1st International Symposium on Dynamical Biomarkers for Translational Medicine

National Central University, Jhongli, Taiwan (April 16-17, 2011)

"It was the best of times, it was the worst of times…" This could be the description of modern medicine today. On one hand, the technological advancements in biomedicine enable us to gather overwhelming amounts of information about our bodies, ranging from genomic and molecular information, all the way to images and physiological signals. On the other hand, the large amount of additional information does not seem to help us to curb the escalating health care costs we are facing.

One strategy to bring down the health care costs is by accelerating the *translation* of new knowledge from research laboratories to clinical practice, the so-called *translational medicine*. Successful implementation of translational medicine may lead to many innovative interventions, and ways for early diagnosis of diseases. A promising, but less recognized direction for this translation is to extract dynamical features hidden in the signals collected by new technologies.

Life is a dynamical process. Thus, it is not surprising that disease processes alter important aspects of healthy dynamics. These changes, therefore, could serve as useful dynamical signatures of the underlying disease states. In recent years, significant progress has been made in decoding these dynamical patterns and using them as biomarkers. The key challenge is that the analytical tools developed for the purpose of measuring *dynamical biomarkers* have to be physically meaningful, mathematically rigorous, and clinically relevant. To meet this challenge, researchers in multiple disciplines, from mathematics, physics, computer science, engineering, to biomedical sciences, have to work together. To this end, the National Science Council of Taiwan established a new *International Research-Intensive Center of Excellence: Center for Dynamical Biomarkers and Translational Medicine,* to explore this new research area. For the inaugural symposium, we bring leading interdisciplinary researchers together to discuss innovative approaches to utilize dynamical patterns in health and disease for better clinical care.

SPEAKERS (in the sequence of presentation)	
Gene Stanley	Member, U.S. National Academy of Sciences / University Professor, Boston University
Shih-Ann Chen	Director of Cardiology, Department of Internal Medicine, Taipei Veterans General Hospital
Paul Hoong-Chien Lee	University Chair Professor of Biophysics / Head and Professor, Graduate Institute of Systems Biology and Bioinformatics, National Central University
Norden E. Huang	Member, U.S. National Academy of Engineering / Academician, Academia Sinica / Director, Research Center for Adaptive Data Analysis (RCADA), National Central University
Kun Hu	Assistant Professor, Brigham and Women's Hospital (BWH) / Harvard Medical School
Albert C. C. Yang	Attending Physician, Chu-Tung Veterans Hospital, Hsinchu County / Lecturer, Division of Psychiatry, National Yang-Ming University
Chung-Kang Peng	Co-Director, Rey Institute, Beth Israel Deaconess Medical Center (BIDMC) / Harvard Medical School
Yi-Lwun Ho	Director, Heart Failure Center, National Taiwan University Hospital
Lian-Yu Lin	Attending Physician, Department of Cardiology, National Taiwan University Hospital
Bernard C. Jiang	Vice President and Chair Professor (Department of Industrial Engineering), Yuan Ze University
Jiann-Shing Shieh	Professor, Department of Mechanical Engineering , Yuan Ze University
Lewis A. Lipsitz	Director, Institute for Aging Research and Professor of Harvard Medical School
Peter Novak	Professor, Department of Neurology, University of Massachusetts Medical School
Hon-Man Liu	Director of Neuroimaging Specialist, National Taiwan University Hospital
Vera Novak	Director, SAFE Lab, BIDMC / Associate Professor of Gerontology, Harvard Medical School
Shuu-Jiun Wang	Professor, Department of Neurology, National Yang-Ming University School of Medicine / Deputy Head, Neurological Institute, Taipei Veterans General Hospital
Robert J. Thomas	Associate Professor of Medicine, BIDMC / Harvard Medical School
Mu-Chun Su	Head and Professor, Department of Computer Science and Information Engineering, National Central University
Terry Bo-Jau Kuo	Professor and Director, Institute of Brain Science, National Yang Ming University
SESSION CHAIRS	
Oscar K. Lee	Professor, Institute of Clinical Medicine, National Yang-Ming University (Session 1)
Wen-Yih Chen	Professor, Department of Chemical & Materials Engineering, National Central University (Session 2)
Shou-Zen Fan	Director of Anesthesiology, National Taiwan University Hospital (Session 3)
Matthew Huei-Ming Ma	Associate Professor, Department of Emergency Medicine, National Taiwan University Hospital (Session4)
Shih-Jen Tsai	Professor, Department of Psychiatry, Taipei Veterans General Hospital (Session 5)

Website: ① http://rcada.ncu.edu.tw/avtivities1.htm ② http://cdbtm.org/ Tel: 03-4258184 Miss Chiang
Venue: Grand Lecture Hall, National Central University, No.300, Jhongda Road, Jhongli, Taiwan

Saturday, April 16, 2011		
09:00-09:20AM	**Registration**	
09:20-09:30AM	**Opening Remarks**	President, NCU, Wei-Ling Chiang Norden E. Huang
	Session 1: Interdisciplinary Approach to Study Biomedical Problems (09:30-11:20AM) Session Chair: Oscar K. Lee	
09:30-10:20AM	**Keynote**: Can Physical Science Contribute to Solving Biomedical Challenges?	Gene Stanley
10:20-10:50AM	The Role of Signal Analysis in Treatment of Atrial Fibrillation	Shih-Ann Chen
10:50-11:20AM	Copy Number Variation in Genomes	Paul Hoong-Chien Lee
	Session 2: Adaptive Signal Analysis of Biomedical/Clinical Data (11:20-03:00PM) Session Chair: Wen-Yih Chen	
11:20-12:10PM	**Keynote**: My Pilgrimage in Data Analysis	Norden E. Huang
12:10-01:30PM	**Lunch**	
01:30-02:10PM	Assessing Dynamics of Cerebral Blood Flow Regulation Using Hilbert-Huang Transform	Kun Hu
02:10-02:40PM	Adaptive Analysis of Epidemiological Time Series	Albert C. C. Yang
02:40-03:00PM	**Break**	
	Session 3: Complexity and Dynamical Biomarkers (03:00-05:20PM) Session Chair: Shou-Zen Fan	
03:00-03:40PM	Dynamical Complexity and its Biomedical Applications	Chung-Kang Peng
03:40-04:10PM	The Prognostic Significance of Multiple-scale Entropy for the Patients with Systolic Heart failure: A Pilot Study	Yi-Lwun Ho
04:10-04:40PM	Detrended Fluctuation Analysis in the Prediction of Shockable Ventricular Fibrillation: An Automated External Defibrillator Wave Form Analysis	Lian-Yu Lin
04:40-05:00PM	Applications of Multi-scale Entropy (MSE) Analysis for Center of Pressure (COP) Data	Bernard C. Jiang
05:00-05:20PM	Applications of Entropy Analysis for Depth of Anaesthesia and Texture of Lymphomas	Jiann-Shing Shieh
Sunday, April 17, 2011		
09:00-09:20AM	**Registration**	
	Session 4: Cerebro-Vascular Disease and Aging (09:20-12:10PM) Session Chair: Matthew Huei-Ming Ma	
09:20-10:10AM	**Keynote**: Loss of Complexity in Aging: The Physiologic Basis of Frailty	Lewis A. Lipsitz
10:10-10:50AM	How Deep Brain Stimulation Drives the Brain: Possible Mechanisms	Peter Novak
10:50-11:00AM	**Break**	
11:00-11:30AM	Ultrasound Data Analysis in the Neck and Brain by Using a HHT Approach	Hon-Man Liu
11:30-12:10PM	Brain Aging is Accelerated in Diabetes	Vera Novak
12:10-01:30PM	**Lunch**	
	Session 5: Brain and Behavior (01:30-04:10PM) Session Chair: Shih-Jen Tsai	
01:30-02:10PM	Reversible Cerebral Vasoconstriction Syndrome	Shuu-Jiun Wang
02:10-02:50PM	The Biological Music and Cacophony of Sleep	Robert J. Thomas
02:50-03:00PM	**Break**	
03:00-03:30PM	A Visualization Map that Aids in Detecting Activated Regions in fMRI	Mu-Chun Su
03:30-04:00PM	Long-term and Real-time Monitoring of Cardiovascular Signals at Home	Terry Bo-Jau Kuo
04:00-04:10PM	**Closing Remarks**	Norden E. Huang Chung-Kang Peng