Cardiorespiratory Fitness in Cardiometabolic Diseases

Peter Kokkinos • Puneet Narayan
Editors

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Prevention and Management in Clinical Practice

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Editors
Peter Kokkinos
Veterans Affairs Medical Center
Georgetown University School of Medicine
Rutgers University Department of Kinesiology and Health
University of South Carolina Arnold School of Public Health
George Washington University School of Medicine and Health Sciences
Washington
DC
USA

Puneet Narayan
Clinical Research Institute of Northern Virginia
Burke
VA
USA

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This book is dedicated to Evangeline, spouse, friend, and mother, and to my sons Nicholas and John Peter, who make life a wonderful journey!

Peter Kokkinos

This book is dedicated to my Parents for instilling us with their values of hard work, dedication and sacrifice with endless support and love.

Puneet Narayan

Preface

Physical activity is the most underutilized medical intervention in prevention and management of cardiovascular disease. This despite the fact that it is inexpensive, relatively low risk, and easily incorporated in most lifestyles. The link between physical activity and health was recognized by Hippocrates in the fifth century BC. Hippocrates stated that a sedentary lifestyle renders the body liable to disease and premature aging. Conversely, moderate physical activity promotes health and slows the aging process. Scientific scrutiny of this concept began in the early 1950s with the landmark work of Morris and coworkers reporting that mortality rates were approximately 50% lower in civil servants with jobs requiring more physical activity versus those serving in more sedentary positions. For more than half a century now, a plethora of evidence has accumulated from large, long-term epidemiological studies that support a strong, inverse, and independent association between physical activity, cardiorespiratory fitness, and cardiovascular and overall mortality in apparently healthy individuals and in patients with documented chronic disease. In addition, similar associations have been observed between incidence of chronic disease and fitness.

The exercise-related health benefits are related in part to favorable modulations in both the traditional and novel cardiovascular risk factors that have been observed with increased physical activity patterns or structured exercise programs. The primary reason for this protection is the innate capacity of the body to adapt to an imposed demand. Specifically, the increased energy requirements during physical activity (work) place a greater demand on all biological systems involved to meet this demand. Consequently, acute changes occur to meet the increased metabolic demand. Moreover, if the demand (exercise) is adequate and chronic (over several weeks), the adaptations made are also chronic and designed to make the systems involved in the task more efficient and, ultimately, more resilient to injury and disease. Specific mechanisms modulating these adaptations and the protection against disease and death have also been defined in recent years.

The overwhelming evidence on the link between cardiorespiratory fitness, chronic diseases, and mortality risk has shifted attention of the medical profession to seriously consider fitness status as part of the patient's medical profile and to encourage patients to increase their daily physical activity.

Accordingly, this book provides a comprehensive overview on exercise-related cellular, cardiovascular, and metabolic chronic adaptations in healthy and diseased populations and, in addition, an extensive review of the literature on the preventive and therapeutic aspects of physical activity, exercise, and cardiorespiratory fitness on cardiovascular risk factors and cardiometabolic diseases.

Washington, DC, USA — Peter Kokkinos
Burke, VA, USA — Puneet Narayan

Contents

Contributors

Elizabeth Anderson Department of Exercise Science, Norman J. Arnold School of Public Health, University of South Carolina, Columbia, SC, USA

Mark A. Chapman Department of Physiology and Pharmacology, Karolinska Institutet, Solna, Sweden

Department of General Engineering, University of San Diego, San Diego, CA, USA

Costas Chryssanthopoulos Department of Physiology, Medical School, National and Kapodistrian University of Athens, Athens, Greece

Louise de Lannoy Queen's University, School of Kinesiology and Health Studies, Kingston, ON, Canada

George Dimitriadis Second Department of Internal Medicine-Research Institute and Diabetes Center, "Attikon" University Hospital, Medical School, National and Kapodistrian University of Athens, Athens, Greece

Cleyton C. Domingues Department of Medicine, George Washington University, Washington, DC, USA

Michael Doumas 2nd Propedeutic Department Internal Medicine, Hippokration Hospital, Thessaloniki, Greece

J. Larry Durstine Department of Exercise Science, Norman J. Arnold School of Public Health, University of South Carolina, Columbia, SC, USA

Jonathan K. Ehrman Department of Internal Medicine, Division of Cardiovascular Medicine, Preventive Cardiology, Henry Ford Medical Group, Detroit, MI, USA

Charles Faselis Veterans Affairs Medical Center, Washington, DC, USA

Barry A. Franklin Preventive Cardiology and Cardiac Rehabilitation, Department of Cardiovascular Diseases, Beaumont Health and Wellness Center, Royal Oak, MI, USA

Oakland University William Beaumont School of Medicine, Rochester, MI, USA

Shruti M. Gandhi Department of Endocrinology, Washington D.C. VA Medical Center, Washington, DC, USA

Eva-Karin Gidlund Department of Physiology and Pharmacology, Karolinska Institutet, Solna, Sweden

Steven P. Hooker College of Health and Human Services, San Diego, CA, USA

Konstantinos P. Imprialos 2nd Propedeutic Department Internal Medicine, Hippokration Hospital, Thessaloniki, Greece

Sergey Kachur Graduate Medical Education, Ocala Regional Medical Center, Ocala, FL, USA

Peter Kokkinos Veterans Affairs Medical Center, Georgetown University School of Medicine, Rutgers University Department of Kinesiology and Health, University of South Carolina Arnold School of Public Health, George Washington University School of Medicine and Health Sciences, Washington, DC, USA

Michael Koutsilieris Department of Physiology, Medical School, National and Kapodistrian University of Athens, Athens, Greece

Anubhav Kumar Clinical Research Institute of Northern Virginia, Burke, VA, USA

Nabanita Kundu Department of Medicine, George Washington University, Washington, DC, USA

Raj Lakshman Veterans Affairs Medical Center and George Washington University School of Medicine, Washington, DC, USA

Michael J. LaMonte Department of Epidemiology and Environmental Health, University at Buffalo – SUNY, School of Public Health, Buffalo, NY, USA

Carl J. Lavie Department of Cardiology, Ochsner Medical Center, New Orleans, LA, USA

Hayley V. MacDonald Department of Kinesiology, The University of Alabama, Tuscaloosa, AL, USA

Maria Maridaki Department of Sports Medicine & Biology of Physical Activity, Faculty of Physical Education and Sport Science, National and Kapodistrian University of Athens, Athens, Greece

Mary M. McDermott Northwestern University, General Internal Medicine and Geriatrics, Chicago, IL, USA

Michelle N. McDonnell School of Health Sciences, University of South Australia, Adelaide, SA, Australia

Jonathan Myers Department of Cardiology, VA Palo Alto Health Care System/Stanford University, Palo Alto, CA, USA

Puneet Narayan Clinical Research Institute of Northern Virginia, Burke, VA, USA

Michelle Phuong Nguyen UCF/HCA Graduate Medical Education - Internal Medicine, Ocala Regional Medical Center, Ocala, FL, USA

Eric S. Nylén Department of Endocrinology, VAMC and George Washington University School of Medicine, Washington, DC, USA

Linda S. Pescatello Department of Kinesiology, University of Connecticut, Storrs, CT, USA

Anastassios Philippou Department of Physiology, Medical School, National and Kapodistrian University of Athens, Athens, Greece

Andreas Pittaras Department of Cardiology, GW University, Veteran Affairs Medical Center, Washington, DC, USA

Ryan R. Porter Department of Exercise Science, Norman J. Arnold School of Public Health, University of South Carolina, Columbia, SC, USA

Kyra E. Pyke Queen's University, School of Kinesiology and Health Studies, Kingston, ON, Canada

Robert Ross Queen's University, School of Kinesiology and Health Studies, Kingston, ON, Canada

Labros S. Sidossis Rutgers University, Department of Kinesiology and Health, New Brunswick, NJ, USA

Konstantinos D. Tambalis Department of Nutrition and Dietetics, Harokopio University, Athens, Kallithea, Greece

Joshua C. Tremblay Queen's University, School of Kinesiology and Health Studies, Kingston, ON, Canada

Apostolos Tsimploulis Department of Cardiology, Stony Brook University Hospital, Stony Brook, NY, USA

Sabyasachi Sen Department of Medicine, George Washington University, Washington, DC, USA

Konstantinos Stavropoulos 2nd Propedeutic Department Internal Medicine, Hippokration Hospital, Thessaloniki, Greece

Carl Johan Sundberg Department of Physiology and Pharmacology, Department of Learning, Informatics, Management and Ethics, Karolinska Institutet, Stockholm, Sweden

Xuewen Wang Department of Exercise Science, Norman J. Arnold School of Public Health, University of South Carolina, Columbia, SC, USA