of individual muscle fibers and motor units, as well as the integrity and innervation of muscle fibers.

The information gathered from needle EMG is combined with that provided by nerve conduction studies to determine the overall interpretation. The results of the analysis of the collective studies often permits delineation of the type of underlying pathologic process, such as a polyneuropathy, mononeuropathy or entrapment neuropathy, radiculopathy, plexopathy, disordered neuromuscular transmission, or myopathic process.

TMS is used for both diagnosis and for therapeutical purposes. The procedure and clinical implications of transcranial magnetic stimulation will be discussed, applied to specific clinical conditions such as depression, Parkinson's disease, cerebellar tremor, focal dystonia, chronic pain, and stroke among others.



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# SEMINARII DE ELECTRONEUROGRAFIE ȘI ELECTROMIOGRAFIE MODUL 1

Studiul de conducere nervoasă se realizează prin administrarea unor impulsuri electrice pe piele, pe traiectul unor nervi și culegerea informației cu ajutorul unor electrozi. Scopul investigației este de a diagnostica afecțiunile neuromusculare: afecțiuni ale nervilor periferici, rădăcinilor și plexurilor nervoase boli de joncțiune neuro-musculară sau afecțiuni musculare. Statutul funcțional al nervilor cranieni și al măduvei spinării poate fi, de asemenea, evaluat.

Nervii periferici pot fi stimulați prin piele cu stimulatori de suprafață sau prin intermediul unui ac plasat aproape de un nerv sau o rădăcină nervoasă. Stimularea radiculară perimedulară și stimularea cortexului cerebral se pot realiza prin stimulare magnetică transcraniană (TMS).

Temele abordate în contextul examenului electroneurografic vor fi principii fizice, accesoriile necesare explorării, aplicații clinice și parametrii precum conducerea motorie, conducerea senzitivă, unda F și reflexul H

Studiul electromiografic se realizează cu ajutorul unor electrozi-acintroduși intramuscular care înregistrează activitatea electrică a mușchiului. Cursanții se vor familiariza cu metodele specifice de explorare, aplicații clinice, și interpretarea rezultatului obținut activitatea spontană, PUM, pattern de recrutarea fibrelor musculare. Diferite situații patologice vor fi discutate și explicitate.

Stimularea magnetică transcraniană este folosită atât în scop diagnostic, cât și terapeutic. Astfel, TMS poate fi utilă în evaluarea activității și funcției anumitor circuite neuronale. Din punct de vedere al aplicațiilor clinice, stimularea magnetică și-a demonstrat eficiența în multiple situații precum depresie, boala Parkinson, tremor cerebelos, distonii focale, durere cronică, accident vascular cerebral.



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