Immune Dysfunction and Immunotherapy in Heart Disease

EDITED BY

Ronald Ross Watson
Department of Nutritional Sciences, The University of Arizona; and
Sarver Heart Center, College of Medicine, The University of Arizona; and
Division of Health Promotion Sciences, Mel and Enid Zuckerman Arizona College
of Public Health, The University of Arizona
Tucson, AZ
USA

Douglas F. Larson
Sarver Heart Center
College of Medicine
The University of Arizona
Tucson, AZ
USA
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Ronald Ross Watson
Department of Nutritional Sciences, The University of Arizona; and
Sarver Heart Center, College of Medicine, The University of Arizona; and
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Tucson, AZ
USA

Douglas F. Larson
Sarver Heart Center
College of Medicine
The University of Arizona
Tucson, AZ
USA
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Mohsen Araghi-Niknam, MA, PhD  
Sr. Clinical Trial Leader  
Cardiac Rhythm Disease Management  
Minneapolis, MN  
USA

Claire Arnaud, PharmD, PhD  
Laboratory HP2  
University of Grenoble  
INSERM ERI 0017  
Grenoble  
France

Christian Assad-Kottner, MD  
The Methodist DeBakey Heart Center  
The Methodist Hospital  
Houston, TX  
USA

Pål Aukrust, MD, PhD  
Research Institute for Internal Medicine  
University of Oslo; and  
Section of Clinical Immunology and Infectious  
Rikshospitalet, University of Oslo  
Oslo  
Norway

Giuseppe Barbaro, MD  
Cardiology Unit  
Department of Medical Pathophysiology  
University “La Sapienza”  
Rome  
Italy

John Anthony Bauer, PhD  
Director, Center for Cardiovascular Medicine  
Columbus Childrens Research Institute; and  
Sections of Neonatology and Cardiology  
Columbus Children’s Hospital  
Columbus, OH  
USA

Zofia T. Bilińska, MD, PhD  
Associate Professor of Cardiology  
Consultant, 1st Department of Coronary Artery Disease  
Institute of Cardiology  
Alpejsja 42  
Warsaw  
Poland

Simin Bolouchi-Vaghefi, PhD, CNS, LNutr.  
Emeritus Professor of Nutrition  
University of North Florida College of Health  
Jacksonville, FL  
USA

A. E. Bolton, PhD, DSc  
Chief Scientific Officer  
Vasogen Ireland Ltd.  
Santry  
Dublin 9  
Ireland

Charles E. Canter, MD  
Professor of Pediatrics  
Washington University of School of Medicine; and  
Medical Director, Heart Transplant Program  
St. Louis Children’s Hospital  
St. Louis, MO  
USA

W. L. Chan, PhD, DSc  
Biochemical Pharmacology  
William Harvey Research Institute  
John Vane Science Centre  
Queen Mary University of London  
Charterhouse Square  
London  
UK

David Chen, MD  
The Methodist DeBakey Heart Center  
The Methodist Hospital  
Houston, TX  
USA
Yinhong Chen, PhD  
Scientist  
Geron Corporation  
Menlo Park, CA  
USA

Jonathan Choy, PhD  
Boyer Center for Molecular Medicine  
Yale University  
New Haven  
Connecticut  
USA

Jack Copeland, MD  
Department of Surgery  
University of Arizona  
USA

Francisco J. Cordova, MD  
The Methodist DeBakey Heart Center  
The Methodist Hospital  
Houston, TX  
USA

Jan Kristian Damås, MD, PhD  
Research Institute for Internal Medicine  
Rikshospitalet  
University of Oslo  
Oslo  
Norway

Betsy B. Dokken, PhD, NP  
Departments of Medicine and Surgery  
University of Arizona  
Tucson, AZ  
USA

Jos Domen, PhD  
Department of Surgery  
University of Arizona  
Tucson, AZ  
USA

Urs Eriksson, MD  
Departments of Internal Medicine  
University Hospital  
Petersgraben 4  
CH-4031 Basle  
Switzerland

Timothy F. Feltes, MD  
Center for Cardiovascular Medicine  
Columbus Childrens Research Institute; and  
Chief Section of Pediatric Cardiology  
Columbus Children’s Hospital  
Columbus, OH  
USA

Julia R. Gage, PhD  
Kendle International, Inc.  
Thousand Oaks, CA  
USA

Amy Galena, MSH, RD  
Clinical Dietitian  
Mayo Clinic  
Jacksonville  
USA

Kimbery Gandy, MD, PhD  
Assistant Professor  
Department of Surgery  
University of Arizona  
Tucson, AZ  
USA

Mohammad Abraham Kazemizadeh Gol  
School of Medicine  
University of Minnesota  
Minneapolis, MN  
USA

Joseph D. Gold, PhD  
Director of Stem Cell Biology and Research Operations  
Geron Corporation  
Menlo Park, CA  
USA

Christina Grothusen, MD  
Department of Cardiology and Angiology  
Medical School of Hannover  
Carl-Neuberg Str. 1  
30625 Hannover  
Germany

Lars Gullestad, MD, PhD  
Senior Consultant  
Department of Cardiology  
University of Oslo  
Oslo  
Norway

Timothy M. Hoffman, MD  
Center for Cardiovascular Medicine  
Columbus Childrens Research Institute; and  
Medical Director, Pediatric Heart Transplant/Heart Failure Program  
Columbus Children’s Hospital  
Columbus, OH  
USA
Palle Holmstrup, DDS, PhD, Dr.Odont., Odont.Dr. (h.c.)  
Professor and Chairman  
Department of Periodontology  
School of Dentistry  
Faculty of Health Sciences  
University of Copenhagen  
Denmark

Katherine Horak, PhD  
Server Heart Center  
The University of Arizona  
Tucson, AZ  
USA

Mandar S. Joshi, PhD  
Center for Cardiovascular Medicine  
Columbus Childrens Research Institute  
Columbus, OH  
USA

Ismail Laher, PhD  
Department of Pharmacology and Therapeutics  
Faculty of Medicine  
University of British Columbia  
Vancouver  
BC, Canada

Douglas F. Larson  
Server Heart Center  
College of Medicine  
The University of Arizona  
Tucson, AZ  
USA

Carl V. Leier, MD  
The James W. Overstreet Professor of Medicine and Pharmacology  
Division of Cardiovascular Medicine  
College of Medicine and Public Health  
The Ohio State University  
Columbus, OH  
USA

Wendy A. Luce, MD  
Center for Cardiovascular Medicine  
Columbus Childrens Research Institute; and  
Section of Neonatology  
Columbus Children's Hospital  
Columbus, OH  
USA

François Mach, MD, PhD  
Division of Cardiology  
Foundation for Medical Research  
Faculty of Medicine  
Geneva University Hospital  
Switzerland

A. Mandel, MD, PhD, DSc  
Director of Fundamental & Medical Research  
Vasogen Inc.  
Mississauga  
Ontario  
Canada

Paul F. McDonagh, PhD  
Professor of Surgery, Physiology and Nutrition  
Allan C. Hudson and Helen Lovaas Endowed Chair of Vascular Biology and Coagulation  
The Server Heart Center  
University of Arizona  
Tucson, AZ  
USA

Bruce M. McManus, MD, PhD, FRSC  
Director, The James Hogg iCAPTURE Centre  
Scientific Director, The Heart Centre  
Providence Health Care – University of British Columbia  
Vancouver, BC  
Canada

Farzad Moien-Afshari, MD, PhD  
Department of Pharmacology and Therapeutics  
Faculty of Medicine  
University of British Columbia  
Vancouver  
BC, Canada

James P. Morgan, MD, PhD  
Chief, Division of Cardiovascular Medicine  
Department of Medicine  
Caritas St. Elizabeth's Medical Center and Caritas  
Carney Hospital and  
Director, Cardiovascular Center Caritas Christi  
Healthcare System  
Boston, MA  
USA

Samira Najmaii, MT (ASCP), MS  
Server Heart Center  
The University of Arizona  
Tucson, AZ  
USA

Sota Omoigui, MD  
Division of Inflammation and Pain Medicine  
LA Pain Clinic  
Hawthorne, CA  
USA

Carlos Orrego, MD  
The Methodist DeBakey Heart Center  
The Methodist Hospital  
Houston, TX  
USA
Oana Madalina Petrescu, MD
Fellow—Cardiovascular Medicine
Department of Medicine
Caritas St. Elizabeth's Medical Center
Boston
USA

Catherine A. Priest, PhD
Associate Director of Transplantation Sciences
Geron Corporation
Menlo Park, CA
USA

Witold Rużyło, MD, FESC
Professor of Cardiology
Head, 1st Department of Coronary Artery Disease and Cardiac Catheterization Laboratory
Institute of Cardiology
Alpejsja 42
04-628 Warsaw
Poland

Bernhard Schieffer, MD
Associate Professor of Medicine
Department of Cardiology and Angiology
Medical School of Hannover
Carl-Neuberg Strasse 1
30625 Hannover
Germany

Guillermo Torre-Amione, MD, PhD, FACC
The Methodist DeBakey Heart Center
The Methodist Hospital
Houston, TX
USA

Donna. L. Vredevoe, PhD
University of California, Los Angeles
School of Nursing
Los Angeles, CA
USA

Ronald Ross Watson, PhD
Department of Nutritional Sciences, The University of Arizona; and Sarver Heart Center, College of Medicine, The University of Arizona; and Division of Health Promotion Sciences, Mel and Enid Zuckerman Arizona College of Public Health, The University of Arizona
Tucson, AZ
USA

Bo Yang, MD, PhD
Department of Surgery
University of Arizona
Tuscon, AZ
USA

Arne Yndestad, PhD
Research Institute for Internal Medicine
University of Oslo
N-0027 Oslo
Norway

Qianli Yu, MD, PhD
Sarver Heart Center
The University of Arizona
Tucson, AZ
USA

Jin Zhang, PhD
Scientist
Iams Technical Center, The Proctor and Gamble Company
Lewisburg, OH
USA

Sherma Zibadi, MD
Department of Nutritional Sciences
The University of Arizona
Tucson, AZ
USA
The pathophysiology of cardiovascular disease and current therapeutics designed for disease treatment are primarily based on autonomic nervous system and endocrine pathways. Yet, there are numerous recent reports describing that the immune system may be a fundamental basis of cardiovascular disease processes which is supported by the evidence that immunomodulatory therapeutics have demonstrated therapeutic efficacy. This text systematically describes cardiovascular disease conditions where the immune system appears to play a pivotal role and provides evidence that selective modulation of the immune system can alter the disease processes. This text provides the first compiled evidence that there exists the possibility that the immune system may be a third pathway that directly affects cardiovascular structure and function beyond that of the neuro-endocrine pathways.

The overall goal of this book is to relate various immune disorders caused by toxicants, autoimmune conditions, aging, HIV, and metabolic disorders with cardiovascular pathology and present the current state-of-the-art immune based therapeutics to reverse the pathology. Therefore researchers reviewed the following areas:

I. Immune dysfunction and its role in the enzymatic changes leading to cardiac remodeling
II. Immune modulation by transplantation drugs and their cardiotoxic side effects
III. Prevention of cytokine dysregulation in cardiac therapy
IV. Immunosuppression promoting cardiac damage by opportunistic pathogens
V. Immunoregulatory treatments and their role in heart health
About the Editors

Ronald R. Watson, PhD, has edited 65 books, including four on the effects of various dietary nutrients in heart disease. He initiated and directed the Specialized Alcohol Research Center at the University of Arizona College of Medicine for six years. The main theme of this National Institute of Alcohol Abuse and Alcoholism (NIAAA) Center grant was to understand the role of ethanol-induced immunosuppression with increased oxidation and nutrient loss on disease and disease resistance in animals. For 8 years he directed with Douglas F. Larson several NIH grants studying the effects of retroviral-induced immune dysfunction on cardiac structure and function in a model of AIDS.

Dr. Watson is a member of several national and international societies concerned with nutrition, immunology, and cancer research. He has directed a program studying ways to slow aging using nutritional supplements, funded by the Wallace Genetics Foundation for 30 years. Currently, he is the co-principal investigator on an NIH grant studying the role of immune dysfunction to exacerbate heart disease. He has recently completed studies using compleetary and alternative medicines in clinical trials. Dr. Watson and Dr. Larson are co principal investigators on an NIH grant from the National Center on Complementary and Alternative Medicine to study cytokine dysregulation in cardiac remodeling.

Dr. Watson attended the University of Idaho, but graduated from Brigham Young University in Provo, UT, with a degree in chemistry in 1966. He completed his PhD degree in 1971 in biochemistry at Michigan State University. His postdoctoral education was completed at the Harvard School of Public Health in Nutrition and Microbiology, including a two-year postdoctoral research experience in immunology. He was Assistant Professor of Immunology and did research at the University of Mississippi Medical Center in Jackson from 1973 to 1974. He was an Assistant Professor of Microbiology and Immunology at the Indiana University Medical School from 1974 to 1978 and an Associate Professor at Purdue University in the Department of Food and Nutrition from 1978 to 1982. In 1982, he joined the faculty at the University of Arizona in the Department of Family and Community Medicine. He is also a professor in the University of Arizona's College of Public Health. He has published 450 research papers and review chapters.

Dr. Larson has had a research focus in the area of immune dysfunction and cardiac function for a number of years. He has performed research related to immunosuppressive therapies for 20 years in the laboratory and in the clinic. As a member of the heart and lung transplantation team at the University of Arizona, he has seen the relationship of immunosuppression between the development of diastolic dysfunction and hypertension. As a senior research scientist in a large pharmaceutical company in Basel, Switzerland, he was charged with the development of a newer generation of immunosuppressants for use in transplantation and autoimmunity. The key experiment that led to Dr Larson's research motivation to define the relationship between the immune system and cardiac remodeling was the observation that the infarcted site in the SCID mouse heart does not remodel. Subsequently, Dr Larson has applied selective immunomodulatory agents to demonstrate that the T-lymphocyte provides a significant control in the cardiac extracellular matrix remodeling. Furthermore, he has shown that cardiovascular pathological conditions can be adaptively transferred with purified T-lymphocytes—further emphasizing the
role of the immune system in cardiac diseases. More specifically, since the current therapeutic armamentarium for systolic heart failure is considered palliative and there are no approved FDA therapeutics for diastolic heart failure, Dr Larson’s primary investigational goal has been to develop immunomodulatory therapeutics for the treatment of heart failure.