

Michael S. Sagiv

Exercise Cardiopulmonary Function in Cardiac Patients



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Exercise Cardiopulmonary Function in Cardiac Patients

*This book is dedicated to the memory of my
parents Judith and Jacob Samama*

Foreword

It is quite obvious nowadays that exercise training in heart disease patients is changing fast and noticeably. For the last half century, the attention of exercise physiologists in general has been largely directed to maintain a healthy heart, thus keeping heart disease at bay. Exercise has a beneficial effect on the heart. Regular physical activity is one of the best ways to improve exercise capacity and to reduce morbidity and mortality. The myocardium is a muscle and without proper exercises it will weaken. A weakened heart muscle does not pump blood as efficiently and therefore becomes disease prone. However, just like any skeletal muscle myocardial functional capacity will significantly improve with a concomitant reduction in heart rate and increased contractility, at rest, and at peak exercise following some moderate exercise for at least 30 min every day and up to 60 min if overweight. A slower heart rate is a more efficient heart and a stronger one. That is why an athlete has a slower heart rate than a sedentary individual at the same absolute workload. By exercising regularly, cardiac disease or heart disease may be prevented. It is the one thing we all should strive to do. Exercising is crucial for our health and there is no need to be an athlete to attain the benefits.

Within this setting, the author Professor Michael S. Sagiv has undertaken to write a book that, in my opinion, is incomparable in its approach. It covers comprehensively a wide range of exercise physiology issues and in a way that combines the exercise physiologist approach and the clinical cardiologist approach as well. The text contains mainly physiological changes during exercise in health and disease including aging with a small portion devoted to physiology at rest. The textbook is for medical and graduate students, physicians, exercise scientists, sports medicine specialists, athletic trainers, and sport physical therapists. It will undoubtedly serve in courses dealing in depth with work capacity of the cardiopulmonary system in cardiac patients and healthy subjects. The text is research oriented but also deductive.

I am impressed with the author's ability to provide deep understanding of the cardiovascular function in health and disease during exercise. This text is comprehensive and provides an excellent understanding on the role of the

different modes of exercise toward alleviation of cardiac symptoms. I compliment the author. His work is a significant contribution to the cardiac exercise physiology literature.

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Preface

This book represents an extended and thoroughly revised literature on the Exercise Cardiopulmonary Function in Cardiac Patients and Healthy Subjects. The key idea, which enables to deal with a wide range of complex cardiac problems in easy-to-check conditions and which also provides generally good solutions, is based on the fact that a large part of the book deals with exercise influences on the cardiopulmonary system and a very minor portion is devoted to cardiopulmonary physiology. This approach is based on the assumption that the reader is acquainted with medical physiology, especially of the cardiopulmonary system.

A substantial proportion of the figures is original and has been prepared specifically for this book; none was taken from published articles or books. Discussions are partially driven from articles by leading authors and partially (marginal portion) from exercise physiology books.

The material presented in the book can be used for courses taught to understand cardiac problems and solutions through physical activity. By-product of the book is a cardiopulmonary response to various modes of exercise in healthy subjects since, to understand pathology, one has to know healthy responses. With respect to the original collection of references, this book contains those that have been previously published in peer-reviewed journals. This is partially due to their novelty and partially to the fact that the referees of many journals are relatively more cautious with papers which are substantially innovative.

Book's Contents:

Chapter 1 discusses the knowledge about a broad range of exercise responses that can occur across time, intensities, and modes of exercise. Modes of exercise include dynamic aerobic, dynamic anaerobic, and isometric. Understanding exercise physiology can help to improve work capacity in health and disease. The chapter contains an introduction to general aspects and principles concerning exercise physiology. The main emphasis is on principles of altering in homeostasis during exercise and the compensatory mechanisms for returning as close as possible to homeostasis.

Chapter 2 focus on the respiratory system which acts by gasses exchange, and therefore functional capacity of the pulmonary under different exercise conditions and tests varies to influence physical performance, thus, may

exclude existence of cardiovascular diseases. Additionally, cardiac output is affected by the phase of respiration with intrathoracic pressure changes influencing diastolic heart filling and therefore cardiac output.

Chapter 3 presents the cardiac output responses to exercise at sea level, altitude, and warm and cold ambient. It discusses the cardiac output dependency mainly on the type of exercise performed, metabolic demand, and fitness level.

Chapter 4 contains a review of the autoregulation mechanism which is characterized by its vasodilatation effect on the small arteries and arterioles, in spite of the domination of the sympathetic nervous system. Autoregulation is a manifestation of local blood flow regulation that assists to redistribute cardiac output so that the working muscles receive the most of it during exercise.

Chapter 5 is devoted to left ventricular function with and without coronary artery narrowing or ischemic heart disease. Normal left ventricular function is the contraction of the ventricle in order to eject maximal blood into the aorta. However, once left ventricular dysfunction occurs, a series of compensatory mechanisms are triggered which lead to a host of structural and neuro-hormonal adaptations.

Chapters 6 and 7 deal with cardiac risk factors and the role of exercise to minimize their impact upon the development of cardiac diseases. Cardiac risk factors are characteristics or traits that reliably predict an individual's chances of developing atherosclerosis or coronary artery disease. The greater the number or severity of cardiac risk factors that be relevant, the higher the chances are for cardiovascular disease. By identifying these cardiac risk factors and taking active step such as exercise, it may reduce their number or severity.

Chapter 8 examines several application problems with aging. Decline in physical performance is an important risk factor in developing cardiovascular diseases. It is estimated that 82% of people who die of coronary heart disease are 65 years and older. Aging is also associated with changes in the mechanical and structural properties of the vascular wall, which leads to the loss of arterial elasticity and reduced arterial compliance and may subsequently lead to coronary artery disease. The chapter discusses in details the physiological changes brought about following exercise training to the elderly population.

Chapter 9 is entirely devoted to the role of exercise in physical inactivity, its role in sudden cardiac death, and its cardioprotective benefits in coronary artery disease and healthy individuals.

Chapter 10 focuses on cardiac rehabilitation seen as a medically supervised program that helps improve the health and well-being of people who have heart problems. Cardiac rehabilitation programs include exercise training, education on heart healthy living, and counseling to reduce stress and help return to an active life. Focal point of this chapter is physiological and medical aspects.

Acknowledgements

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