

**Editor**

Vladimir Marascu-Klein



# *Advances in Biomedicine & Health Science*

*Advances in Biomedicine & Health Science*

*Proceedings of the 2<sup>nd</sup> International Conference on  
Biomedicine and Health Engineering (BIHE '13)*

*Proceedings of the 2<sup>nd</sup> International Conference on  
Health Science and Biomedical Systems (HSBS '13)*

*Brasov, Romania, June 1-3, 2013*

## Scientific Sponsors





# ADVANCES in BIOMEDICINE and HEALTH SCIENCE

Proceedings of the 2nd International Conference on Biomedicine and  
Health Engineering (BIHE '13)

Proceedings of the 2nd International Conference on Health Science  
and Biomedical Systems (HSBS '13)

Brasov, Romania  
June 1-3, 2013

## Scientific Sponsors:



Transilvania University  
of Brasov



University  
of Craiova



University Politehnica  
of Bucharest



Stefan cel Mare  
University of Suceava



Constantin Brancusi  
University of Targu-Jiu



Megatrend University  
of Belgrade



University Lucian Blaga  
of Sibiu



Constanta Maritime  
University

# **ADVANCES in BIOMEDICINE and HEALTH SCIENCE**

**Proceedings of the 2nd International Conference on Biomedicine and Health Engineering (BIHE '13)**

**Proceedings of the 2nd International Conference on Health Science and Biomedical Systems (HSBS '13)**

**Brasov, Romania  
June 1-3, 2013**

Published by WSEAS Press  
[www.wseas.org](http://www.wseas.org)

**Copyright © 2013, by WSEAS Press**

All the copyright of the present book belongs to the World Scientific and Engineering Academy and Society Press. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Editor of World Scientific and Engineering Academy and Society Press.

All papers of the present volume were peer reviewed by no less than two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.  
See also: <http://www.worldses.org/review/index.html>

ISSN: 1790-5125  
ISBN: 978-1-61804-190-6

# **ADVANCES in BIOMEDICINE and HEALTH SCIENCE**

**Proceedings of the 2nd International Conference on Biomedicine and  
Health Engineering (BIHE '13)**

**Proceedings of the 2nd International Conference on Health Science  
and Biomedical Systems (HSBS '13)**

**Brasov, Romania  
June 1-3, 2013**



**Editors:**

Prof. Vladimir Marascu-Klein, Transilvania University of Brasov, Romania

**Reviewers:**

Mahboobeh Mahmoodi  
Khin Wee Lai  
Muhammad Musaddique Ali Rafique  
Dhaval Vyas  
Marcio Dorn  
Horacio Pérez-Sánchez  
Muhammad Naufal Mansor  
Antigona Trofor  
Mohammad Mehrmohammadi  
Sorinel Oprisan  
Yoshiyuki Tohno  
Maling Ebrahimpour  
Ming-Shen Jian  
Humberto Varum  
Tsvetelina Draganova  
Yong Kheng Goh  
Claudia A. F. Aiub  
Carla Pinto  
Ioana Adrian  
Sk. Sarif Hassan  
Larion Alin  
Pedro Nucci  
Theodoros Xanthos  
Zengshi Chen  
Corina Carranca  
Alexander N. Pisarchik  
Cosmin Sinescu  
Krishnaveni Marimuthu  
Hongjun Liu  
Carlos Rivas-Echeverria  
Aamir Saeed Malik  
Dayanand Kalyani  
Carlos E. Formigoni  
Yuqing Zhou  
Thomas Panagopoulos  
Calin Ciufudean  
Tiberiu Socaciu  
Mansoor Shariatmadare Tehrani  
Dumitru-Alexandru Bodislav  
Vijay Kumar G  
Walid Oueslati  
JainShing Wu  
Md. Shamim Akhter  
Daniela Cristina Momete  
Jose Alberto Duarte Moller  
John Antonopoulos  
Delia Monica Bică  
Montri Phothisonothai  
Chris Stout  
Serban Corina  
Dana Anderson  
Panagiotis Ioannis



## Table of Contents

<b>Plenary Lecture 1: Application of Induced Pluripotent Stem Cells to Neuronal Differentiation and Nerve Tissue Regeneration in Biomaterials</b>	9
<i>Yung-Chih Kuo</i>	
<b>Plenary Lecture 2: Some Automatic Control Methods of Brain Temperature with Its Local Estimation for Clinical Hypothermia</b>	10
<i>Hidetoshi Wakamatsu</i>	
<b>Plenary Lecture 3: Arterial Stiffness - Current Issues</b>	11
<i>Ioana Mozos</i>	
<b>Heart Rate Variability in Noltisalis Database: Twenty-Four-Hour Fractal Dimension Analysis</b>	13
<i>G. Corbi, A. Accardo, N. Ferrara, M. Cesarelli, G. D'Addio</i>	
<b>Reproducibility of Non Linear Analysis Parameters in Chronic Heart Failure Patients</b>	19
<i>G. Corbi, M. Cesarelli, N. Ferrara, G. D'Addio</i>	
<b>Cervical Segmentation in Ultrasound Image Using Level-Set Algorithm</b>	25
<i>Amanina Iymia Binti Jeffree, Christina Pahl, Heamn Noori Abduljabbar, Ismaliza Ramli, Nur Illani Binti Aziz, Yin Mon Myint, Eko Supriyanto</i>	
<b>Rate of Oligonucleotides Transformation</b>	31
<i>Jelenka Savkovic-Stevanovic</i>	
<b>Classification of Hemiplegic Gait Using Kinetic Data on Ankle</b>	37
<i>Ubaldo Rafael Padilla Liendo</i>	
<b>Screening and Rehabilitation System for Patients with Parkinson's Disease</b>	45
<i>Oana Geman</i>	
<b>Risk Management for Medical Devices</b>	51
<i>Călin Corciovă, Marius Turnea, Radu Ciorap</i>	
<b>Sustainable Utilization of Health Care Technologies is Influenced by Organizational and Cultural Factors – A Case Study</b>	57
<i>Jane Paunkovic, Srdjan Zikic, Aleksandra Cvetkovic</i>	
<b>Evaluation of Functional Features of Immobilized Enzymes Using Electrochemical Label-Free Methods</b>	62
<i>Monica Florescu</i>	
<b>Synthesis and Characterization of Polyacrylamide Based Hydrogel Containing Magnesium Oxide Nanoparticles for Antibacterial Applications</b>	66
<i>Seyed Ali Asgharzadehahmadi, Ida Idayu Muhamad, Nozieana Khairuddin, Dayang Norulfairuz Abang Zaidel, Eko Supriyanto</i>	

<b>Biomechanical Conditions of Intramedullary Fixation in Comminuted Shaft Fractures. The Advantages of Flexible Locking</b>	72
<i>Iosif Şamotă, Adrian Burnariu, Radu Dan Necula, Ioan Szava</i>	
<b>Determination of Elasticity Module to Compression on the Prelevated Human Femurs Fragments and Evaluation of Relative Displacements with VIC Method in Osteosynthesis of Proximal Femur Fractures</b>	77
<i>Adrian Burnariu, Iosif Samota, Radu Necula, Ioan Szava</i>	
<b>Study on Improving the Motric Capacity to People with Disabilities with the Aim of Social Integration</b>	84
<i>Durbăcea-Bolovan Marian</i>	
<b>The Virtual Morphology and the Main Movements of the Human Neck Simulations Used for Car Crash Studies</b>	88
<i>St. Ciunel, D. L. Popa, N. Dumitru, M. Cliniciu</i>	
<b>Pulse Wave Velocity, Augmentation Index and Arterial Age in Students</b>	94
<i>Ioana Mozos, Serban Gligor</i>	
<b>Aspects of Hydrostatic Pressure Effects with Specific Therapeutical Implication for Hydrokinetotherapy</b>	100
<i>Tiberiu Tătaru, Camelia Plăstoi, Monica Bică, Georgian Badea-Miss</i>	
<b>Hydrokinetotherapy Contribution in Lower Limbs Mobility Recovery after Injuries as a Result of Practicing Sport Activities</b>	106
<i>Camelia Plăstoi, Tiberiu Tătaru, Monica Bică, Georgian Badea-Miss</i>	
<b>Influence of Gym Practising on Mobility, Strength and Balance in People with Psychiatric Disabilities</b>	112
<i>Durbăcea-Bolovan Marian</i>	
<b>Authors Index</b>	116

## Plenary Lecture 1

### Application of Induced Pluripotent Stem Cells to Neuronal Differentiation and Nerve Tissue Regeneration in Biomaterials



**Professor Yung-Chih Kuo**  
Department of Chemical Engineering  
National Chung Cheng University  
Republic of China  
E-mail: [chmyck@ccu.edu.tw](mailto:chmyck@ccu.edu.tw)

**Abstract:** The understanding of differentiating induced pluripotent stem (iPS) cells in biomaterials is an important issue in recent biotechnological development. The cultivation and differentiation of iPS cells in porous scaffolds is presented in this speech. The culture results in various hybrid biomaterials, including alginate-poly( $\gamma$ -glutamic acid) with surface CSRARKQAASIKVAVSADR, TATVHL peptide-grafted alginate-poly( $\gamma$ -glutamic acid), poly( $\epsilon$ -caprolactone)-poly( $\beta$ -hydroxybutyrate), heparinized poly( $\epsilon$ -caprolactone)-poly( $\beta$ -hydroxybutyrate), alginate-poly( $\gamma$ -glutamic acid), alginate-chitosan-gelatin with surface neuron growth factor, and chitin-chitosan-gelatin, will be presented. Physicochemical property and morphology of these scaffolding substrates, adhesion of iPS cells, cytotoxicity, flow cytometric diagram, and fluorescent image of construct staining against stage-specific embryonic surface antigen-1 and  $\beta$ III tubulin will also be discussed. The combination of iPS cells with porous biomedical scaffolds can be effective in inducing the neuronal differentiation and can enhance nerve regeneration for clinical trial.

**Brief Biography of the Speaker:** Dr. Yung-Chih Kuo is a professor at the Department of Chemical Engineering, National Chung Cheng University. His research interests are focused on biomaterials, drug delivery system, tissue engineering, blood-brain barrier, stem cell differentiation, nerve regeneration, cancer therapy, Alzheimer's disease treatment, biophysics, and colloid and interface science. In these fields, he has authored or coauthored over 100 SCI journal papers. He is an honor member of Phi Tau Phi Society, a life member in various academic Societies including American Nano Society, European Atherosclerosis Society, Asia-Pacific Chemical, Biological and Environmental Engineering Society, Asian Federation of Biotechnology, Asian Biotechnology Directory, Taiwanese Society of Biomedical Engineering, Chinese Institute of Engineers, Taiwan Institute of Chemical Engineers, Biochemical Engineering Society of Taiwan, and Taiwan Biomaterials and Controlled Release Society. He won Young Scholar Award in 2003 and Excellent Research Award in 2010. He is also an associate editor of J. Taiwan Inst. Chem. Engrs. (Impact factor 2.110) and an editorial board member in 6 journals, and has been invited as a manuscript reviewer for over 50 journals (top reviewer of the Journal of Physical Chemistry (American Chemical Society)), an external reviewer for academic awards, research grants, faculty recruitments and promotions, and financial support of hosting international symposiums, and an advisory board committeeman of international conferences and symposiums.

## Plenary Lecture 2

### Some Automatic Control Methods of Brain Temperature with Its Local Estimation for Clinical Hypothermia



**Professor Hidetoshi Wakamatsu**

Dept. Biomedical System Technology  
Graduate School of Health Sciences  
Tokyo Medical and Dental University  
Japan

E-mail: wakamatsu.bse@tmd.ac.jp

**Abstract:** Automatic control systems of brain hypothermia treatment of patients in cerebrovascular disorders are discussed for water/air body surface cooling, direct cooling of blood and catheter in a blood vessel, and selective brain cooling including the estimation of temperature of specific brain part in order to prevent secondary brain damage and avoid various side effects. A patient in ICU is regarded as a unity controlled system with inputs such as temperature of water/air into blanket, blood and catheter in a blood vessel and infusing Ringer's solution into jugular vein in realization of an appropriate temperature of specific brain part. Thus, brain temperature is well controlled in a long period according to the schedule by physicians and the state of patients with little influence due to various medical treatments during the therapeutic course under continuously internal and external change of environment including the effect of characteristics of individual patients. The effective algorithm of optimal-adaptive and fuzzy control laws inclusive of our clinically developed cooling and warming machines are discussed for therapeutic course to keep temperature of specific brain part of a patient within its appropriate range. The same concept is applied to the other cases of brain temperature control, where the estimation of intracerebral temperature distribution is basically studied. Hereby, a mathematical continuum model is applied, which reflects metabolic heat production and Fourier's heat conduction in a brain with necessary parameters obtained from various clinical models, while an intracerebral temperature distribution is clinically difficult to observe. That enables us to perform an experiment of heat conduction in a similar condition of human for the study of future brain hypothermia.

The concerning present method is not only for the control of biologically special mechanisms, but also for practically automatic long time control of state and function by approach of medicare using medicine and/or by surgery as structural changes, because conventional methods are sometimes not effective due to biological characteristics depending on individualities.

**Brief Biography of the Speaker:** Born on 15.Nov.1946, received his B.E. and M.E. degrees from Yokohama National University in 1970 and 1972, respectively. He received his Dr. of Eng. degree in 1984 from the University of Tokyo. He was a research Associate at the Institute for Medical and Dental Engineering from 1972-1986. Visiting Research Associate, Institute for Biocybernetics, University of Erlangen-Nuernberg, Germany 1973-1974. Associate Professor at Ashikaga Institute of Technology 1986-1988, Associate professor 1988-1991, Professor 1991-1992 at Fukui University and Professor, Faculty of Medicine, Professor, Graduate School of Health Care Sciences in 1992-2012, Professor Emeritus, Tokyo Medical and Dental University since 2012. In 1994 a visiting professor, Oregon State University and so on. From 2006 a general chair of Asia Pacific Conference on Control and Measurement. From 2010 Editor-in-chief, Journal of Automatic Control of Physiological State and Function (ACPSF).

## Plenary Lecture 3

### Arterial Stiffness - Current Issues



#### Associate Professor Ioana Mozos

Department of Functional Sciences - Pathophysiology  
“Victor Babes” University of Medicine and Pharmacy  
Timisoara, Romania  
E-mail: ioanamozos@umft.ro

**Abstract:** Arterial stiffness is a marker of vascular dysfunction, organ damage, subclinical atherosclerosis and cardiovascular risk. It is significantly associated with cardiovascular risk and mortality, aging and several diseases.

The session includes a description of the main factors and mechanisms associated with arterial stiffening in aging patients, hypertension, chronic kidney disease, diabetes mellitus and systemic autoimmune diseases.

The pulse wave velocity and augmentation index were identified as valuable, reliable, simple and inexpensive markers for arterial stiffness, suitable for clinical and epidemiological studies. Arterial stiffness can be assessed using several devices: oscillometric, tonometric or plethysmographic and can be measured at the systemic, regional or local level.

The most important adverse effect of arterial stiffening is an elevated left ventricular afterload, with left ventricular hypertrophy and impaired coronary perfusion.

**Brief Biography of the Speaker:** Dr I. Mozos graduated 1992 the “Victor Babes” University of Medicine and Pharmacy from Timisoara, Romania and holds a PhD from the same University. Since 1998, she served at the Pathophysiology Department as Assistant professor, Lecturer and, lately, as Associate Professor. Her research interests include: ventricular arrhythmia risk, QT interval, late ventricular potentials, body surface mapping, myocardial infarction, atherosclerosis, and hypertension. She published 31 full-text articles (6 in ISI journals), 61 ISI abstracts, 16 book-chapters, 4 books and has 11 citations.

## Authors Index

Abang Zaidel, D. N.	66	Gligor, S.	94
Abduljabbar, H. N.	25	Jeffree, A. I. B.	25
Accardo, A.	13	Khairuddin, N.	66
Asgharzadehahmadi, S. A.	66	Mozos, I.	94
Badea-Miss, G.	100, 106	Muhamad, I. I.	66
Bîcă, M.	100, 106	Myint, Y. M.	25
Binti Aziz, N. I.	25	Necula, R. D.	72, 77
Burnariu, A.	72, 77	Padilla Liendo, U. R.	37
Cesarelli, M.	13, 19	Pahl, C.	25
Ciorap, R.	51	Paunkovic, J.	57
Ciunel, S.	88	Plăstoi, C.	100, 106
Clinciu, M.	88	Popa, D. L.	88
Corbi, G.	13, 19	Ramli, I.	25
Corciovă, C.	51	Samota, I.	72, 77
Cvetkovic, A.	57	Savkovic-Stevanovic,	31
D'Addio, G.	13, 19	Supriyanto, E.	25, 66
Dumitru, N.	88	Szava, I.	72, 77
Durbăcea-Bolovan, M.	84, 112	Tătaru, T.	100, 106
Ferrara, N.	13, 19	Turnea, M.	51
Florescu, M.	62	Zikic, S.	57
Geman, O.	45		