

BIOMEDICAL SIMULATIONS RESOURCE
UNIVERSITY OF SOUTHERN CALIFORNIA

Short Course On

MODELING AND PARAMETER ESTIMATION
IN RESPIRATORY CONTROL

May 21-22, 1989

Marina International Hotel
4200 Admiralty Way
Marina del Rey, California

Sponsored by

BIOMEDICAL RESEARCH TECHNOLOGY PROGRAM
DIVISION OF RESEARCH RESOURCES
NATIONAL INSTITUTES OF HEALTH

Chairman and Organizer:
Michael C.K. Khoo
Assistant Professor, Biomedical Engineering

Day 1, Sunday, May 21, 1989

7:45 Registration

8:30 Introduction

Michael Khoo
University of Southern California

Morning Session: **MODELING OF RESPIRATORY CONTROL DURING SLEEP**

Chair: M.C.K. Khoo

8:45 Forebrain mechanisms related to
respiratory patterning during
sleep-waking states

Ronald Harper
University of California, Los Angeles

9:20 Sleep effects on chemoresponsiveness
and breathing stability

Jerome Dempsey
University of Wisconsin, Madison

10:15 Sleep state and periodic ventilation

Allan Pack
University of Pennsylvania

10:50 Modeling of periodic breathing

Neil Cherniack
Case Western Reserve University

11:25 Modeling the effect of sleep state
on respiratory stability

Michael Khoo
University of Southern California

12:00 Lunch Break

Afternoon Session: **MODELING OF BREATHING PATTERN GENERATION AND
NEURAL CONTROL OF RESPIRATION**

Chair: S.M. Yamashiro

1:30 Introductory remarks

Stanley Yamashiro
University of Southern California

1:40 Current concepts in generation of
respiratory rhythm and pattern

Jack Feldman
University of California, Los Angeles

2:15 Phase resetting of the respiratory
oscillator - Experiments and models

Frederic Eldridge
University of North Carolina, Chapel Hill

2:50 Three-phase model of respiratory rhythm
generation

Eugene Bruce
Case Western Reserve University

3:40 Distinguishing random from chaotic
breathing pattern behavior

Stanley Yamashiro
University of Southern California

4:15 Modeling the relation between
respiratory neural and mechanical
outputs

Magdy Younes
University of Manitoba, Canada

4:50 Conceptual models of ventilatory
muscle recruitment and diaphragmatic
fatigue

Gary Sieck
University of Southern California

5:25 GENERAL DISCUSSION

Day 2, Monday, May 22, 1989

Morning Session: **MODELING OF RESPIRATORY CONTROL DURING EXERCISE**

Chair: F.S. Grodins

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| 8:30 | Introductory remarks | Fred Grodins
University of Southern California |
| 8:40 | Why and how one models exercise on a computer | William Yamamoto
George Washington University |
| 9:15 | Optimal regulation of ventilation during exercise | Chi-Sang Poon
Harvard-M.I.T. |
| 10:05 | Consequences of lung volume optimization on exercise hyperpnea | Stanley Yamashiro and Fred Grodins
University of Southern California |
| 10:40 | Experimental design and analysis for assessing gas exchange kinetics during exercise | George Swanson
University of Colorado, Denver |
| 11:15 | Analysis of exercise hyperpnea using dynamic work-rate forcing | Richard Casaburi
University of California, Los Angeles |
| 12:15 | Lunch Break | |

Afternoon Session: **MINIMAL MODELS AND PARAMETER ESTIMATION
IN RESPIRATORY CONTROL**

Chair: M.C.K. Khoo

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| 1:30 | Introductory remarks | Michael Khoo
University of Southern California |
| 1:40 | Parameter estimation theory for respiratory physiology | Donald Wiberg
University of California, Los Angeles |
| 2:15 | Application of the end-tidal forcing technique: Models and parameter estimation | Jacob DeGoede
University of Leiden, Netherlands |
| 2:50 | Dynamic models and parameter estimation: the hypoxic ventilatory response | Denham Ward
University of California, Los Angeles |
| 3:40 | Design and analysis of experiments for studying hypoxic-hypercapnic interactions in respiratory control | Peter Robbins
Oxford University, United Kingdom |
| 4:15 | Minimal modeling of respiratory control and its applications | David Carley
University of Illinois, Chicago |
| 4:50 | Estimation of chemoreflex gain from spontaneous breathing data | Michael Khoo
University of Southern California |
| 5:25 | GENERAL DISCUSSION | |

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