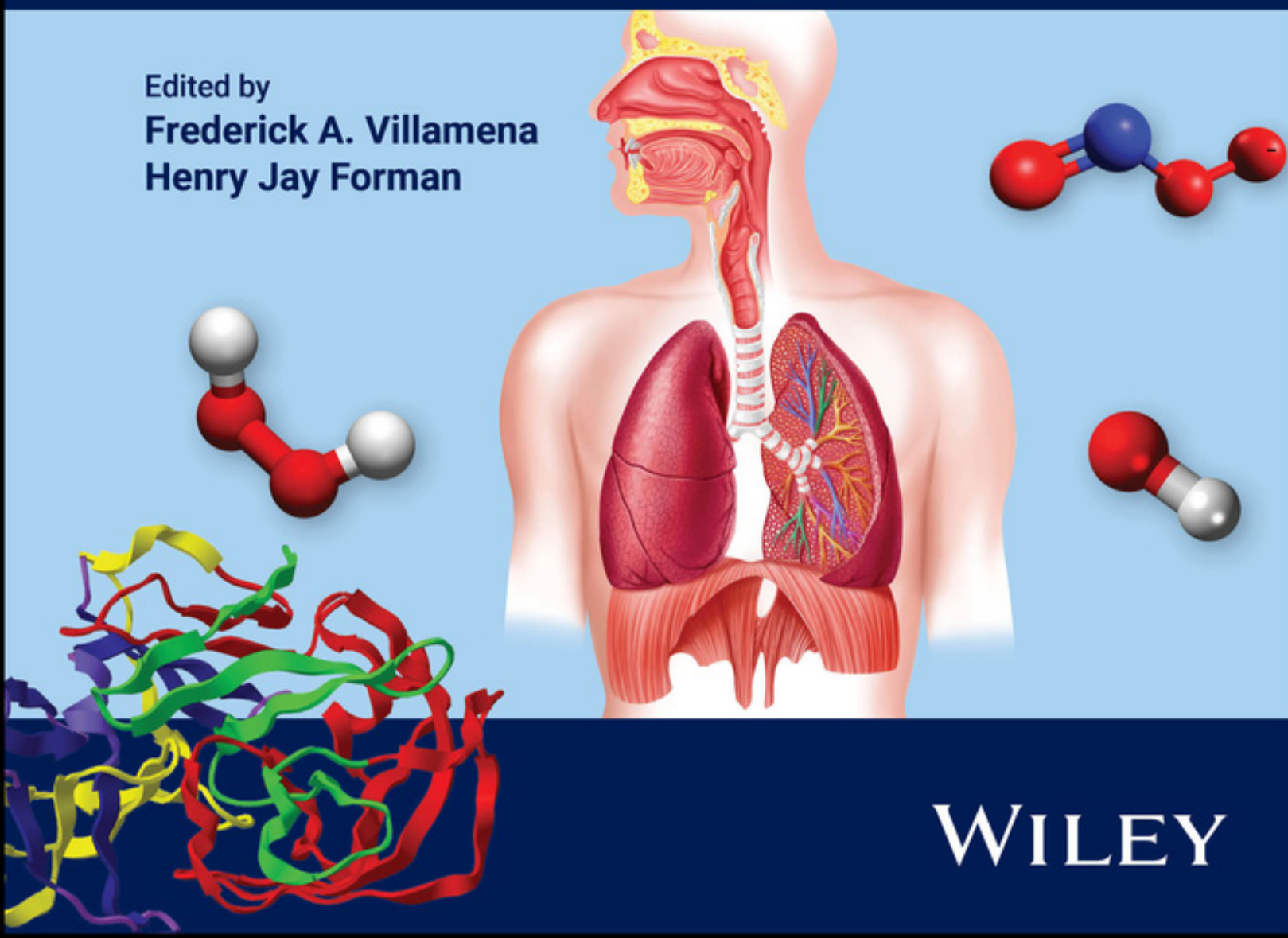


Second Edition

Molecular Basis of Oxidative Stress

Chemistry, Toxicology, Disease Pathogenesis,
Diagnosis, and Therapeutics

Edited by
Frederick A. Villamena
Henry Jay Forman



WILEY

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and Therapeutics**

Second Edition

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Matthew A. Reilly, PhD, is an associate professor in the Department of Biomedical Engineering and the Department of Ophthalmology and Visual Sciences at The Ohio State University. His academic background is in chemical and materials engineering, with BChE and MS degrees in chemical and materials engineering from the University of Dayton, followed by a PhD in energy, environmental, and chemical engineering from Washington University in St. Louis. His research interests are primarily in the area of ocular biomechanics related to aging in the ocular lens, as well as ocular trauma.

Dr Alejandra Romero is a Spanish postdoctoral researcher in Austria. She completed her PhD in pharmacological research and physiology in 2020, focusing on vascular

aging associated with metabolic syndromes. Afterward, she continued at the German Diabetes Centre, where she studied the role of senescence in the development of diabetes complications including nonalcoholic fatty liver disease or diabetic nephropathy and their causes. She is now continuing her research career at VAScage in collaboration with Oroboros Instruments to study mitochondrial respiration as a potential biomarker.

Annie K. Ryan, MS, is a PhD candidate at The Ohio State University in the Department of Biomedical Engineering. She received her bachelor's degree from Duquesne University in Biomedical Engineering in 2020. Her current research examines diagnostic visual electrophysiology, in the form of electroretinograms, and therapeutic approaches for traumatic optic neuropathy (TON).

Dr. Francisco J. Schopfer's academic and professional journey is marked by significant achievements, earning his BS in biology and PhD in biochemistry from the University of Buenos Aires. After postdoctoral training at the University of Alabama at Birmingham, he joined the Department of Pharmacology & Chemical Biology, University of Pittsburgh in 2006, becoming professor in 2023. Dr. Schopfer's research program is a testament to his expertise and innovation, focusing on basic lipid signaling and translating research findings into preclinical and clinical developments, specifically focusing on redox signaling, metabolism, and inflammation.

Martín Sosa was born in Canelones, Uruguay. He received his degree in biochemistry from Universidad de la República, in 2022. Martín is interested in the interaction between nitroalkene fatty acids and glutathione metabolism enzymes. During his undergraduate studies, he worked under Lucía Turell and Martina Steglich at the Enzymology Laboratory. His research is focused on the selenoenzyme thioredoxin glutathione reductase from the helminth parasite *Echinococcus granulosus* and its interaction with nitro-oleic acid. Currently, Martín is pursuing an MSc degree, studying the metabolism of nitro-conjugated linolenic acid by human glutathione transferases.

Martina Steglich is an assistant professor at the Enzymology Laboratory at the Universidad de la República, Uruguay. She earned her degree in biochemistry and her master's in chemistry from the Universidad de la República, Uruguay, and she is about to finish her PhD studies in chemistry with the supervision of Lucía Turell. In her PhD thesis, she is studying the role of cytosolic glutathione transferases in the reaction between nitrooleic acid and glutathione.

Katelyn E. Swindle-Reilly, PhD, is tenured faculty with appointments in biomedical engineering, chemical & biomolecular engineering, and ophthalmology & visual sciences at The Ohio State University. She has degrees in chemical engineering, with a BS from Georgia Institute of Technology, and MS and PhD from Washington University in St. Louis. She has managed multiple research projects from initial research phase through manufacturing and regulatory approval, including serving as chief technology officer of an ophthalmic startup company. Dr. Swindle-Reilly's research focuses on the design of polymeric biomaterials for soft tissue repair and drug delivery with focused applications in ophthalmology.

Lucía Turell is an associate professor at the Enzymology Laboratory at the Universidad de la República, Uruguay. She earned her degree in biochemistry and her PhD in chemistry from the Universidad de la República, Uruguay. Her research is focused on the interaction between thiols and electrophiles of biological and pharmacological interest. In particular, she is interested in unraveling the nitroalkene fatty acids reactions with thiols such as glutathione, and the role of glutathione transferases in these reactions. This is important considering the potential of these compounds as drugs for the treatment of several pathologies, since these reactions can affect their pharmacokinetics.

Murugesan Velayutham was born in Tamil Nadu, India, and received his PhD in physical chemistry (magnetic resonance spectroscopy) from the Indian Institute of Technology Madras, Chennai, India. He did his postdoctoral training at North Carolina State University and Johns Hopkins University. Currently, he is a research scientist at the Davis Heart Lung Research Institute, The Ohio State University College of Medicine. His research interests have been focused on understanding the roles of free radicals/reactive oxygen species and nitric oxide in biological systems as well as measuring and mapping molecular oxygen levels and redox state in *in vitro* and *in vivo* systems using EPR spectroscopy/oximetry/imaging techniques. He is a co-founding member of the Asia-Pacific EPR/ESR Society and a member of The International EPR Society.

Frederick A. Villamena was born in Manila, Philippines, and earned his bachelor of science degree in chemistry from the University of Santo Tomas. He then obtained his doctorate of philosophy in physical organic chemistry from Georgetown University. After completing postdoctoral fellowships with ORISE, CNRS, and NIH-NRSA, he joined the pharmacology department and

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Giulio Vistoli is currently full professor in medicinal chemistry at the University of Milan. Since 2022, he is coordinator of the PhD course in pharmaceutical sciences at the University of Milan. His expertise involves the computational approaches as applied to pharmaceutical sciences in their broadest sense ranging from homology modeling and virtual screening to ADME predictions or drug delivery optimization. His recent research focuses on the development of new docking approaches to be used in both correlative analyses and virtual screening campaigns, as well as in the employment of artificial intelligence approaches to predict the drug metabolism and toxicity. He is co-author of about 220 scientific publications.

Peter G. Wells was born in Ontario, Canada. He obtained his PharmD at the University of Minnesota, followed by a postdoctoral fellowship at Vanderbilt University, before becoming a professor in the faculties of medicine and pharmacy at the University of Toronto. His research centers on the role of oxidative and antioxidative pathways in determining risk of neurodegenerative diseases and birth defects. His chapter contribution was coauthored by Annmarie Ramkissoon, Aaron Shapiro, and Margaret Loniewska. Dr. Annmarie Ramkissoon received her PhD from the University of Toronto with a focus on drug bioactivation and antioxidative responses in neurodegeneration. She is currently a postdoctoral fellow at the Cincinnati Children's Hospital Medical Center. Aaron Shapiro received his BSc from the University of Guelph and an MSc from the University of Northern British Columbia. His doctoral research focuses on the role of xenobiotic-initiated oxidative stress and DNA repair in the formation of neurodevelopmental deficits. Margaret Loniewska received her BSc from Carleton University. Her doctoral research focuses on glucose-6-phosphate dehydrogenase in neurodegeneration.

Dr Jordan Younes is a recently graduated junior doctor at Western Health in Melbourne. He undertook his medical studies at Deakin University where he made

the Dean's list for academic excellence. He has a keen interest in acute care and improving hospital outcomes for those with chronic diseases such as diabetes.

Jay L. Zweier was born in Baltimore, MD, and received his baccalaureate degrees in physics and mathematics from Brandeis University. After PhD training in biophysics at the Albert Einstein College of Medicine, he pursued medical training at the University of Maryland, School of Medicine, and received his MD in 1980. Subsequently he completed his residency in internal medicine followed by his cardiology fellowship at Johns Hopkins. In 1987, he joined the faculty of The Johns Hopkins University School of Medicine. In 1998, he was promoted to the rank of professor and in 2000

appointed as chief of cardiology research, at the Johns Hopkins Bayview Campus. He was elected as a fellow in the American College of Cardiology in 1995 and the American Society of Clinical Investigation in 1994. In July 2002, Dr. Zweier joined The Ohio State University College of Medicine as director of the Davis Heart & Lung Research Institute and the John H. and Mildred C. Lumley chair in medicine. Dr. Zweier is currently professor of internal medicine, physiology, and biochemistry, director of the Center for Environmental and Smoking Induced Disease and the Ischemia and Metabolism Program of the Davis Heart & Lung Research Institute. He has published over 400 peer reviewed manuscripts in the fields of cardiovascular research, free radical biology, and magnetic resonance.

