



COST EMF-MED

European network for innovative uses of EMFs
in biomedical applications

Workshops and WG Meetings:

COST EMF-MED Workshop on Non-Thermal EMF Cancer Treatment



COST EMF-MED Workshop on Vagus Nerve Stimulation



Mini-Workshops: The use of EMF medical devices in the context of safety issues and research needs; New Working Module proposals

Warsaw, 14-16 February 2017

Final Program (ver. 10/02/2017)

Meeting Venue:

**Centralny Instytut Ochrony Pracy – Państwowy Instytut Badawczy (CIOP-PIB)
Czerniakowska 16, 00-701 Warszawa
POLAND**

Local organiser:

Dr. Jolanta Karpowicz
Centralny Instytut Ochrony Pracy – Państwowy Instytut Badawczy (CIOP-PIB)
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Mini-Workshops of the EMF-MED COST Action

Tuesday 14/02/2017

Centralny Instytut Ochrony Pracy-Państwowy Instytut Badawczy (CIOP-PIB), Warsaw, Poland

16:00 – 19:15

Chairs: Mirjana Moser and Jolanta Karpowicz

16:00 – 16:45 **Get-together with welcome coffee (social event)**

The use of EMF medical devices in the context of safety issues and research needs

16:45 – 17:00 *The use of EMF medical devices in the context of labour law and medical personnel safety and the need of research in that field*

Jolanta Karpowicz¹

¹CIOP-PIB, Warsaw, Poland

17:00 – 17:15 *Safety of the MRI diagnosis and need for research*

Siegal Sadetzki¹

¹The Gertner Institute for Epidemiology and Health Policy Research Ltd., Israel

17:15 – 17:30 *The use of EMF medical devices in the context of safety and comfort of growing population of users of implant / tele-medicine electronic devices*

Victoria Ramos¹

¹Instituto de Salud Carlos III, Madrid, Spain

17:30 – 17:45 *EMF hot-spots identification in the context of emerging exposure scenarios (by Skype)*

Francisco Falcone¹

¹Universidad Publica de Navarra, Pamplona, Spain

17:45 – 18:00 *Discussion*

Intermezzo

18:00 – 18:20 *ICNIRP statement on diagnostic devices using non-ionizing radiation: existing regulations and potential health risks (part EMF) (by Skype)*

Carmela Marino¹

¹ENEA, Rome, Italy

New Working Module proposals

18:20 – 18:35 *EMF applications in aesthetic medicine*

Theodoros Samaras

¹Aristotle University of Thessaloniki, Greece

18:35 – 18:55 *Treating neuropathic pain with electrical stimulation*

Damir Sapunar¹, Livia Puljak¹

¹Medical School, University of Split, Croatia

18:55 – 19:10 *Early Stage Health Technology Assessment of Medical Devices (by Skype)*

Leandro Pecchia¹

¹University of Warwick, UK

19:10 – 19:15 *Discussion*

COST EMF-MED Workshop on Non-Thermal EMF Cancer Treatment

Wednesday 15/02/2017

Centralny Instytut Ochrony Pracy-Państwowy Instytut Badawczy (CIOP-PIB), Warsaw, Poland

08:30 – 18:30

Workshop Chairs: G.C. van Rhoon and A. Šarolić

Opening

08:30 – 09:00

Registration and welcome coffee

09:00 – 09:20

CIOP-PIB representative: **Welcome to CIOP-PIB**

A. Šarolić (Action Chair; FESB, University of Split, Croatia):

Introduction: COST EMF-MED, Warsaw program, Grant Holder

G.C. van Rhoon (WG1 Leader; Erasmus MC, Rotterdam, Netherlands):

Workshop Introduction

Biological mechanisms and experimental research

09:20 – 09:40

New paradigm in assessing biological effects of low intensity electromagnetic fields

I. Belyaev^{1, 2*}

¹Laboratory of Radiobiology, Cancer Research Institute, Biomedical Research Center, Slovak Academy of Science, Bratislava, Slovakia; ²Laboratory of Radiobiology, Prokhorov's General Physics Institute, Russian Academy of Science, Moscow, Russia

09:40 – 09:55

Cancer Cell Fate Control By Magneto-Mechanical Treatments

K. Spyridopoulou¹, K. Chlichlia¹, T. Samaras², N. Maniotis², A. Makridis², E. Myrovali², O. Kalogirou², M. Angelakeris^{2*}

¹Laboratory of Molecular Immunobiology, Department of Molecular Biology and Genetics, Democritus University of Thrace, Alexandroupolis, Greece; ²Department of Physics, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

09:55 – 10:10

Numerical Modeling of the Thermal Effects of Irreversible Electroporation for In Vitro Studies

P. Agnass^{1, 2*}, E. van Veldhuisen¹, J.A. Vogel¹, T.M. van Gulik¹, M.G.H. Besselink¹, J. Crezee² and H.P. Kok²

¹Department of Surgery, Academic Medical Center, Amsterdam, the Netherlands; ²Department of Radiotherapy, Academic Medical Center, Amsterdam, the Netherlands

10:10 – 10:25

B16 melanoma cell death and increased immunogenic potential as electrothermic effects on tumor cells treated with a newly designed closed loop microwave heating reactor

Drescher C^{1, 2}, Derer A¹, Rosin A², Gerdes T², Willert-Porada M², Fietkau R¹, Gaipl US¹, Frey B^{1*}

¹Department of Radiation Oncology, Universitätsklinikum Erlangen, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; ²Chair of Materials Processing, University of Bayreuth, Bayreuth, Germany

10:25 – 10:40

Low frequency pulsed electromagnetic field (LF-PEMF; 7Hz, 30mT) stimulation induces cell death changes in cultured H4 glioma cells

Kaszuba-Zwoińska Jolanta¹, Nowak Bernadeta², Thor Piotr¹, Guzdek Piotr³, Gil Krzysztof¹

¹Department of Pathophysiology, Jagiellonian University Medical College, Cracow, Poland; ²Department of Immunology, Jagiellonian University Medical College, Cracow, Poland; ³Institute of Electron Technology, Zabłocie, Cracow, Poland

10:40 – 11:20

Coffee/tea break

11:20 – 11:40

Non-thermal EMF cancer interactions - in vitro study design at the University of Split

Anton Kordić^{1, 2*}, Vedrana Čikeš-Čulić², and Antonio Šarolić¹

¹FESB, University of Split, Croatia; ²MEFST, University of Split, Croatia

- 11:40 – 12:00** ***Interaction Between Electromagnetic Fields and Cellular Mechanisms – What We Learned From Our Investigation of The Impact on Genome Integrity and Cell Proliferation***
 Schuermann David^{1*}, Bešić Gyenge Emina¹, Manser Melissa¹, Focke Frauke¹, Sater Mohamad Abdul^{2,3,4}, Barekati Zeinab¹, Noreen Faiza¹, Schmid Christoph^{2,3,4}, Murbach Manuel³, Fröhlich Jörg⁴, Kuster Niels^{3,5}, and Schär Primo¹
¹Department of Biomedicine, University of Basel, Basel, Switzerland; ²Swiss Tropical and Public Health Institute, Basel, Switzerland; ³University of Basel, Basel, Switzerland; ⁴SIB Swiss Institute of Bioinformatics, Basel, Switzerland, IT'IS Foundation, Zürich, Switzerland; ⁵Swiss Federal Institute of Technology (ETH), Zürich, Switzerland
- 12:00 – 12:20** ***Search For Tumor-Specific Frequencies Of AmplitudeModulated 27 MHz Electromagnetic Fields In Mice With Hepatocarcinoma Xenografted Tumors***
 Yann Percherancier^{1*}, Sophie Kohler², Renaud Charlet de Sauvage¹, Gilles N'Kaoua¹, Annabelle Hurtier¹, Emmanuelle Haro¹, Florence Poullétier de Gannes¹, Isabelle Lagroye¹, Philippe Lévêque², and Bernard Veyret¹
¹Laboratoire de l'Intégration du Matériau au Système (IMS), UMR 5218 Université de Bordeaux I, 351 av de la libération, Bat A31 33400 Talence, France; ²XLIM Research Institute, CNRS-University of Limoges and LABEX "Sigma-LIM", F-87060 Limoges, France
- 12:20 – 12:40** ***Electromagnetic resonance in biological systems: Myth or reality?***
 M. Teplan^{1*}, O. Štrbák², M. Cifra³, I. Bajla¹
¹Institute of Measurement science, Slovak Academy of Sciences Bratislava, Slovakia; ²Jessenius faculty of Medicine, Comenius University, Martin, Slovakia; ³Institute of Photonics and Electronics, Czech Academy of Sciences, Prague, Czechia
- 12:40 – 13:00** ***Non-Thermal Positive and Negative Effects of EMFs***
 Włodzimierz Klonowski¹
¹Nalecz Institute of Biocybernetics and Biomedical Engineering Polish Academy of Sciences, Warsaw, Poland
- 13:00 – 15:00** **Lunch and visit to CIOP-PIB laboratories**

Keynote Invited Speakers – Clinical research

- 15:00 – 15:40** Boris Pasche
 Director, Comprehensive Cancer Center and Chairman, Department of Cancer Biology, Wake Forest University, USA; TheraBionic GmbH, Germany
Treatment of cancer with amplitude-modulated EMFs
- 15:40 – 16:20** Yoram Palti
 Founder, Chief Technology Officer and Director, Novocure Inc., Israel
Mechanisms and clinical results of NovoCure's alternating electric fields cancer treatment
- 16:20 – 17:00** Lluís Mir
 Director of the Laboratory of Vectorology and Anticancer Therapies – Joint Research Unit of CNRS, Univ. Paris-Sud, and Gustave-Roussy; Université Paris-Saclay, France
Electroporation-based anticancer therapies: electrochemotherapy, electrogenetransfer and irreversible electroporation
- 17:00 – 17:30** **Coffee/tea break**

WG1/WG3 Meeting

- 17:30 – 18:30** ***Plenary discussion (audience & panel)***
 Panel members: Y. Palti; L. Mir; B. Pasche; N. Kuster (WG3 Leader); D. Schuerman; B. Frey

19:30 Social dinner

COST EMF-MED Workshop on Vagus Nerve Stimulation

Thursday 16/02/2017

Centralny Instytut Ochrony Pracy-Państwowy Instytut Badawczy (CIOP-PIB), Warsaw, Poland

08:30 – 17:15

Workshop Chairs: Eugenijus Kaniusas and Lluís Mir

Opening

08:30 – 09:00 Registration and welcome coffee

Introduction VNS

09:00 – 09:30 **Current directions in auricular vagus nerve stimulation (keynote, invited speaker)**

Eugenijus Kaniusas¹, Stefan Kampusch¹, Jozsef Constantin Széles²

¹Institute of Electrodynamics, Microwave and Circuit Engineering, Vienna University of Technology, Austria; ²Department of Surgery, Medical University Vienna, Austria

Clinical VNS

09:30 – 10:00 **Innovative clinical medicine based on auricular vagus nerve stimulation (keynote, invited speaker)**

Jozsef Constantin Széles^{1*}, Stefan Kampusch², Eugenijus Kaniusas²

¹Department for Surgery, Medical University Vienna, Vienna, Austria; ²Institute of Electrodynamics, Microwave and Circuit Engineering, TU Wien, Vienna, Austria

10:00 – 10:15 **Neuropathic pain and epigenetic aspects for a gain of action**

Michele Papa^{1*}, Assunta Virtuoso¹, Giovanni Cirillo¹, Ciro De Luca¹

¹Laboratory of Neuronal Networks, Dept. of Mental and Physical Health and Preventive Medicine, University of Campania "Luigi Vanvitelli", 80138 Naples, Italy

10:15 – 10:30 **fMRI acquisition of central vagal projections modulated by tVNS**

A. González Olmos¹, S. Edwin-Thandarajah¹, T. Münte², Marc Tittgemeyer^{1*}

¹Max-Planck-Institute for Metabolism Research, Cologne, Germany; ²University Medical Centre of Schleswig-Holstein, Department of Neurology, Lübeck, Germany

10:30 – 11:00 Coffee/tea break

Animal VNS

11:00 – 11:30 **Animal models of auricular vagus nerve stimulation (keynote, invited speaker)**

Fivos Panetsos^{1,2}, Raquel Fernandez-Gines^{1,2}, Eugenijus Kaniusas^{3,4}, Stefan Kampusch^{3,4}

¹Neurocomputing & Neurorobotics Research Group, Complutense Univ of Madrid, Madrid, Spain; ²Health Research Institute, San Carlos Clinical Hospital (IdISSC), Madrid, Spain; ³Institute of Electrodynamics, Microwave and Circuit Engineering, Vienna University of Technology, Vienna, Austria; ⁴SzeleSTIM GmbH, Vienna, Austria

11:30 – 11:45 **Principles of vagus nerve stimulation for the control of autoimmune diseases: Crohn's Disease**

Raquel Fernandez-Gines^{1,2}, Fivos Panetsos^{1,2}

¹Neurocomputing & Neurorobotics Research Group, Complutense Univ of Madrid, Madrid, Spain; ²Health Research Institute, San Carlos Clinical Hospital (IdISSC), Madrid, Spain

11:45 – 12:00 **Vagal nerve stimulation reduces infarct size via a mechanism involving the alpha-7 nicotinic acetylcholine receptor and down-regulation of cardiac and vascular arginase**

Attila Kiss^{1,2*}, Yahor Tratsiakovich¹, Ali Mahdi¹, Jiangning Yang¹, Adrian T Gonon¹, Bruno Podesser², John Pernow¹

¹Department of Medicine, Unit of Cardiology, Karolinska Institutet, Department of Cardiology Karolinska University Hospital, Stockholm, Sweden; ²Ludwig Boltzmann Cluster for Cardiovascular Research at the Center of Biomedical Research, Medical University of Vienna, Vienna, Austria

Numerical VNS

- 12:00 – 12:15** *Vagus Nerve Stimulation: Comparison of Thresholds for A-, B-, and C- Fiber Recruitment for Cuff Electrodes and Alternative Stimulation Configurations in Functionalized Generic and Anatomical Models*
Antonino Mario Cassara^{1*}, Esra Neufeld¹, Niels Kuster^{1,2}
¹IT'IS Foundation, Zurich, Switzerland; ²ETHZ, Zurich, Switzerland
- 12:15 – 12:30** *Numerical modelling of percutaneous auricular vagus nerve stimulation: Investigation of the percentage of activated axons using different stimulation patterns*
Emmeric Tanghe^{1*}, Amine M. Samoudi¹, Stefan Kampusch², Luc Martens¹, Eugenijus Kaniusas², Jozsef C. Széles³, Wout Joseph¹
¹INTEC, Ghent University/imec, Ghent, Belgium; ²Biomedical Sensing, Institute of Electrodynamics, Microwave and Circuit Engineering, TU Wien, Vienna, Austria; ³University Clinic for Surgery, Medical University Vienna, Vienna, Austria
- 12:30 – 12:45** *Numerical modelling of percutaneous auricular vagus nerve stimulation: Assessment of sensitivity of neural activation to electrode position*
Amine M. Samoudi^{1*}, Emmeric Tanghe¹, Stefan Kampusch², Luc Martens¹, Eugenijus Kaniusas², Jozsef C. Széles³, Wout Joseph¹
¹INTEC, Ghent University/imec, Ghent, Belgium; ²Biomedical Sensing, Institute of Electrodynamics, Microwave and Circuit Engineering, TU Wien, Vienna; ³University Clinic for Surgery, Medical University Vienna, Vienna, Austria
- 12:45 – 13:00** *Effect of myelin parameters and membrane channel dynamics in the SENN model*
Thomas Tarnaud^{1*}, Luc Martens¹, Wout Joseph¹, Emmeric Tanghe¹
¹Ghent University/IMEC, 9052 Zwijnaarde, Belgium

13:00 – 14:30 **Lunch break**

Biofeedback VNS

- 14:30 – 14:45** *Multimodal unobtrusive devices for chronic disease monitoring*
Vaidotas Marozas^{1*}, Saulius Daukantas¹, Andrius Petrėnas¹, Andrius Sološenko¹, Birutė Paliakaitė¹, Darius Jegelevičius¹, Arūnas Lukoševičius¹, Eleni Kaldoudi²
¹Biomedical Engineering Institute, Kaunas University of Technology, Kaunas, Lithuania; ²School of Medicine, Democritus University of Thrace, Alexandroupoli, Greece
- 14:45 – 15:00** *The use of multimodal sensing data stream for neurostimulation feedback*
Arunas Lukosevicius^{1*}, Vaidotas Marozas¹, Mindaugas Marozas¹
¹Biomedical Engineering Institute, Kaunas University of Technology, Lithuania

Engineering of VNS and regulatory issues

- 15:00 – 15:15** *Electrical safety and EMC of electrostimulation devices*
Niko Ištuk^{1*}, Antonio Šarolić¹
¹FESB, University of Split, Croatia
- 15:15 – 15:30** *Design of the electrode-tissue interface in percutaneous auricular vagus nerve stimulation*
Stefan Kampusch^{1*}, Ewald Unger², Johannes Bernardi³, Karin Whitmore³, Jozsef Constantin Széles⁴, Eugenijus Kaniusas¹
¹Institute of Electrodynamics, Microwave and Circuit Engineering, TU Wien, Vienna, Austria; ²Center for Medical Physics and Biomedical Engineering, Medical University Vienna, Vienna, Austria; ³USTEM, TU Wien, Vienna, Austria; ⁴Department for Surgery, Medical University Vienna, Vienna, Austria
- 15:30 – 15:45** *Bringing auricular vagus nerve stimulation to the market: Regulatory burdens from research to Business*
Sarah Lechner^{1*}, Eugenijus Kaniusas^{1,2}, Stefan Kampusch^{1,2}
¹SzeleSTIM GmbH, Vienna, Austria; ²Institute of Electrodynamics, Microwave and Circuit Engineering, TU Wien, Vienna, Austria
- 15:45 – 16:15** **Coffee/tea break**

WG2/WG3 Meeting

- 16:15 – 17:15** *Discussion on VNS topics and issues*