
Cellular Physiology and Metabolism of Physical Exercise

Livio Luzi
Editor

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 Springer

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*Dedicated to my father, Mario,
who died on May 31, 2011*

Preface

Cellular Physiology and Metabolism of Physical Exercise deals with several areas of science, including evolution. Physical inactivity is one of the leading causes of death in industrialized countries. Accordingly, intensive research has been devoted to studies of the regulation of muscle physiology and contraction. In this volume, these topics are particularly up to date and thoroughly debated. The aim of this book is to furnish both a basic and an advanced scientific portrait of the cellular physiology of skeletal muscle cells. Basic information includes an overview of muscle cell morphology, biochemistry, molecular biology, and physiology, with special emphasis on the cell membrane, energy metabolism, and cell contraction. Particularly innovative are the chapters dealing with methodologies to study, both invasively (muscle biopsies) and non-invasively (NMR-spectroscopy, mathematical modeling), intracellular metabolism and physiology. A specific chapter is dedicated to a new frontier of research in the field of sport sciences, namely, the possibility of correlating specific DNA polymorphisms and athletic performance. The micro environment of a contractile cell is of pivotal relevance to nutritional status. For this reason, three chapters are dedicated to “cellular feeding” and related issues. In many countries, the practice of sport is encouraged to prevent and treat most chronic degenerative diseases. Nonetheless, excess physical activity may also cause health problems. The common mechanism underlining both (positive and negative) effects is inflammation, which is also treated in a chapter. Inflammation, along with immune tolerance, is also a relevant issue in the host vs. graft reaction, the basis of transplant rejection. Whether patients who have undergone organ transplantation benefit from exercise is a matter of debate that is treated herein. Hyperactivity is also profoundly related to disorders of alimentation, such as anorexia, whose metabolic features are addressed in this book as well. The non-human primate model is often used in biomedical research to test new drugs. Modern concepts in suggesting an exercise program consider physical exercise as a drug, introducing the necessity of studying patterns of physical exercise in an animal model closest to the genus *Homo* (primates). To do so requires fundamental knowledge of the basics of exercise physiology in primates. The last chapter of the book is centered on the fundamentals of exercise physiology in primates, which necessitated a discussion of how (and, possibly, why) the genus *Homo* developed

from Australopithecines some 1.5 million years ago. In conclusion, I believe this work provides a complete manual for scientists interested in understanding the basic physiology and clinical relevance of physical exercise. The book's realization was made possible by the proactive and factual interaction of the authors (most of them are or at some time were co-workers of mine), to whom I convey my most sincere appreciation and acknowledgment.

Milan, November 2011

Livio Luzi

About the Editor

Livio Luzi is presently Professor of Endocrinology at the Università degli Studi di Milano and Director of the Metabolism Research Center of the Scientific Institute Policlinico San Donato, Milan, Italy. He graduated with a degree in Medicine *cum laude* in 1981, completing his residency in Internal Medicine in 1986. From 1984 through 1987, he was a post-doctoral fellow in Endocrinology and Metabolism at the Yale University School of Medicine. Returning to Italy, he became an Investigator at the San Raffaele Research Institute in Milan. In 1993, he moved to the Harvard Medical School, in Boston, where he had accepted a position as Assistant Professor of Medicine in the Endocrinology-Hypertension Division of the Brigham and Women's Hospital. In 2002, he was appointed Full Professor at the University of Milan. From 2007 through 2010, he was Dean of the Faculty of Sport Sciences (Facoltà di Scienze Motorie) of the University of Milan. Currently, he is Coordinator of the Ph.D. Program in Sport Sciences of the same university. Since 2005, he has been an Adjunct Professor of the Diabetes Research Institute at the University of Miami, Florida (USA). He has over 150 publications in the areas of metabolism, diabetes, and sport sciences, with an *H*-index of 40.

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