SIMULTANEOUS FITTING

Time (Days)

EPO (mU/mL) + Retics (%)

Sheep 3, Phlebotomy 1
Sheep 5, Phlebotomy 1

Hb (g/dL)

Advanced Methods of Physiological System Modeling

Biological Neural Network

Organized by
Vasilis Z. Marmarelis, Ph.D.

Supported by
Division of Biomedical Technology

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Saturday
April 20, 2002

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UNIVERSITY OF SOUTHERN CALIFORNIA

BIOMEDICAL SIMULATIONS RESOURCE (BMSR)
PREAMBLE

For many years, the “reductionist” view has dominated research in biological sciences, inadvertedly relegating the “integrative” or “systems” view to the status of a “poor relative”.

Regardless of the indisputable value of molecular and cellular biology (practiced in a reductionist manner) many thoughtful observers have felt that the value of systems biology/physiology is equally indisputable, and the two approaches must be equally supported and jointly nurtured. This balanced approach is the only way scientific progress can be secured in the long run.

There are signs of resurgence of interest in the systems view of biology/physiology, as the reductionist view approaches its natural limits of autonomous development. The scientific community begins to realize (again!) that understanding the components alone is not sufficient -- the functional properties of the integrated whole (system) is the means for achieving the goal of improved health care.

At the threshold of this new era of systems physiology, we have a critical role to play and a responsibility to meet the new challenges: advanced methods of analysis/modeling that treat the real problem under natural operating conditions (multi-variate, nonlinear, dynamic, nonstationary, stochastic, broadband, closed-loop).

We must also endeavor to collect more and better data for this purpose, as well as provide the requisite interpretation and means of utilization that allow rapid and effective transition to clinical practice.

The BMSR sponsors this Workshop as part of its continuing efforts to promote interaction among leading experts and facilitate the advent of this new era.

Vasilis Z. Marmarelis

April 2002
Workshop Schedule
Saturday, April 20, 2002

8:00  Registration & Continental Breakfast

8:45  Introductory Remarks

9:00  Signal Processing by the Gerbil Cochlea: What We Can See in Wiener Kernels
      Vasilis Z. Marmarelis
      University of Southern California

9:20  Searching for Connections in a Mammalian Sensory Pathway by Nonlinear Analysis of Spike Trains
      Edwin R. Lewis
      University of California, Berkeley

9:40  Pharmacodynamic Analysis of Erythropoietin
      Andrew S. French
      Dalhousie University, Halifax

10:00 Break

10:15 Separation of Spiky Transient Activity in EEG/MEG Data Using Multiresolution and Morphological Analysis
      Peter Veng-Pedersen
      University of Iowa

10:35 Population Coding in Hippocampal Neurons: The Necessity of Transfer Functions for Correct Short-Term Memory Performance
      Robert J. Sclabassi
      University of Pittsburgh

10:55 Parametric and Nonparametric Models of Presynaptic Nonlinearities of Hippocampal Pyramidal Neurons
      Robert E. Hampson
      Wake Forest University

11:15 Break

11:30 Detection and Control of Epileptic Seizures Using Artificial Neural Networks
      Theodore W. Berger
      University of Southern California

11:50 Localizing Brain Activity in Space and Time: Combining VEP and fMRI
      Berj L. Bardakjian
      University of Toronto

12:10 A Bayesian Framework for Sensory Adaptation
      Stanley A. Klein
      University of California, Berkeley

12:30 Lunch

2:30 Independent or Correlated Convergent Presynaptic Trains Embody Poisson or Cluster Point Processes
      Norberto M. Grzywacz
      University of Southern California

2:50 Nonlinear Modeling and Identification of Reflex Contributions to Joint Stiffness
      Jose P. Segundo
      University of California, Los Angeles

3:10 Separable Least Squares: A New Approach to the Identification of Nonlinear Block Structured Models
      Robert E. Kearney
      McGill University

3:30 Break

3:45 Synthesizing Response Sequences from the Kernel Series of Multi-Input Systems
      David T. Westwick
      University of Calgary

4:05 Applications of Parallel-Cascade System Identification
      Erich E. Sutter
      Smith-Kettlewell Eye Research Institute

4:25 Multi-Variate Nonlinear Dynamic Modeling of Closed-Loop Physiological Systems
      Edward D. Lipson
      Syracuse University

4:45 Discussion

6:00 Reception
# University of Southern California

**Biomedical Simulations Resource (BMSR)**

## Workshop on

**ADVANCED METHODS OF PHYSIOLOGICAL SYSTEM MODELING**

*Saturday, April 20, 2002*

Marina Beach Marriott

Marina del Rey, California

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