BASIC AND APPLIED HIGH PRESSURE BIOLOGY

EDITED BY

Peter B. Bennett and Robert E. Marquis

UNIVERSITY OF ROCHESTER PRESS

Table of Contents

Preface by Peter B. Bennett and Robert E. Marquis xi
Acknowledgements xii

CELLULAR AND MOLECULAR BIOLOGY

Cellular responses to Pressure

Invited Review by R E Marquis

High Pressure Microbiology 1

H J Moore et al Hyperbaric Superfusion Experiments

Using Synaptosomes Prepared from

Deep Frozen Brain 15

A M Zimmerman et al Pressure Induced Disruption of the

Cytoskeleton and the Protein Synthesizing Machinery 23

C L Haskin et al Human Osteosarcoma Cells Alter

Cytoskeletal and Adhesion Proteins in

Response to Physiological Levels of

Hydrostatic Pressure 31

S Chen et al Effect of Mild Hydrostatic Pressure on

Red Blood Cell Aggregability 41

Effects of Elevated Pressures of Inert R B Philp

and Narcotic Gases on Basal and

Stimulated Free Cystolic Calcium Levels

of Human Platelets 47

Hyperbaric Superfusion of H J Moore et al

Synaptosomes Using Heliox Saturated

Solutions 57

M Murayama Decompression-Inducible Platelet

Aggregation (DIPA) 63

Pressure-Induction of Diploid F Volckaert et al

> Gynogenesis in the Eggs of African Catfish (Clarias garepinus) 73

Molecular Responses to Pressure

Invited Review by K Heremans

Molecular Responses to Hydrostatic

Pressure 83

Molten-Globule and Collapsed States J L Silva

Under Pressure 99

Pressure Induced Salt-Bridge Rupture A A Ismail and

and Aggregate Dissociation of PTT Wong

Homopolypeptides 111

S F Scarlata The Use of High Pressure Spectroscopy

to Determine the Perturbations of Lipid Membranes Caused by Cholesterol

I Morishima Pressure Effects on Ligand Binding

Kinetics for Hemoproteins

V B Kostkin et al Physico-Chemical State of the Cell

Membranes After Effect of Increased

Pressure of the Medium

Y Taniguchi and

Pressure-Induced Reversible Changes in N Takeda Secondary Structure of Ribonuclease A:

An FT-IR Spectroscopic Study 147

Table of Contents vii

PRESSURE EFFECTS ON ANIMALS AND ANIMAL SYSTEMS

Nervous System

Invited Review by J C Rostain	
-------------------------------	--

Nervous System at High Pressure 157

B Gardette and Mice and Monkeys Deep Dives in Heliox,

C Gortan Hydrox and Hydreliox Gas

Mixtures—Synthesis of COMEX

"Hydra" Programme 173

J.J Risso and Effects of 5 MPa Heliox Pressure

M Requin Anaesthesia on Dopaminergic Pathway:

An In Vivo Neurochemical and Receptor

Study 185

D Schleifstein High Pressure Effects on Modulation of

-Attias et al Mammalian Spinal Monosynaptic

Reflex 193

P C Pearce et al Species Dependency of a Partial Agonist

at the GABA-Benzodiasepine Receptor Against the High Pressure Neurological

Syndrome (HPNS) 201

H Golan et al Quantal Analysis of Synaptic Currents

at High Pressure 213

N N Nalivaeva et al Adaptive Ganglioside Effect on Mouse

Motor Activity Under High He or O2

Pressure 221

S. A. Yu et al Nitrogen Narcosis and High Pressure

Nervous Syndrome: Experimental

Study in Rabbits 231

P Joanny et al Effect of High Helium Pressure upon

Lipoperoxidation in Rat Cerebral

Cortical Slices 237

J C Rostain et al Neurophysiological Studies in Macaca

Fascicularis During Exposures with

Breathing Mixtures Containing Hydrogen up to 1200 MSW 243

I T Demchenko et al Cerebral Blood Flow and HPNS of

Monkeys During Heliox and Trimix

Compression 253

Non-Nervous Systems

Invited Review by A G Macdonald

Homeostasis, Adaptation and High

Pressure 259

I T Demchenko et al Blood Flow and PO2 in the Brain With

Breathing Gaseous Mixtures of High

Density 277

K W Ranatunga et al Responses of Skeletal Muscle Fibres

Under High Pressure 283

A I Selivra et al The State of Mammals During Short

Exposure to Air at High Pressure to 7.1

MPa and Effects of Ascent to the

Surface 289

APPLICATIONS OF PRESSURE BIOLOGY

Applied Research and Development

Invited Review by J R Claybaugh

Renal and Endocrine Responses to the

High Pressure Environment 295

J Lorenz et al Latency Changes of Human Brainstem

Auditory Evoked Potentials Correlated with Vestibular and Motor HPNS and Time-Dependent Acclimation 313

P Giry et al Regulation of Ventilation in Hyperbaric

Environments: Effects of Gas and

Pressure 321

Table of Contents ix

J Tatsuno et al Progress in Heliox Saturation Dive from

33 ATA to 41 ATA and EEG

Investigation During Compression 331

Y C Lin et al Interspecies Conversion of Tables for

Decompression from 300 MSW

(UDT300) 341

J Lorenz et al Phenomenon and Implications of

Contribution of Cognitive Criteria to EEG-Theta Generation in Deep

Experimental Diving 353

Toxic and Beneficial Effects of Oxygen

Invited Review by S R Thom

Applications of Pressure Biology: Toxic and Beneficial Effects of Oxygen 365

D Mathieu et al Non-Invasive Assessment of

Vasoconstrictive Effects of Hyperoxygenation in Focal

Ischemia 375

Y Mano et al Hydroxyl Radicals (-OH) in Plasma

Under Hyperbaric Oxygen

Exposure 383

J A S Ross et al Pulmonary Alveolar-Capillary Changes

in Rats Exposed to 100% Oxygen 399

A Mayevsky et al Interrelations Between Hyperbaric

Oxygenation and Carbon Monoxide Intoxication in the Rat Brain In

Vivo 409

B G Laskaris and

R E Marquis

N₂O Killing of Escherichia coli is

Enhanced by Cytoplasmic

Acidification 421

J Zhang et al Cerebral Amino Acids and Hyperbaric

Oxygen Toxicity 431

T D Oury et al The Nitric Oxide Synthesis Inhibitor

N-ω-Nitro-L-Arginine Decreases

Mortality and Delays Seizure Onset in

Mice Exposed to Hyperbaric

Oxygen 437

W R Jackson A Preliminary Investigation of the

Impact of Treatment with Ambient Air

at 2 ATA Pressure 445

J H Rudell Diagnosis and Treatment of

Bends 451

H Urayama et al Effect of Hyperbaric Oxygen and

Cervical Sympathectomy upon Rat

Brain 457