



BDH-Klinik Greifswald
Neurologisches Rehabilitationszentrum
und Querschnittgelähmtenzentrum



"ImpactG" - Improvement of the research competitiveness in neuroscience at the Ernst-Moritz-Arndt-University of Greifswald

Neuroscience Group at the Medical Faculty of the University of Greifswald

Brain stimulation and brain repair Mechanisms, behavioural and clinical effects

**International symposium
September 2—4, 2010**



Sponsored by the European Union



and the Alfried Krupp von Bohlen und Halbach-Stiftung, Essen

Preface

Neuroscience is one of the fastest growing areas in research. Knowledge, treatments, and cures are the possibilities that continue to be discovered through neuroscientific research.

The [Neuroscience Group at the Medical Faculty of the University of Greifswald](#) promotes interdisciplinary investigations from the level of gene expression in single neurons to imaging of localized regions of the human brain and neurorehabilitation.

The Medical Faculty at the Ernst-Moritz-Arndt University (EMAU) is the beneficiary of the EU Programme “Unlocking and developing the research potential of research entities in the EU’s convergence regions and outermost regions” whose implementation in the [project ImpactG](#) (FP7-REGPOT-2008-1, Grant agreement no.: 229750) allowed us to acquire cutting-edge technology and equipment and to advance our research capacity in neuroscience by creating a network across Europe aiming for the improvement of science and technology (S&T) experience and knowledge of researchers by exchange of know-how and experience with our [Strategic Partners](#) from:

- (1) the Institute of Brain Research in Zurich, Switzerland;
- (2) the Institute of Neuropathology, Zurich, Switzerland;
- (3) the Institute of Human Genetics, Newcastle University, UK;
- (4) the Physiology and Pathophysiology of Human Motor Control Research Group at the Sobell Department of Motor Neuroscience and Movement Disorders, Institute of Neurology, Queen Square, London, UK,
- (5) the Department of Cognitive Neuroscience, Faculty of Psychology, Maastricht University, the Netherlands, and
- (6) the Laboratory of Neural Stem Cell Biology, University of Lund, Sweden.

Improvement of the research capacity in neuroscience at the Ernst Moritz Arndt University Greifswald is an ongoing process with several steps starting with collaboration with strategic partners in Europe, followed by support workshops, equipment purchase, collaborative applications and dissemination of gained knowledge and experience.

The objectives of ImpactG (project co-ordinator: Prof. A. Popa-Wagner) will be reached through the implementation of several work packages (WP):

- (1) Improvement of the S&T experience and knowledge of researchers in cellular and molecular neuroscience (WP Leader: Prof. A. Popa-Wagner),
- (2) in the treatment of neurodegenerative diseases (WP Leader: Dr. M. Sabolek, Prof. Dr. Dr. C. Kessler),
- (3) in molecular neuropathology (WP Leader: PD Dr. S. Vogelgesang),
- (4) molecular neurophysiology (WP Leader: Prof. H. Brinkmeier), and
- (5) neurorehabilitation at the EMAU Greifswald (WP Leader: Prof. T. Platz).

Project dissemination includes the organization of three workshops with international participation to facilitate knowledge transfer at an international level.

The [second workshop](#) is scheduled for [September 2nd to 4th 2010](#) and [covers the topic of brain stimulation and brain recovery](#).

State-of-the-art knowledge about repetitive transcranial magnetic stimulation (rTMS) effects from animal experiments to clinical trials in conditions such as stroke, Parkinson disease and depression is presented by senior researchers in the field from all around the world coming from various neuroscience and medical fields. The results of

the workshop are timely made available with a [special issue](#) of the journal [Restorative Neurology and Neuroscience](#).

The [workshop is funded by the European Union](#) (ImpactG Project, FP7-REGPOT-2008-1, Grant agreement no.: 229750) and the [Alfried Krupp von Bohlen und Halbach-Stiftung, Essen](#).

The contribution of all members of the workshop's international faculty to its success as well as the support and organisational help of members of the Alfried Krupp Wissenschaftskolleg Greifswald, especially of its scientific CEO Dr. Suhm and Ms. Sülberg, the organisational help of the neurorehabilitation department's secretary Mrs. Mertin and of the administration of the EMAU is gratefully acknowledged.

Brain stimulation and brain repair **Mechanisms, behavioural and clinical effects**

International symposium
September 2—4, 2010

Scientific Chair:

Prof. Dr. Thomas Platz (Greifswald)
BDH-Klinik Greifswald, neurorehabilitation research group, department neuroscience, Ernst-Moritz-Arndt-Universität Greifswald, Germany

Conference Venue:

Alfried Krupp Wissenschaftskolleg Greifswald
Martin-Luther-Straße 14
D-17489 Greifswald

Conference Office:

Scientific matters:

BDH-Klinik, An-Institut der EMAU
Email: t.platz@bdh-klinik-greifswald.de

Registration and organisational matters:

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The conference language is English.

Objective of the symposium

The multi-professional targeted approach of neurorehabilitation can enhance recovery of functional deficits beyond spontaneous recovery and consequently improve quality of life: Specifically tailored therapeutic interventions address very specific information processes in the brain, re-train skills and thereby improve performance and abilities step by step. As a consequence of training, centres within the brain responsible for these functions become effectively re-activated, functional re-organisation of the brain occurs and ensures long-term benefits of training therapy.

The non-invasive brain stimulation techniques of repetitive or patterned transcranial magnetic stimulation (rTMS) can focally influence the excitability of specific brain areas and might promote these functional adaptations in concert with and potentially beyond training therapy. rTMS holds much promise as a potential therapeutic intervention in a wide range of neurological conditions. However, many questions need to be addressed before a more widespread use in clinical practise can be recommended. The symposium on brain stimulation and brain recovery will shed light on these issues.

State-of-the-art knowledge about rTMS effects from animal experiments to clinical trials in conditions such as stroke, Parkinson disease and depression will be presented by senior researchers in the field from all around the world coming from various neuroscience and medical fields. This concentrated multi-disciplinary in depth approach on brain stimulation with rTMS and recovery will facilitate our understanding of mechanisms, effects, and therapeutic potentials of rTMS, and will promote future research from bench to bed side. The results of the symposium have timely been made available with a special issue of the journal *Restorative Neurology and Neuroscience*.

Programme

Thursday, September 2, 2010

17:00

Welcome Addresses

Bärbel Friedrich (Greifswald, Germany)
Academic Director of the Alfried Krupp
Wissenschaftskolleg Greifswald

Rainer Westermann (Greifswald, Germany)
Rector, Ernst-Moritz-Arndt-Universität Greifswald

Christof Kessler (Greifswald, Germany)
Neuroscience Group at the Medical Faculty of the
University of Greifswald

Ulf Dembski (Greifswald, Germany)
Deputy Major, City of Greifswald

Conference Chair's Address

Thomas Platz (Greifswald, Germany)

Opening Lecture

Curing the brain by rTMS therapy?

Michael C. Ridding, University of Adelaide

18:30

Reception and Buffet

Friday, September 3, 2010

09:00-11:00 **Metabolic and haemodynamic effects of rTMS**

Session I, chairs: *Klaus Funke, Charlotte Stagg*

09:00 Theta burst and conventional low-frequency rTMS differentially affect GABAergic neurotransmission in the rat cortex (GAD and Ca-binding proteins expression)

Alia Benali

Institut für Neurophysiologie, Universität Bochum

09:20 Immediate and prolonged effects of theta burst stimulation (TBS) and conventional low frequency rTMS on the rat cortex — concepts and overview

Klaus Funke

Institut für Neurophysiologie, Universität Bochum

09:55 Neurochemical effects of theta burst stimulation

Charlotte Stagg

FMRIB Centre, University of Oxford

10:20 Neural substrates of low-frequency rTMS during movement in healthy subjects and acute stroke patients. A PET study

Angelique Gerdela-Mas

INSERM U 825, Universités de Toulouse

Friday, September 3, 2010

- 10:45 Assessing the effects of TMS on brain activity in a quantifiable fashion by interleaved TMS/CASL (continuous arterial spin-labeling): Comparison of different rTMS protocols
Axel Thielscher
MPI for Biological Cybernetics, Tübingen
- 11:05-11:35 Coffee break
- 11:35-18:30 **Specificity and Modification of rTMS effects****
- Session II, chairs: *Walter Paulus, Ying-Zu Huang*
- 11:35 Optimizing functional accuracy of TMS in cognitive studies: a comparison of methods
Alexander Sack
Faculty of Psychology and Neuroscience,
Maastricht University
- 12:00 Optimizing stimulation parameters for theta burst stimulation applications
Walter Paulus
Clinical Neurophysiology, Georg-August-University
Göttingen
- 12:30-14:00 Lunch break

Friday, September 3, 2010

Session II, continued, chairs: *Walter Paulus, Ying-Zu Huang*

- 14:00 The complex relationship between voluntary movement and rTMS-induced plasticity in motor cortex
Gabrielle Todd
School of Molecular and Biomedical Science,
University of Adelaide
- 14:25 The effect of continuous theta burst stimulation on circuits in the motor cortex and spinal cord and its modulation by physiological activity and a NMDA receptor antagonist
Ying-Zu Huang
Department of Neurology, Chang Gung Memorial Hospital and Chang Gung University, College of Medicine, Taipei
- 14:50 Suppression of ipsilateral motor cortex facilitates motor skill learning
Masahito Kobayashi
Department of Neurosurgery, Saitama Medical University

Friday, September 3, 2010

- 15:15 Motor skill learning – a combined behavioural training and theta burst TMS study
Thomas Platz
BDH-Klinik Greifswald, Ernst-Moritz-Arndt-Universität
- 15:35-16:05 Coffee break
- Session III, chairs: *Martin Lotze, Orlando B.C. Swayne*
- 16:05 Electrophysiological correlates of reduced pain perception after theta burst stimulation
Andrea Antal
Clinical Neurophysiology, Georg-August-Universität Göttingen
- 16:25 Effects of priming stimulation (metaplasticity) in human rTMS studies — concepts and overview
Michael C. Ridding
Neuromotor Plasticity & Development (NeuroPAD)
The Robinson Institute School of Paediatrics and Reproductive Health, University of Adelaide

Friday, September 3, 2010

- 16:50 Modulation of effects of iTBS applied over M1 by conditioning stimulation of the opposite M1
Patrick Ragert
Max-Planck-Institut für Kognitions- und Neurowissenschaften, Abteilung Kognitive Neurologie, Leipzig
- 17:10 TMS-jamming during complex movement performance — evidence for functional involvement in healthy subjects and stroke patients
Martin Lotze
Baltic Imaging Center, Diagnostische Radiologie und Neuroradiologie, Ernst-Moritz-Arndt-Universität Greifswald
- 17:30 Effects of TBS on motor performance and motor learning and its pharmacological modification
Orlando B.C. Swayne
Sobell Department of Motor Neuroscience and Movement Disorders, Institute of Neurology, University College London
- 19:30 *Social programme*

Saturday, September 4, 2010

09:00-14:15 **Clinical effects of rTMS**

Session IV, chairs: *John Rothwell, Margaret A. Naeser*

- 09:00 Curing the brain by applied neurophysiology —
fact or fiction?
John Rothwell
Sobell Department of Motor Neuroscience and
Movement Disorders, Institute of Neurology,
University College London
- 09:30 Short- and long-term effect of rTMS on motor
function recovery after acute ischemic stroke
Eman M. Khedr
Department of Neurology, Assiut University Hospital
- 09:55 Effects of ipsilesional and contralesional rTMS on
motor recovery in cortical and subcortical stroke
Mitra Ameli
Klinik für Neurologie, Uniklinik Köln

Saturday, September 4, 2010

- 10:15 **Effects of parietal theta burst stimulation trains on visual attention and visual neglect**
Thomas Nyffeler
Abteilung für kognitive und restorative Neurologie,
Inselspital Bern
- 10:40 **Research with rTMS in the treatment of aphasia**
Paula I. Martin, Margaret A. Naeser
Harold Goodglass Boston University, Aphasia
Research Center, Department of Neurology, Boston
University School of Medicine and the Veterans
Affairs
- 11:10-11:40 **Coffee break**

Session V, chairs: Masashi Hamada, Giacomo Koch
- 11:40 **Effects of coupled rTMS and speech therapy on language and brain activation in subacute stroke patients**
Ilona Rubi-Fessen
RehaNova Köln

Saturday, September 4, 2010

- 12:00 [High-frequency rTMS over the supplementary motor area improves bradykinesia in Parkinson's disease](#)
Masashi Hamada
Department of Neurology, Division of Neuroscience
Graduate School of Medicine, University of Tokyo
- 12:25 [Cerebellar magnetic stimulation decreases levodopa-induced dyskinesias in Parkinson disease](#)
Giacomo Koch
Laboratorio di Neurologia Clinica e
Comportamentale Fondazione Santa Lucia, IRCCS,
Rome
- 12:50 [Efficacy and safety of bilateral continuous theta burst stimulation \(cTBS\) for the treatment of chronic tinnitus: a three-armed randomized controlled trial](#)
Christian Plewnia
Neurophysiology & Interventional Psychiatry,
Universitätsklinikum Tübingen
- 13:10 [Influence of rTMS on depression and its symptoms](#)
Jacqueline Höppner
Universitätsklinik für Psychiatrie und Psychotherapie,
Rostock

Saturday, September 4, 2010

13:30 **Antidepressant effects of augmentative transcranial magnetic stimulation. Randomised multicentre trial**
Carlos Schönfeldt-Lecuona
Universitätsklinik für Psychiatrie und Psychotherapie III, Ulm

14:00 **Closing**
Thomas Platz
BDH-Klinik Greifswald
Ernst-Moritz-Arndt-Universität Greifswald

14:15 ***Farewell lunch***



