

Oxidative Stress in Applied Basic Research and Clinical Practice

Stephen Bondy  
Kenneth Maiese  
*Editors*


# Aging and Age-Related Disorders

 Humana Press

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*Editors*

Stephen Bondy  
Department of Medicine  
Community & Environmental  
Medicine  
Center for Occupational  
& Environmental Health  
University of California, Irvine  
Room 320, Med Surge II  
Irvine  
CA 92697  
USA  
scbondy@uci.edu

Kenneth Maiese  
Department of Neurology  
and Neurosciences  
University of Medicine & Dentistry  
of New Jersey  
New Jersey Medical School  
Medical Science Building  
Room H-506  
185 South Orange Avenue  
Newark  
NJ 07101  
USA  
wntin75@yahoo.com  
maieseke@umdnj.edu

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# **Oxidative Stress in Applied Basic Research and Clinical Practice**

**Editor-in-Chief**

Donald Armstrong

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### **Note from the Editor-in-Chief**

All books in this series illustrate point-of-care testing and critically evaluate the potential of antioxidant supplementation in various medical disorders associated with oxidative stress. Future volumes will be updated as warranted by emerging new technology, or from studies reporting clinical trials.

Donald Armstrong  
Editor-in-Chief

# Preface

Some of the features that characterize the aging process include the gradual accumulation of damage to cells consequent to prolonged exposure to oxidative and inflammatory events over a lifetime. In addition to the accretion of lesions that often cannot be resolved, the intrinsic levels of pro-oxidant and aberrant immune responses are elevated with age. These adverse events are often further enhanced in the chronic and slow-progressing diseases that characterize the senescent brain and cardiovascular system. The incidence of some disorders such as Alzheimer's disease and vascular diseases becomes sufficiently prevalent in the extreme elderly so that these disorders can arguably be considered "normal." The chapters of this volume examine the interface between normal and pathologic aging and illustrate how this border can sometimes be diffuse. In organs with a very low rate of cell division such as cardiac and nervous tissues, the immune "memory" of early insults can be very prolonged. This can lead to poor reversibility of heightened inflammatory responses in such tissues, leading to oxidative stress and cell death. This volume explores and illustrates the processes underlying the means by which aging becomes increasingly associated with inappropriate levels of free radical activity and how this can serve as a platform for the progression of age-related diseases.

With these observations that oxidative stress plays an important role during aging and age-related disorders, it becomes imperative to gain further knowledge into the pathways that may regulate aging. This volume, *Aging and Age-Related Disorders*, relies on the knowledge of internationally recognized experts and provides chapters that examine the interactive relationship between systems in the body, such as the nervous system and vascular system, that can enhance or sometimes even limit cellular longevity. In addition, specific redox mechanisms in cells are discussed that ultimately influence the development of disorders, such as diabetes and cardiovascular insufficiency. With this, energy mechanisms that rely upon proper mitochondrial function are seen as key players during both normal physiologic processes and during age-related disorders. Another important aspect for aging that this volume describes is the close relationship between the systems of the body and exposure to environmental influences of oxidative stress that can affect both cellular senescence and destruction of a cell's nuclear DNA. What may be even more interesting to note is that these external stressors are not only confined to illnesses usually associated

with aging but also can be evident early in maturing and young individuals. As the editors, we are extremely enthusiastic about this volume and honored by the breadth of collaborators that have worked with us to highlight emerging knowledge and therapy for the understanding of the basis and development of age-related disorders.

Irvine, California  
Newark, New Jersey

Stephen Bondy  
Kenneth Maiese

# Contributors

**Madeleine Arseneault** INRS-Institut Armand-Frappier, Laval, QC, Canada

**Markus Bachschmid** Department of Medicine, Whitaker Cardiovascular Institute, Boston University, School of Medicine, Boston, MA, USA

**Martin R. Bennett** Division of Cardiovascular Medicine, University of Cambridge, Addenbrooke's Hospital, ACCI, Hills Road, Cambridge, CB2 2QQ, UK

**Stephen Bondy** Department of Medicine Community and Environmental Medicine, Center for Occupational and Environmental Health, University of California, Irvine, CA 92697, USA

**Consuelo Borrás** Department of Physiology, Faculty of Medicine, University of Valencia, Valencia 46010, Spain

**Loredana G. Bucciarelli** Division of Surgical Science, Department of Surgery, Columbia University, New York, NY 10032, USA

**Ufuk Çakatay** Central Laboratory of Clinical Biochemistry, Istanbul Faculty of Medicine, Istanbul University, Istanbul 34390, Turkey

**Giovanni G. Camici** Cardiovascular Research, Center for Integrative Human Physiology (ZIHP), Institute of Physiology, University of Zurich, Zurich, Switzerland

**Fernando Cardozo-Pelaez** Department of Biomedical and Pharmaceutical Sciences, Center for Environmental Health Sciences, University of Montana, Missoula, MT 59812, USA

**Yoichi Chiba** Kyoto Department of Pathology, Institute for Developmental Research, Aichi Human Service Center, Kasugai, Aichi, Japan

**Zhao Zhong Chong** Department of Neurology and Neurosciences, University of Medicine & Dentistry of New Jersey, Newark, NJ 07101, USA



**Andreas Daiber** Second Medical Clinic, Molecular Cardiology, Medical Center of the Johannes Gutenberg University, Mainz, Germany

**Kaushik M. Desai** Department of Pharmacology, College of Medicine, Cardiovascular Research Group (CVRG), University of Saskatchewan, Saskatoon, Canada

**N. D’Orazio** Human Nutrition, Biomedical Sciences, University “G. D’Annunzio,” Chieti, Italy

**Juan Gambini** Department of Physiology, Faculty of Medicine, University of Valencia, Valencia 46010, Spain

**Chandramallika Ghosh** Center for Devices and Radiological Health, Food and Drug Administration, Silver Spring, MD, USA

**Einat Gochman** Department of Anatomy and Cell Biology, Faculty of Medicine, Technion – Israel Institute of Technology, Haifa, Israel

**Mari Carmen Gómez-Cabrera** Department of Physiology, Faculty of Medicine, University of Valencia, Valencia 46010, Spain

**Isabelle Gorenne** Division of Cardiovascular Medicine, University of Cambridge, Addenbrooke’s Hospital, ACCI, Hills Road, Cambridge CB2 2QQ, UK

**Nigel H. Greig** Intramural Research Program, Laboratory of Neurosciences, National Institute of Aging, National Institutes of Health, Baltimore, MD, USA

**Elizabeth Head** Department of Molecular and Biomedical Pharmacology, Sanders-Brown Center on Aging, University of Kentucky, Lexington, KY 40536, USA

**Masanori Hosokawa** Department of Pathology, Institute for Developmental Research, Aichi Human Service Center, Kasugai, Aichi, Japan

**Jinling Hou** Division of Cellular and Molecular Cerebral Ischemia, Wayne State University School of Medicine, Detroit, MI 48201, USA

**Mitsuaki Isobe** Department of Cardiovascular Medicine, Tokyo Medical and Dental University, Tokyo, Japan

**Miklós Péter Kalapos** Theoretical Biology Research Group, Budapest, Hungary

**Joachim Kienhoefer** Biological Chemistry, University of Konstanz, Germany

**Debomoy K. Lahiri** Laboratory of Molecular Neurogenetics, Departments of Psychiatry, Institute of Psychiatric Research, Indianapolis, IN, USA; Medical and Molecular Genetics, Indiana University School of Medicine, Indianapolis, IN, USA

**Wan-Yu Lee** Department of Biochemistry and Molecular Biology, School of Life Sciences, National Yang-Ming University, Taipei 112, Taiwan

**Predrag Ljubuncic** Laboratory of Musculoskeletal Research, Department of Anatomy and Cell Biology, The Bruce Rappaport Faculty of Medicine, Technion – Israel Institute of Technology, Haifa, Israel

**Bernd van der Loo** University Hospital of the ETH Zürich, Switzerland

**Raul López-Grueso** Department of Physiology, Faculty of Medicine, University of Valencia, Valencia 46010, Spain

**Thomas F. Lüscher** Cardiovascular Research, Center for Integrative Human Physiology (ZIHP), Institute of Physiology, University of Zurich, Zurich, Switzerland; Department of Cardiology, Cardiovascular Center, University Hospital, Zurich, Switzerland

**Kenneth Maiese** Department of Neurology and Neurosciences, University of Medicine & Dentistry of New Jersey, New Jersey Medical School, Medical Science Building, Room H-506, 185 South Orange Avenue, Newark, NJ 07101, USA

**Ryuichi Morishita** Department of Clinical Gene Therapy, Osaka University, Osaka, Japan

**Ryozo Nagai** Department of Cardiovascular Medicine, University of Tokyo, Tokyo, Japan

**Dang Thanh Nam** INRS-Institut Armand-Frappier, Laval, QC, Canada

**Federico V. Pallardó** Department of Physiology, Faculty of Medicine, University of Valencia, Valencia 46010, Spain

**Kedar N. Prasad** Premier Micronutrient Corporation, Antioxidant Research Institute, Novato, CA 94949, USA

**Ravichandran Ramasamy** Division of Surgical Science, Department of Surgery, Columbia University, New York, NY 10032, USA

**Charles Ramassamy** INRS-Institut Armand-Frappier, Laval, QC, Canada; INAF, Laval University, QC, Canada; Department of Medical Biology, Faculty of Medicine, Laval University, Laval, QC, Canada

**Jane F. Reckelhoff** Department of Physiology and Biophysics, The Center for Excellence in Cardiovascular-Renal Research, University of Mississippi Medical Center, Jackson, MS 39216-4505, USA

**Abraham Z. Reznick** Department of Anatomy and Cell Biology, Faculty of Medicine, Technion – Israel Institute of Technology, Haifa, Israel

**G. Riccioni** Cardiology Unit, “San Camillo de Lellis” Hospital, Manfredonia, Foggia, Italy

**Jack T. Rogers** Department of Psychiatry-Neuroscience, Harvard Medical School, Massachusetts General Hospital (East), Charlestown, MA, USA

**V. Sblendorio** Unit of Pharmacology, Department of Pharmaco-Biology, Faculty of Pharmacy, University of Bari, Bari, Italy

**Ann Marie Schmidt** Division of Surgical Science, Department of Surgery, Columbia University, New York, NY 10032, USA

**Yan Chen Shang** Department of Neurology and Neurosciences, University of Medicine & Dentistry of New Jersey, Newark, NJ 07101, USA

**Edward H. Sharman** Department of Medicine, Center for Occupational and Environmental Health, University of California, Irvine, CA 92697, USA;  
Department of Neurology, University of California, Irvine, CA 92697, USA

**Yi Shi** Cardiovascular Research, Center for Integrative Human Physiology (ZIHP), Institute of Physiology, University of Zurich, Zurich, Switzerland

**Atsuyoshi Shimada** Kyoto Department of Pathology, Institute for Developmental Research, Aichi Human Service Center, Kasugai, Aichi, Japan

**Jun-ichi Suzuki** Department of Advanced Clinical Science and Therapeutics, Graduate School of Medicine, University of Tokyo, Tokyo, Japan

**Eric Thorin** Department of Surgery, Montreal Heart Institute, Université de Montréal, Montreal, Quebec, Canada

**Nathalie Thorin-Trescases** Montreal Heart Institute, Research Center, Université de Montréal, Montreal, Quebec, Canada

**Volker Ullrich** Biological Chemistry, University of Konstanz, Germany

**Julio Sartori Valinotti** Department of Physiology and Biophysics, The Center for Excellence in Cardiovascular-Renal Research, University of Mississippi Medical Center, Jackson, MS 39216-4505, USA

**Jose Viña** Department of Physiology, Faculty of Medicine, University of Valencia, Valencia 46010, Spain

**Chih-Hao Wang** Department of Biochemistry and Molecular Biology, School of Life Sciences, National Yang-Ming University, Taipei 112, Taiwan

**Yau-Huei Wei** Department of Biochemistry and Molecular Biology, School of Life Sciences, National Yang-Ming University, Taipei 112, Taiwan

**Philip Wenzel** Second Medical Clinic, Molecular Cardiology, Medical Center of the Johannes Gutenberg University, Mainz, Germany

**Lingyun Wu** Department of Pharmacology, College of Medicine, Cardiovascular Research Group (CVRG), University of Saskatchewan, Saskatoon, Canada

**Shi-Bei Wu** Department of Biochemistry and Molecular Biology, School of Life Sciences, National Yang-Ming University, Taipei 112, Taiwan

**Yu-Ting Wu** Department of Biochemistry and Molecular Biology, School of Life Sciences, National Yang-Ming University, Taipei 112, Taiwan

**Shi Fang Yan** Division of Surgical Science, Department of Surgery, Columbia University, New York, NY 10032, USA

**Licy Yanes** Department of Physiology and Biophysics, The Center for Excellence in Cardiovascular-Renal Research, University of Mississippi Medical Center, Jackson, MS 39216-4505, USA

**Nasser H. Zawia** Department of Biomedical and Pharmaceutical Sciences, University of Rhode Island, Kingston, RI, 02881, USA

**Rebecca Zee** Department of Medicine, Whitaker Cardiovascular Institute, Boston University, School of Medicine, Boston, MA, USA

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# **Part I**

## **General Aspects of Aging**



