



# 10<sup>th</sup> Vienna International Workshop on Functional Electrical Stimulation



## 15<sup>th</sup> Annual Conference of the International FES Society

8 – 12. September 2010

Vienna, Austria



### Program

<http://conference.ifess.org>



### GENERAL INFORMATION

	Wednesday 08.Sept.2010	Thursday 09.Sept.2010	Friday 10.Sept.2010	Saturday 11.Sept.2010	Sunday 12.Sept.2010	
08:00-09:00	Pre-Conference Course	Opening	Control, Sensors, Algorithms – non invasive 1	Lower Extremities		
09:00-10:00		Anniversary Session 1			FES and Human Motor Control 1	
10:00-11:00		Coffee break	Coffee break	Coffee break	Coffee	
11:00-12:00		Anniv. Session 2 + Podium discussion with FES users	Control, Sensors, Algorithms – non invasive 2	INS Session: Neuromodulation 2010: The way ahead	FES and Human Motor Control 2	
12:00-13:00		Lunch	Lunch			
13:00-14:00				Lunch	Lunch	
14:00-15:00			Technology	Control, Sensors, Algorithms – invasive	Lower Extremities, SCI	FES and Human Motor Control 3
15:00-16:00			Coffee break	Coffee break		
16:00-17:00			Future Applications 1	Modeling	"Stefan Schuy" presentation	
17:00-18:00				Upper Extremities	Coffee and General	
18:00-19:00			Future Applications 2	Visit Posters		17:30 Bus to Conference Dinner Location
		Welcome Cocktail	Free evening	20:00 City Hall		

## GENERAL INFORMATION

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The triennial "Vienna International Workshop on Functional Electrical Stimulation" provides a platform for researchers to present and discuss their recent work whilst visitors can expect a representative and actual overview of the state of the art of FES.

### Conference venue

The Imperial Riding School Vienna  
A Renaissance Hotel  
Ungargasse 60, 1030 Wien, Austria  
Phone: +43 1 51518 52  
Fax: +43 1 51518 8720  
<http://www.imperialrenaissance.at>

### National organizers

Center for Medical Physics and Biomedical Engineering  
Medical University of Vienna and the  
"FES group of the Austrian Society for Biomedical Engineering"  
M.Bijak, H.Lanmüller, W.Mayr, M.Pichler, D.Rafolt

### Contact address

Medical University of Vienna  
Center for Medical Physics and Biomedical Engineering  
Secretary M. Pichler Phone: +43-1-40400/1984  
Waehringerguertel 18-20/4L, Fax: +43-1-40400/3988  
A-1090 Vienna, Austria e-Mail: [office@fesworkshop.org](mailto:office@fesworkshop.org)

### Conference language

The official language of the conference is English

### Dates

Pre conference course 08. Sept.2010 (08:30-17:00)  
Welcome Cocktail 08.Sept.2010 (19:00-21:00)  
Scientific program from 09.Sept.2010 (08:30)  
to 12.Sept.2010 (16:00)

### Registration fee

Conference\* € 590,00 / € 560,00\*  
Day Ticket\*\* € 120,00  
Pre Conference Course € 150,00  
\* Members of ÖGBMT or IFESS  
\*\* Does not include social activities in the evening

## GENERAL INFORMATION

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### Accompanying persons

Welcome cocktail	€ 30,00	08.09.2010
Reception by the Lord Mayor City Hall	€ 30,00	10.09.2010
Conference Dinner	€ 110,00	11.09.2010

### Methods of payment

Bank transfer, Credit card transfer, PayPal  
or directly at the registration desk (cash or credit card)

### The registration fee for the whole conference includes

Welcome cocktail  
Coffee breaks, Lunch  
Reception by the Lord Mayor of Vienna  
Conference dinner  
Conference proceedings

Day tickets include: Scientific program, coffee breaks, lunch and conference proceedings

### Registration Desk

Open throughout the conference:  
Wednesday, 08.09. (18:30–21:00)  
Thursday to Sunday 09.-12.09. (08:00-17:00/ Sunday 15:00)

### INS Session

Neuromodulation 2010: "The way ahead"  
(Chair: Prof. Francois Alesch).

### Conference Dinner

11. Sept. 2010, in the beautiful location "Kaiserbahnhof Laxenburg". During the Dinner the Vodovnik Student Paper Award, the Bohdan V. Olijnyk Research Participant Award and the Stefan Schuy award will be presented.

### Commercial exhibition

Facilities for exhibition and commercial product presentations are available - interested companies please contact the secretary.

## Oral presentation

*Time: 15 minutes  
(10 minutes presentation and 5 minutes discussion)*

## Presentation media

*Beamer and PC for Power Point presentations  
(provide a CD or USB memory stick)*

*Speakers should submit their media 30 minutes prior to the start of their session at slide desk.*

## Poster presentation

*The posters should be exhibited at the assigned poster board during the whole conference. All participants are encouraged to contact the authors during the coffee breaks.*

*Paper size A0, portrait.*

## Proceedings of the conference

*The proceedings with full length papers will be available at the beginning of the workshop. All abstracts and selected full length papers will be published in "Artificial Organs".*

## Social program

*Wednesday, 08.09.2010, (19:00 – 21:00)  
Welcome Cocktail at the conference venue, Hotel "The Imperial Riding School"*

*Friday, 10.09.2010, (20:00 – 22:00)  
Reception by the Lord Mayor of Vienna, City hall*

*Saturday, 11.09.2010 (18:00-24:00)  
Conference Dinner at the "Kaiserbahnhof Laxenburg"*

## Detailed information

*Please find further information at the official conference homepage:  
<http://conference.ifess.org>*

*Francois Alesch*

*Brian Andrews*

*Julie Armstrong*

*Christine Azevedo-Coste*

*Rik Berkelmans*

*Manfred Bijak*

*Jane Burridge*

*Ugo Carraro*

*Imre Cikajlo*

*Alberto Cliquet-Jr.*

*Glen Davis*

*Ross Davis*

*Sam Eljamel*

*Simona Ferrante*

*Paolo Gargiulo*

*David Guiraud*

*Thordur Helgason*

*Andy Hoffer*

*Ursula Hofstoetter*

*Kenneth Hunt*

*Jonathan Jarvis*

*Roman Kamnik*

*Thierry Keller*

*Gon Khang*

*Klaus Koch*

*Hermann Lanmueller*

*Richard Lauer*

*Young-Hee Lee*

*Thomas Mandl*

*Johannes Martinek*

*Winfried Mayr*

*Karen Minassian*

*Dong Ming*

*Tatjana Paternostro*

*Dejan Popovic*

*Mirjana Popovic*

*Milos Popovic*

*Feliciano Protasi*

*Dietmar Rafolt*

*Frank Rattay*

*Martin Reichel*

*Janez Rozman*

*Ruediger Rupp*

*Michael Russold*

*Stefan Saueremann*

*Thomas Schauer*

*Martin Schuettler*

*Kazunori Seki*

*Thomas Sinkjaer*

*Brian Smith*

*Thomas Stieglitz*

*Rune Thorsen*

*Peter Veltink*

*Ken Yoshida*

## Date

Wednesday, 8.9.2010 from 8:00 till afternoon

## Language

English

## Registration fee

€ 150,00

## The registration fee includes

Participation in the Pre Conference Course  
Lunch  
Coffee breaks

## Neuron Modeling for Neuroprosthetic Applications

by **Rattay F, Wenger C, Paredes L**

Neuron modeling and computer simulation are powerful tools for the functional design of neuroprosthetic devices. Individual electrical and geometrical characteristics of neural substructures as well as ion current fluctuations can have surprising effects in functional electrical nerve and muscle stimulation. The first part of the course helps to explore such phenomena with models for peripheral nerve stimulation. The second part deals with the stimulation of the central nervous system, cochlear and retina implants, blocking of neural activities, etc. At the end of every part the time is used to discuss specific questions concerning the applications of the participants. Software: MATLAB, NEURON, COMSOL

**Venue:** Technical University of Vienna, 1040 Vienna, Wiedner Hauptstrasse 8-10

## FES: From Neuroscience to Clinical Practice

by **Whittaker M, Grey M, Burridge J, Postans N, Lee S C K, Taylor P**

1. Overview/update on the physiological effects of FES & evidence of its effect on neuroplasticity of the brain and spinal cord.
2. Overview of therapeutic, orthotic & neuroprosthetic FES interventions
3. FES best practices & application across different diagnostic groups
4. Identification of strategies that insure success in FES clinical service provision
5. Patient evaluation, education, follow up, treatment outcomes
6. Methods to promote awareness of FES use & benefits in the medical community
7. FES continuing education
8. Question & answer session

by **Straub C, Mödlin M, Kern H**

9. FES of denervated muscles

**Venue:** Wilhelminenspital, 1160 Vienna, Montleartstraße 37

## Spinal Cord Stimulation

by **Minassian K, Hofstoetter U, Dimitrijevic M**

Epidural stimulation of the human posterior lumbar cord can evoke spinal reflexes and enhance locomotor functions in spinal cord injured persons. In this workshop, we will present a novel non-invasive method of spinal cord stimulation based on surface electrodes. We will elaborate the theoretic background of this transcutaneous technique and will demonstrate its utilization for eliciting spinal reflexes in multiple lower limb muscle groups bilaterally. Potential applications of this method as assessment and training tool will be discussed.

**Venue:** General Hospital Vienna, AKH, 1090 Vienna, Waehringuer Guertel 18-20, 4L

## Thursday 09.9.2010

### Anni- versary

#### Opening Session

Chairpersons: Popovic D (Belgrade, Serbia)  
Stein R (Edmonton, Canada)

08:30 - 08:40 Welcome

08:40-09:00 Mayr W (Vienna, Austria)  
VIENNA FES WORKSHOPS: 1983-2010

### Key

#### Keynote Lecture:

09:00-09:30 Vossius G (Karlsruhe, Germany)  
NEURO-MOTOR REHABILITATION IN REFERENCE TO CONTROL  
THEORY

### Key

#### Keynote Lecture:

09:30-10:00 Plenk H Jr. (Vienna, Austria)  
THE ROLE OF MATERIALS BIOCOMPATIBILITY FOR FES-APPLICATIONS

10:00-10:30 Coffee Break

### Key

#### Keynote Lecture:

10:30-11:00 Taylor P (Salisbury, UK)  
DROPPED FOOT STIMULATOR: FROM THE FIRST IDEA TO A PATIENT  
SATISFACTORY DEVICE

11:00-11:15 Burrige J, Donovan-Hall M, Ellis-Hill C, Dibb B, Triccas L,  
Rushton D (Hampshire, UK)  
THE VIEWS OF PEOPLE WITH SPINAL CORD INJURY ABOUT THE USE  
OF FUNCTIONAL ELECTRICAL STIMULATION

11:15-12:00 **Panel Discussion with Patients**  
Chairpersons and Moderation:  
Burrige J (Hampshire, UK), Russold FM (Vienna, Austria)

12:00-13:30 Lunch

### Session 1

#### Technology

Chairpersons: Donaldson N (London, UK)  
Schüttler M (Freiburg, Germany)

### Key

#### Keynote Lecture:

13:30-14:00 Hochmair E (Innsbruck, Austria)  
TECHNICAL CHALLENGES WITH COCHLEAR IMPLANTS AND THE  
MEDEL COCHLEAR IMPLANT COMPANY

14:00-14:15 Vanhoestenbergh A, Donaldson N (London, UK)  
THE LIMITS OF HERMETICITY TEST METHODS FOR MICRO-PACKAGES

14:15-14:30 Boretius T, Schuettler M, Stieglitz T (Freiburg, Germany)  
ON THE STABILITY OF PEDOT AS COATING MATERIAL FOR ACTIVE  
NEURAL IMPLANTS

14:30-14:45 Donaldson N, Vanhoestenbergh A, Liu X, Saeidi N,  
Demosthenous A, Schuettler M (London, UK)  
ACTIVE BOOKS: A PRACTICAL WAY TO INCREASE THE NUMBER OF  
STIMULATION CHANNELS FOR FES AFTER SCI?

14:45-15:00 Liu X, Demosthenous A, Vanhoestenbergh A, Donaldson N  
(London, UK)  
TOWARDS THE DEVELOPMENT OF AN INTEGRATED STIMULATOR FOR  
ACTIVE BOOKS

15:00-15:15 Nonclercq A, Vanhoestenbergh A, Aqueveque P, Cirmirakis D,  
Donaldson N (London, UK)  
SACRO-LUMBAR ANTERIOR ROOT STIMULATOR IMPLANT FOR  
EXERCISING

- 15:15-15:30 Hoffer J, Tran B, Tang J, Saunders J, Francis C, Sandoval R, Meyyappan R, Seru S, Wang H, Nolette M, Tanner A (Burnaby, Canada)  
DIAPHRAGM PACING WITH ENDOVASCULAR ELECTRODES
- 15:30-15:45 Rubehn B, Lewis C, Fries P, Stieglitz T (Freiburg, UK)  
FLEXIBLE SHAFT ELECTRODES FOR TRANSDURAL IMPLANTATION AND CHRONIC RECORDING

15:45-16:15 **Coffee break (visit posters Po1\_x)**

**Session  
2**

**Future Applications 1**

Chairpersons: Mushawar V (Edmonton, Canada)  
Stieglitz T (Freiburg, Germany)

- 16:15-16:30 Nahrstaedt H, Schauer T, Seidl R (Berlin, Germany)  
BIOIMPEDANCE BASED MEASUREMENT SYSTEM FOR A CONTROLLED SWALLOWING NEURO-PROSTHESIS
- 16:30-16:45 Kuno H, Yamamoto N, Yamamoto T, Aoyagi Y, Tsubahara A (Okayama, Japan)  
SURFACE ELECTRICAL STIMULATION TO ASSIST LARYNGEAL ELEVATION FOR SWALLOWING REHABILITATION IN DYSPHAGIA
- 16:45-17:00 Mclachlan A, Gollee H, Mclean A, Allan D (Glasgow, Scotland)  
THE EFFECT OF AN ABDOMINAL FES TRAINING PROTOCOL ON PULMONARY FUNCTION IN TETRAPLEGIA
- 17:00-17:15 Gollee H, Henderson G (Glasgow, UK)  
OPTIMISATION OF ELECTRODE PLACEMENT FOR ABDOMINAL MUSCLE STIMULATION

17:15-17:30 **Short break**

**Session  
3**

**Future Applications 2**

Chairpersons: Sawan M (Montréal, Canada)  
Lanmüller H (Vienna, Austria)

- 17:30-17:45 Popovic L, Malesevic N, Petrovic I, Popovic M (Belgrade, Serbia)  
SEMI-CLOSED LOOP TREMOR ATTENUATION WITH FES
- 17:45-18:00 Bonmassar G, Freeman D, Fried S, Gale J (Harvard, USA)  
ON THE MICROSCOPIC MAGNETIC STIMULATION
- 18:00-18:15 Pfeifer S, Çaldıran O, Vallery H, Riener R, Arieta A (Zürich, Switzerland)  
DISPLAY CENTRE OF PRESSURE LOCATION BY ELECTROTACTILE STIMULATION USING PHANTOM SENSATION
- 18:15-18:30 Perkins T, Donaldson N, Demosthenous A, Jiang D (London, UK)  
A SWITCHED CAPACITOR METHOD FOR CROSSTALK REDUCTION IN VESTIBULAR NERVE STIMULATORS
- 18:30-18:45 Harreby K, Sevcencu C, Struijk J (Aalborg, Denmark)  
MODULATION OF SEIZURE SUSCEPTIBILITY BY SPINAL CORD STIMULATION
- 18:45-19:00 Krenn M, Haller M, Bijak M, Unger E, Hofer C, Kern H, Mayr W (Vienna, Austria)  
SAFE NEUROMUSCULAR ELECTRICAL STIMULATOR DESIGNED FOR ELDERLY PEOPLE

**IFESS Board of Directors Meeting (not public)**

**Free Evening**

## Friday 10.09.2010

### Session 4

#### *Control, Sensors, Algorithms – non invasive 1*

Chairpersons: Helgason T (Reykjavik, Iceland)  
Rafolt D (Vienna, Austria)

### Key

#### *Keynote Lecture:*

- 08:00-08:30 Merletti R, Botter A, Minetto M (Turin, Italy)  
SPINAL INVOLVEMENT AND MUSCLE CRAMPS IN ELECTRICALLY-ELICITED MUSCLE CONTRACTIONS
- 08:30-08:45 Malik N, Chappell P, Wood D, Taylor P (Southampton, UK)  
EVENT DETECTION FOR GLUTEAL OR HAMSTRING STIMULATION DURING WALKING IN NEUROLOGICAL PATIENTS
- 08:45-09:00 Luo R, Norton J, Donaldson N (London, UK)  
CAN THE COHERENCE BETWEEN TWO EMG SIGNALS BE USED TO MEASURE THE VOLUNTARY DRIVE IN PARETIC MUSCLES?
- 09:00-09:15 Kamavuako E, Farina D (Aalborg, Denmark)  
STIMULUS-RESPONSE CURVES: EFFECT OF RECORDING SITE AND INTER-ELECTRODE DISTANCE
- 09:15-09:30 Miura N, Watanabe T, Kanai H (Sendai, Japan)  
A PRELIMINARY STUDY OF MUSCLE FATIGUE EVALUATION USING M-WAVES ELICITED BY ADDITIONAL PULSES FOR REHABILITATION WITH FES
- 09:30-09:45 Zhang Q, Hayashibe M, Sablayrolles B, Azevedo-Coste C (Montpellier, France)  
TORQUE PREDICTION BASED ON EVOKED EMG IN FATIGUING MUSCLE TOWARD ADVANCED DROP FOOT CORRECTION
- 09:45-10:00 Koutsou A, Rocon E, Moreno J, Pons J (La Poveda Arganda del Rey, Spain)  
OUTPUT-ERROR MODEL SYSTEM IDENTIFICATION FOR FES-DRIVEN CONTROL OF KNEE EXTENSOR MUSCLES
- 10:00-10:30 **Coffee break**

### Session 5

#### *Control, Sensors, Algorithms - non invasive 2*

Chairpersons: Watanabe T (Sendai, Japan)  
Schauer T (Berlin, Germany)

- 10:30-10:45 Ambrosini E, Ferrante S, Pedrocchi A, Schauer T, Nahrstaedt H, Mazzocchio R (Milano, Italy)  
AUTOMATIC REAL TIME PROCEDURE FOR ADJUSTING THE STIMULUS INTENSITIES TO ENSURE RELIABLE MEASUREMENTS OF THE H-REFLEX RECRUITMENT CURVE
- 10:45-11:00 Tan J, Zariffa J, Vette A, Lynch C, Masani K, Popovic M (Toronto, Canada)  
USE OF AN INVERTED PENDULUM APPARATUS FOR THE STUDY OF CLOSED-LOOP FES CONTROL OF THE ANKLE JOINTS DURING QUIET STANDING
- 11:00-11:15 Watanabe Takuya, Tagawa Y, Shiba N (Fukuoka, Japan)  
MAPPING METHOD USING A SUPER MULTI-ELECTRICAL STIMULATION DEVICE
- 11:15-11:30 Watanabe Takashi, Fukushima K (Sendai, Japan)  
A STUDY ON FEEDBACK ERROR LEARNING CONTROLLER FOR FES: GENERATION OF TARGET TRAJECTORIES BY MINIMUM JERK MODEL
- 11:30-11:45 Alon G, Roys S, Gullapalli R (Baltimore, USA)  
CAN NON-INVASIVE ELECTRICAL STIMULATION OF THE BRAIN (ESB) MODIFY THE RESTING-STATE FUNCTIONAL CONNECTIVITY OF THE MOTOR CORTEX? A PROOF OF CONCEPT FMRI STUDY
- 11:45-13:15 **Lunch**

**Session  
6**

**Control, Sensors, Algorithms – invasive**

Chairpersons: Hoffer A (Burnaby, Canada)  
Azevedo-Coste C (Montpellier, France)

- 13:15-13:30 Lewis S, Glindemann H, Russold M, Westendorff S, Gail A, Dörge T, Hoffmann K, Dietl H (Vienna, Austria)  
PERFORMANCE OF IMPLANTED MULTI-SITE EMG RECORDING ELECTRODES: IN VIVO IMPEDANCE MEASUREMENTS AND SPECTRAL ANALYSIS.
- 13:30-13:45 Kurstjens M, Jensen W (Aalborg, Denmark)  
SELECTIVITY OF LONGITUDINAL VERSUS TRANSVERSE TRIPOLAR STIMULATION OF MEDIAN NERVE IN PIGS USING A MULTICONTACT NERVE CUFF ELECTRODE
- 13:45-14:00 Merrill D, Lockhart J, Troyk P, Weir R, Hankin D (Santa Clarita, USA)  
DEVELOPMENT OF AN IMPLANTABLE MYOELECTRIC SENSOR FOR ADVANCED PROSTHESIS CONTROL
- 14:00-14:15 Maciejasz P, Marcol W, Pańniczek R, Dörge T (Warsaw, Poland)  
AN EXPERIMENTAL SETUP FOR STIMULATION SELECTIVITY MEASUREMENT - VARIABILITY OF THE MUSCLE RESPONSES TO THE CONSTANT STIMULUS
- 14:15-14:30 Arnold D, Faenger B, Huebner A, Scholle H (Jena, Germany)  
EMG RECORDINGS OF TRICEPS BRACHII MUSCLE IN RATS DURING DOWNHILL LOCOMOTION
- 14:30-14:45 Faenger B, Schumann N, Arnold D, Grassme R, Fischer M, Scholle H (Jena, Germany)  
IN VIVO ELECTRICAL STIMULATION OF RAT TRICEPS BRACHII MUSCLE TO IDENTIFY INTRAMUSCULAR ELECTRICAL SENSITIVE POINTS
- 14:45-15:00 Nielsen T, Sevcencu C, Struijk J (Aalborg, Denmark)  
STIMULATION SELECTIVITY OF AN INTERFASCICULAR ELECTRODE IN THE SCIATIC NERVE OF RABBITS

- 15:00-15:15 Jensen W, Nielsen M, Ottesen K, Fjeldborg L (Aalborg, Denmark)  
CHARACTERIZATION OF PERI-INFARCT, INTRA-CORTICAL MOTOR CORTEX RESPONSES DURING REACHING TASK IN A CHRONIC ANIMAL MODEL OF ISCHEMIC STROKE

15:15-15:45 **Coffee break (visit posters Po6\_x)**

**Session  
7**

**Modeling**

Chairpersons: Popovic M (Toronto, Canada)  
Gargiulo P (Reykjavik, Iceland)

- 15:45-16:00 Qiao S, Yoshida K (Indianapolis, USA)  
DEVELOPMENT OF A METHOD FOR ESTIMATING UNIT CONDUCTION VELOCITY USING SPECTRAL ANALYSIS OF THE ACTION POTENTIAL
- 16:00-16:15 Gargiulo P, Carraro U, Fridgeirsson E, Reynisson P, Helgason T (Reykjavik, Iceland)  
3D-COLORCOMPUTER TOMOGRAPHY ASSESSMENT: MONITORING OF MUSCLE RECOVERY IN SCI PATIENTS TREATED WITH ELECTRICAL STIMULATION
- 16:15-16:30 Paredes L, Wenger C, Rattay F (Vienna, Austria)  
ENHANCEMENT OF VOWEL ENCODING FOR COCHLEAR IMPLANTS BY ADDING A HIGH FREQUENCY SIGNAL: A MODELLING STUDY
- 16:30-16:45 Wenger C, Paredes L, Rattay F (Vienna, Austria)  
CURRENT-DISTANCE RELATIONS FOR MICROELECTRODE STIMULATION OF PYRAMIDAL CELLS
- 16:45-17:00 Jezernik S, Dandrea G, Kolomiets B, Djilas M, Cahuzac B, Ladmiral R, Kuhn A, Beesau C, Cadetti L, Picaud S, Sahel J (Zürich, Switzerland)  
IMPROVING STIMULATION, RECORDING, AND MODELING TOOLS AND TECHNIQUES FOR RETINAL IMPLANT DEVELOPMENT
- 17:00-17:15 **Short break**

**Session  
8**

**Upper Extremity**

Chairpersons: Keller T (San Sebastin, Spain)  
Lee Y (Wonju, Republic of Korea)

- 17:15-17:30 Zadavec M, Oblak J, Cikajlo I, Matjačić Z (Ljubljana, Slovenia)  
PRELIMINARY COMPARISON BETWEEN HAPTIC AND ELECTRICAL STIMULATION ADAPTIVE SUPPORT FOR UPPER EXTREMITY MOTOR TRAINING
- 17:30-17:45 Kapadia N, Zivanovic V, Furlan J, Craven B, McGillivray C, Popovic M (Toronto, Canada)  
TORONTO REHABILITATION INSTITUTE'S FUNCTIONAL ELECTRICAL STIMULATION THERAPY FOR GRASPING IN TRAUMATIC INCOMPLETE SPINAL CORD INJURY: RANDOMIZED CONTROL TRIAL
- 17:45-18:00 Thorsen R, Della Costa D, Chiaramonte S, Binda L, Redaelli T, Occhi E, Beghi E, Converti R, Ferrarin M (Milano, Italy)  
MULTICENTER CLINICAL TRIAL OF MYOELECTRICALLY-CONTROLLED FES (MECFES) FOR ASSISTING HAND FUNCTION IN SUBJECTS WITH TETRAPLEGIA –A STUDY OF USER POPULATION, ORTHOTIC EFFECT AND ADL USE
- 18:00-18:15 Dosen S, Kristensen G, Bakhshaie B, Pizzolato M, Smondrk M, Krohova J, Popović M (Aalborg, Denmark)  
COMPUTER VISION FOR SELECTION OF ELECTRICAL STIMULATION PROTOCOL TO ASSIST PREHENSION AND GRASP

visit posters Po8\_x

20:00 Reception by the Lord Mayor of Vienna

**Saturday 11.09.2010**

**Session  
9**

**Lower Extremities**

Chairpersons: Davis G (Sydney, Australia)  
Rozman J (Ljubljana, Slovenia)

- 08:00-08:15 Rozman J, Pečlin P, Krajnik J (Ljubljana, Slovenia)  
TWENTY-FIVE YEAR STIMULATION OF THE COMMON PERONEAL NERVE
- 08:15-08:30 Miljkovic N, Kojovic J, Jankovic M, Popovic D (Belgrade, Serbia)  
AN EMG BASED SYSTEM FOR ASSESSMENT OF RECOVERY OF MOVEMENT
- 08:30-08:45 Milovanović I, Djurić-Jovičić M (Belgrade, Serbia)  
POLYMYOGRAPHY DURING HEMIPLEGIC WALKING: IMPLICATIONS FOR CONTROL OF FES
- 08:45-09:00 Hakansson N, Kesar T, Reisman D, Binder-Macleod S, Higginson J (Delaware, USA)  
EFFECTS OF FASTFES GAIT TRAINING ON MECHANICAL RECOVERY IN POST-STROKE GAIT
- 09:00-09:15 Szecsi J, Götz S, Straube A (Munich, Germany)  
PERSPECTIVES OF PERIPHERAL FUNCTIONAL MAGNETIC STIMULATION IN THE REHABILITATION OF CENTRAL PARESES
- 09:15-09:30 Minogue C, Caulfield B, Crowe L, Lowery M (Galway, Ireland)  
THE TIME DEPENDENCE OF OXYGEN UPTAKE AND EVOKED TORQUE DURING PROLONGED ISOMETRIC SUB-TETANIC NMES.
- 09:30-09:45 Krenn M, Kneisz L, Hanc C, Rafolt D, Bijak M, Ciupa R, Mayr W, Kollmann C (Vienna, Austria)  
ACTIVATION THRESHOLD AND CONTRACTION DYNAMICS OF QUADRICEPS FEMORIS HEADS MEASURED WITH ULTRASOUND IMAGING : A PILOT STUDY
- 09:45-10:00 Gandolla M, Casellato C, Ferrante S, Ferrigno G, Baselli G, Molteni F, Martegani A, Frattini T, Pedrocchi A (Milao, Italy)  
BRAIN ACTIVATION DURING ACTIVE, PASSIVE AND FES-INDUCED MOVEMENTS: A FEASIBILITY FMRI STUDY

10:00-10:30 Coffee break (visit Po10\_x, Po11\_x)

**Session  
10**

**INS Session: Neuromodulation 2010: The way ahead**

Chairpersons: Alesch F (Vienna, Austria)  
Bijak M (Vienna, Austria)

**Key**

**Keynote Lecture:**

10:30-11:00 Alesch F (Vienna, Austria)  
DEEP BRAIN STIMULATION - CURRENT AND FUTURE INDICATIONS

**Key**

**Keynote Lecture:**

11:00-11:30 Erfurth A (Vienna, Austria)  
PSYCHIATRIC INDICATIONS - A NEW CHALLENGE IN DEEP BRAIN STIMULATION

**Key**

**Keynote Lecture:**

11:30-12:00 Manola L (Brussels, Belgium)  
SHAPING THE ELECTRICAL FIELD - A CONCEPT FOR IMPROVING NEUROSTIMULATION

**Key**

**Keynote Lecture:**

12:00-12:30 Kainz W (Silver Spring, USA)  
NEUROMODULATION AND MAGNETIC RESONANCE IMAGING - CONFLICTING PARTNERS?

**12:30-14:00 Lunch**

**Session  
11**

**Lower Extremities, SCI**

Chairpersons: Ferrante S (Milano, Italy)  
Hofer C (Vienna, Austria)

- 14:00-14:15 Carraro U, Kern H (Milano, Italy)  
HOME-BASED FES IN SCI: RECOVERY OF TETANIC CONTRACTILITY DRIVES THE STRUCTURAL IMPROVEMENTS OF DENERVATED MUSCLES
- 14:15-14:30 Holinski B, Mazurek K, Everaert D, Mushahwar V, Stein R (Edmonton, Canada)  
RESTORING STEPPING AFTER SPINAL CORD INJURY USING NOVEL ELECTRICAL STIMULATION AND FEEDBACK CONTROL STRATEGIES
- 14:30-14:45 Alvarado Pacheco L, Ogilvie R, Chong S, Mushahwar V (Edmonton, Canada)  
ACTIVE ARM INVOLVEMENT IN THE REHABILITATION OF WALKING AFTER SPINAL CORD INJURY: A CASE STUDY
- 14:45-15:00 Nekoular V, Erfanian A (Tehran, Iran)  
OPTIMAL WALKING TRAJECTORIES ESTIMATION USING WAVELET NEURAL NETWORK FOR FES-ASSISTED ARM-SUPPORTED PARAPLEGIC WALKING
- 15:00-15:15 Curtis C, Chong S, Mushahwar V (Edmonton, Canada)  
THE EFFECTS OF INTERMITTENT ELECTRICAL STIMULATION WITH VARYING LOAD AND STIMULATION PARADIGMS FOR THE PREVENTION OF DEEP TISSUE INJURY
- 15:15-15:30 Fornusek C, Davis G (Sydney, Australia)  
REPEATED BOUT EFFECT DURING ECCENTRIC FES CYCLING: PILOT DATA
- 15:30-15:45 Craven C, Gollee H, Purcell M, Allan D (Glasgow, UK)  
CARDIOPULMONARY RESPONSES TO ACTIVE AND ELECTRICALLY STIMULATED STEPPING, WITH ROBOTICS ASSISTANCE IN EARLY-STAGE SPINAL CORD INJURY
- 15:45-16:00 Davis G, Estigoni E, Fornusek C, Smith R (Sydney, Australia)  
EFFECTS OF RECOVERY AFTER FATIGUE ON M-WAVE VS TORQUE RELATIONSHIPS DURING ISOMETRIC FES-INDUCED CONTRACTIONS

- 16:00-16:15 Presentation by Stefan Schuy prize winner  
(in English)  
REVIEW IN PROGRESS
- 16:15-16:30 Grab some Coffee
- 16:30-17:00 IFESS General Assembly
- 17:30 Bus to Conference Dinner Location

## Sunday 12.09.2010

### Session 12

#### *FES and Human Motor Control 1*

Chairpersons: Rothwell J (London, UK)  
Dimitrijevic M (Ljubljana, Slovenia and Houston,  
TX. USA)

### Key

#### *Keynote Lecture:*

- 09:00-09:40 Deliagina T (Stockholm, Sweden)  
NEURAL CONTROL OF POSTURE AND LOCOMOTION
- 09:40-10:00 Hofstoetter U, Minassian K, Mayr W, Rattay F,  
Dimitrijevic M (Vienna, Austria)  
NEURAL CONTROL OF HUMAN POSTURE AND MOVEMENT:  
MODIFICATIONS OF MONOSYNAPTIC LUMBOSACRAL POSTERIOR  
ROOT-MUSCLE REFLEXES
- 10:00-10:20 Minassian K, Hofstoetter U, Tansey K, Rattay F, Mayr W,  
Dimitrijevic M (Vienna, Austria)  
NEUROPHYSIOLOGY OF THE HUMAN LUMBAR LOCOMOTOR PATTERN  
GENERATOR
- 10:20-10:40 Bijak M (Vienna, Austria)  
MULTISITE STIMULATION OF THE LUMBAR POSTERIOR ROOTS AS A  
TOOL FOR STUDIES OF THE LOCOMOTOR PATTERN GENERATOR IN  
HUMAN
- 10:40-11:00 **Coffee Break**

**Session  
13**

**FES and Human Motor Control 2**

Chairpersons: Deliagina T (Stockholm, Sweden)  
Vrbova G (London, UK)

**Key**

**Keynote Lecture:**

- 11:00-11:40 Rothwell J (London, UK)  
HUMAN NEUROPHYSIOLOGY OF THE VOLUNTARY MOTOR TASKS
- 11:40-12:00 Rattay F, Minassian K, Hofstoetter U, Danner S, Mayr W,  
Dimitrijevic M (Vienna, Austria)  
COMPUTATION IN NEUROSCIENCE OF CONDUCTING AND  
PROCESSING CAPABILITIES OF THE HUMAN NERVOUS SYSTEM
- 12:00-12:20 Mayr W (Vienna, Austria)  
CAN FES DEVICE BE ALSO A TOOL FOR ASSESSMENT OF MOTOR  
CONTROL
- 12:20-13:30 **Lunch**

**Session  
14**

**FES and Human Motor Control 3**

Chairperson: Kern H (Vienna Austria)  
Dimitrijevic M (Ljubljana, Slovenia and Houston,  
TX, USA)

**Key**

**Keynote Lecture:**

- 13:30-14:10 Vrbova G (London, UK)  
COMPARISON OF NEUROMUSCULAR STIMULATION TO EXERCISE
- 14:10-15:30. **General discussion and conclusion**  
with invited additional six contributors  
(selected participants of the meeting)
- 15:30-16:00 **Demonstration Workshop on transcutaneous posterior roots  
electrical stimulation in human**  
by Hofstoetter U, Minassian K (Vienna, Austria)

**Good Bye**

**Scientific Poster Presentations**

- PO01\_1 Hiatt S, Clark G, Norman R (Salt Lake City, USA)  
1100-CHANNEL NEURAL STIMULATOR FOR FUNCTIONAL ELECTRICAL  
STIMULATION USING HIGH-ELECTRODE-COUNT NEURAL INTERFACES
- PO01\_2 Aqueveque P, Nonclercq A, Vanhoestenbergh A, Cirmirakis D, Donaldson N  
(London, UK)  
FUNCTIONING OF SACRO-LUMBAR ANTERIOR ROOT STIMULATOR IMPLANT
- PO01\_3 Townsend B, Stitt I, Engler G, Engel A, Rubehn B, Stieglitz T (Freiburg,  
Germany)  
DEVELOPMENT OF A THIN-FILM ARRAY FOR CORTICAL STIMULATION
- PO01\_4 Hasanuzzaman M, Sawan M, Raut R  
(Montréal, Canada)  
AN ENERGY-EFFICIENT AND MULTIPLE-WAVEFORM STIMULI GENERATOR  
FOR VISUAL CORTEX MICROSTIMULATION
- PO01\_5 Jovicic N (Belgrade, Serbia)  
THERAPEUTIC FES WITH DISTRIBUTED UNITS
- PO01\_6 Melgaard J, Rijkhoff N (Aalborg, Denmark)  
IMPLANTABLE PRESSURE SENSOR FOR DETECTING THE ONSET OF A  
BLADDER CONTRACTION – PRELIMINARY RESULTS
- PO01\_7 Malešević N, Bijelić G (Belgrade, Serbia)  
METHODS FOR IN VITRO STUDY OF ELECTRICAL CURRENT AND POTENTIALS  
DISTRIBUTION IN LAYERED BIOLOGICAL TISSUE
- PO01\_8 Nguyen R, Micera S, Morari M (Zürich, Switzerland)  
ITERATIVE LEARNING CONTROL FOR FES OF THE ANKLE
- PO02\_1 McDonnall D, Gossman M, Guillory K  
(Salt Lake City, USA)  
BLINK PROSTHESIS FOR FACIAL PARALYSIS PATIENTS
- PO02\_3 Geng B, Yoshida K, Jensen W (Aalborg, Denmark)  
EFFECTS OF THE NUMBER OF PULSES ON EVOKED SENSATIONS IN PAIRWISE  
ELECTROCUTANEOUS STIMULATION
- PO02\_4 Mabuchi K, Niuro H, Shimojo M, Kunitomo M,  
Ishikawa M, Suzuki T (Tokyo, Japan)  
DEVELOPMENT OF A WEARABLE SENSORY PROSTHETIC DEVICE FOR  
PATIENTS WITH PERIPHERAL NEURAL DISTURBANCES

- PO06\_1 Ethier C, Oby E, Bauman M, Miller L (Chicago, USA)  
CORTICALLY CONTROLLED FUNCTIONAL ELECTRICAL STIMULATION: A NEUROPROSTHESIS FOR GRASP FUNCTION
- PO06\_2 Kundu A, Jensen W, Kurstjens M, Stieglitz T, Boretius T, Yoshida K (Aalborg, Denmark)  
DEPENDENCE OF IMPLANTATION ANGLE OF THE TRANSVERSE, INTRAFASCICULAR ELECTRODE (TIME) ON SELECTIVE ACTIVATION OF PIG FORELIMB MUSCLES
- PO06\_3 Klauer C, Schauer T, Raisch J (Berlin, Germany)  
HIGH PERFORMANCE MOTION CONTROL BY NEURO-MUSCULAR ELECTRICAL STIMULATION APPLIED TO THE UPPER-LIMB
- PO06\_4 Bhadra N, Gerges M, Foldes E, Ackermann M, Bhadra N, Kilgore K (Cleveland, USA)  
REDUCTION OF THE ONSET RESPONSE IN HIGH FREQUENCY NERVE BLOC WITH FREQUENCY AND AMPLITUDE TRANSITIONED WAVEFORMS
- PO06\_6 Wilder A, Normann R, Clark G (Salt Lake City, USA)  
OPTIMIZATION OF A TREMOR-REDUCTION ALGORITHM FOR ASYNCHRONOUS STIMULATION OF INDEPENDENT MOTOR-UNIT GROUPS
- PO06\_7 Lynch C, Graham G, Popovic M (Toronto, Canada)  
INCLUDING NON-IDEAL BEHAVIOUR IN SIMULATIONS OF FUNCTIONAL ELECTRICAL STIMULATION APPLICATIONS
- PO06\_8 Hatakeyama K, Matsunaga T, Ishikawa Y, Ohtaka K, Sato M, Chida S, Watanabe M, Misawa A, Sasaki K, Tomite T, Yoshikawa T, Kudo D, Iwami T, Shimada Y, Iizuka K (Akita, Japan)  
INFLUENCE OF BACK MUSCLE STRENGTH ON VERTEBRAL STRESS
- PO06\_9 Yoshikawa T, Matsunaga T, Hongo M, Tomite T, Sasaki K, Kudo D, Sato M, Chida S, Hatakeyama K, Iwami T, Shimada Y (Akita, Japan)  
MOTION ANALYSIS OF LOW-INTENSITY BACK MUSCLE EXERCISE USING A THREE-DIMENSIONAL MUSCULOSKELETAL MODEL
- PO06\_10 Zhang D (Shanghai, Japan)  
A REVIEW ON FUNCTIONAL ELECTRICAL STIMULATION IN CHINA
- PO08\_1 Sasaki K, Matsunaga T, Misawa A, Tomite T, Yoshikawa T, Kudo D, Chida S, Sato M, Hatakeyama K, Shimada Y (Akita, Japan)  
CORTICAL CHANGE AND FUNCTIONAL RECOVERY OF UPPER LIMB BY THERAPEUTIC ELECTRICAL STIMULATION WITH CHRONIC HEMIPLEGIC PATIENT: A CASE REPORT

- PO08\_2 Kudo D, Matsunaga T, Tomite T, Sasaki K, Yoshikawa T, Sato M, Chida S, Hatakeyama K, Shimada Y (Akita, Japan)  
THERAPEUTIC ELECTRICAL STIMULATION THROUGH SURFACE ELECTRODES FOR HEMIPLEGIC SHOULDER SUBLUXATION – COMPARATIVE STUDY OF THE LOW-FREQUENCY STIMULATION METHOD AND THE RUSSIAN METHOD
- PO08\_3 Thorsen R, Cortesi M, Jonsdottir J, Carpinella I, Morelli D, Converti R, Ferrarin M, Casiraghi A (Milano, Italy)  
IMPROVING THE HEMIPLEGIC HAND FUNCTION BY FES USING DIRECT MYOELECTRIC CONTROL
- PO08\_4 Lee Y, Lee J, Yoo E, Park S, Choi I, Kim Y (Wonju, Republic of Korea)  
EMG-TRIGGERED NEUROMUSCULAR ELECTRICAL STIMULATION COMBINED WITH MOTOR POINT BLOCK TO IMPROVE ON HAND FUNCTION IN HEMIPLEGIC PATIENTS WITH SEVERE SPASTICITY
- PO08\_5 Ko A, Lee Y, Son J, Kim Y (Wonju, Republic of Korea)  
EFFECT OF COMBINED PERIPHERAL MOTOR ELECTRICAL STIMULATION AND ANODAL TRANSCRANIAL DIRECT CURRENT STIMULATION(TDCS) IN STROKE PATIENTS
- PO08\_6 Óskarsdóttir A, Helgason T (Kopavogur, Iceland)  
NEUROPROSTHESIS FOR FINGER REHABILITATION AND INDEPENDENT USER APPLICATION
- PO08\_7 Chida S, Matsunaga T, Sato M, Hatakeyama K, Tomite T, Sasaki K, Yoshikawa T, Kudo D, Iwami T, Kosaka T, Shimada Y (Akita, Japan)  
REPETITIVE EXERCISES USING ELECTRICAL STIMULATION AND A ROBOT ARM FOR UPPER EXTREMITIES: A PILOT STUDY
- PO08\_8 Lee S, Harrington A, McRae C (Newark, USA)  
FES-ASSISTED CYCLING TRAINING CAN IMPROVE CYCLING PERFORMANCE, CARDIORESPIRATORY FITNESS, STRENGTH, GAIT AND FUNCTIONAL ACTIVITY FOLLOWING AN 8-WEEK, HOME-BASED TRAINING PROGRAM – A CASE REPORT
- PO08\_9 Jager K, Donaldson N, Newham D (London, UK)  
BI-MOMENT CHAIR FOR THE MEASUREMENT OF JOINT MOMENTS

- PO10\_1 Sayenko D, Milosevic M, Robinson M, Masani K, McConville K, Popovic M (Toronto, Canada)  
COMBINED VIDEO GAME AND NEUROMUSCULAR STIMULATION BASED TRAINING
- PO10\_2 Song T, Gon K, Hwang S, Lee B, Jung D, Kim D, Park D, Ryu J, Kang S (Chungbuk, Republic of Korea)  
A COMPARATIVE STUDY ON ELECTRICAL STIMULATION AND MAGNETIC STIMULATION AS FOR THE MUSCLE CONTRACTILITY AND THE PAIN PERCEPTION
- PO10\_3 Tomite T, Shimada Y, Matsunaga T, Sasaki K, Yoshikawa T, Kudo D, Sato M, Chida S, Hatakeyama K, Iwami T (Akita, Japan)  
GAIT CYCLE DETECTION USING 3-AXES LINEAR ACCELEROMETERS & AMP; GYROSCOPES IN HEMIPLEGIC PATIENTS.
- PO10\_4 Suzuki T, Watanabe T, Saura R, Uchiyama H (Maizuru, Japan)  
MOVEMENT OF ANKLE PLANTAR FLEXOR AND SUBJECTIVE PAIN BY MONOPHASIC ELECTRICAL STIMULATION
- PO10\_5 Nielsen S, Grey M, Sinkjaer T, Nascimento O (Aalborg, Denmark)  
THE DYNAMICS OF CORTICAL REORGANIZATION ASSOCIATED WITH VOLUNTARY AND PERIPHERAL ELECTRICAL STIMULUS
- PO10\_6 Ferrante S, Ambrosini E, Ravelli P, Ferrigno G, Molteni F, Pedrocchi A (Milano, Italy)  
A BIOFEEDBACK TREATMENT BASED ON FES TO RECOVER THE MEDIAL HAMSTRING USE IN STROKE PATIENTS SUFFERING OF STIFF LEGGED GAIT
- PO11\_1 Seyedi A, Erfanian A (Tehran, Iran)  
REDUCING THE UPPER BODY EFFORT DURING FES-ASSISTED ARM-SUPPORTED STANDING UP IN PARAPLEGIC PATIENTS
- PO11\_2 Gudjonsdottir B, Gargiulo P, Helgason T (Reykjavík, Iceland)  
USE OF ULTRASOUND CURRENT SOURCE DENSITY IMAGING (UCSDI) TO MONITOR ELECTRICAL STIMULATION OF DENERVATED MUSCLES AND FIBER ACTIVITY, SOME THEORETICAL CONSIDERATIONS
- PO11\_3 Matsunaga T (Akita, Japan)  
JOINT REACTION FORCE OF LOWER EXTREMITIES DURING ROWING IN NON-DISABLED INDIVIDUALS

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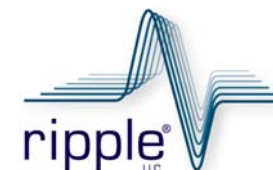
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