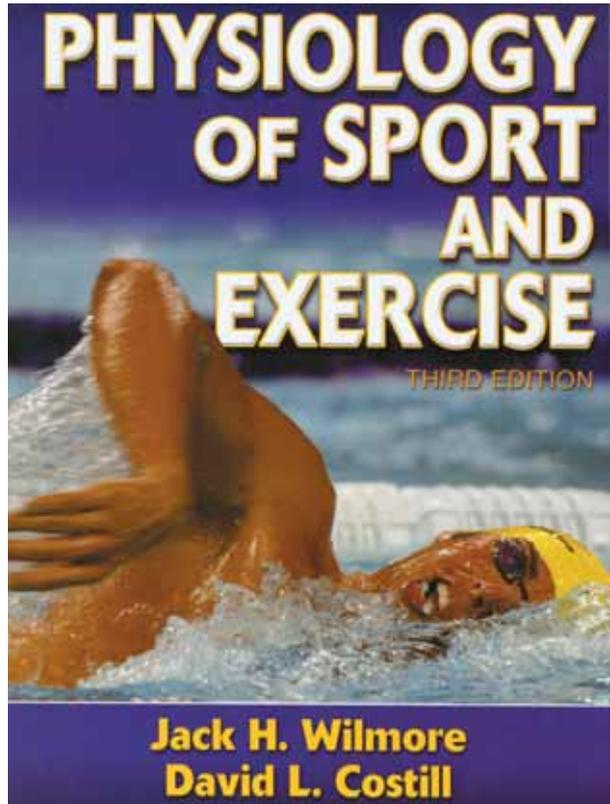


Physiology of Sport and Exercise (3rd Ed.)

by Jack H. Wilmore & David L. Costill

How does your body respond to the high physiological demands of physical activity? This is the key question when one studies the physiology of sport and exercise and Jack Wilmore and David Costill try to give an answer to it. Hardly anyone can be better qualified for this project:

Jack Wilmore, PhD, was a distinguished professor and head of the Department of Health and Kinesiology at Texas A&M University, a professor and department chair at the University of Texas at Austin, and Director of the Exercise and Sports Sciences Laboratory at the University of Arizona from 1976 to 1985. He has written extensively about exercise physiology and has been a member of the editorial board of several journals, including *Sports Medicine*, *Pediatric Exercise Science*, *Journal of Cardiopulmonary Rehabilitation*, *Journal of Athletic Training*, *International Journal of Obesity*, and *Medicine and Science in Sports and Exercise*. He is the former president of the American College of Sports Medicine (ACSM) and has served as a consultant for several professional sport teams in the USA, including the Los Angeles Dodgers, Los Angeles Rams, Los Angeles Lakers, Los Angeles Kings, California Angels, and San Francisco 49ers. Dr Wilmore is also a fellow and former president of the American Academy of Kinesiology and Physical Education.



David Costill, PhD, is the emeritus John and Janice Fisher chair in exercise science at Ball State University in Muncie, Indiana. He established the Ball State University Human Performance Laboratory in 1966 and served as its director for 32 years. He has written and coauthored more than 400 publications over the course of his career, including books, peer-reviewed journal articles, and lay publications. He served as the editor in chief of the *International Journal of Sports Medicine* for twelve years. He was president of the ACSM

from 1976 to 1977, a member of its board of trustees for twelve years, and a recipient of ACSM Citation and Honor Awards. Many of his former students are now leaders in the field of exercise physiology.

With their first and second editions of *Physiology of Sport and Exercise*, which appeared in 1994 and in 1999 respectively, Wilmore and Costill presented a solid foundation of basic exercise physiology and redefined the discipline's standard for textbooks. Now, with the third edition they offer an improved version of their text, framing the latest and most significant research findings in a reader-friendly format that makes it easier for students to learn and for teachers to teach.

Like the second edition, the third edition features ancillaries such as an updated and improved presentation package including a comprehensive series of PowerPoint slides for each chapter, a free test package including a bank of over 700 questions created especially for this new edition, a free instructor guide including among other things sample course syllabi, sample lecture outlines, and direct links to detailed sources on the Internet for every chapter in the text. Also included is an online student study guide with study questions and activities to test the student's knowledge as he or she prepares for tests.

Because of the rapid progress of research in the area of exercise physiology, it goes without saying that the information presented in this new edition has been considerably updated. There's a section in the historical chapter on the emergence of molecular biology, new information on clinical research and researchers in the field, and an updated discussion of longitudinal versus cross-sectional research and the basics of how to accurately read scientific graphs. The present edition also contains:

- The most current information on muscle fibre type categorisation.
- Coverage of recent studies of the neural component of strength gains and the molecular changes that are responsible for these gains.

- New research on muscle soreness and its causes.
- More instructive material to illustrate the measurement of oxygen consumption and carbon dioxide production during exercise, including the Haldane transformation.
- Expanded material on estimating anaerobic effort using the Wingate test, maximal accumulated oxygen deficit, and other new techniques.
- New evidence of the causes of fatigue at the contractile muscle and central nervous system levels.
- Additional VO_2max information just published from the Heritage Family Study (724 untrained subjects who completed an identical training programme for 20 weeks and showed increases in VO_2max from 0 to 53%).
- Updated information on thermal regulation by hydration before exercise.
- New research on exercise in microgravity (space) environments.
- More firsthand research on the demands of training, from Costill's Human Performance Lab at Ball State University.
- Expanded material on chronic fatigue syndrome, overreaching, and overtraining principles.
- Recent research on tapering.
- More details on assessing body composition using the newest methods and technologies.
- Up-to-date diagnostic techniques for medical clearances for an exercise program.
- Updated statistical information from the American Heart Association on the leading causes of death in the United States and updated information on obesity rate, risks of obesity, and prevention through physical activity.
- All-new information on diabetes based on the most recent research and trends.

The present edition also includes some improved features to encourage learning. New research is highlighted in breakout boxes to bring attention to important trends and directions, improved conversion tables focus on SI units (international system of units for

measuring physical properties), and an expanded glossary makes it easier for students to look up and cross-reference terms.

Contents

In the introduction, the authors begin with a historical overview of sport and exercise physiology as they have emerged from the parent disciplines of anatomy and physiology, and the basic principles used throughout the text are explained (e. g. acute physiological responses to exercise and chronic physiological adaptations to training).

In parts I through III, selected physiological systems are reviewed, focusing on their response to acute bouts of exercise, before it is considered how these systems adapt to long-term exposure to exercise in the form of training. In part I, the authors focus on how the muscular and nervous systems coordinate to produce body movement. In part II, it is explained how the basic energy systems provide the energy needed for movement and the role of the endocrine system in regulating metabolism. In part III, the authors look at how the cardiovascular and respiratory systems transport nutrients and oxygen to the active muscles and waste products away from them during physical activity.

In part IV, the perspective is changed to examine the impact of the external environment on physical performance. The body's response to heat and cold is considered, and then the impact of low atmospheric pressure experienced at altitude and high atmospheric pressure experienced during diving is examined. Part IV is concluded by considering the effects of a unique environment – one of little gravity – during space travel.

In part V, the attention is shifted to how athletes can optimise physical performance. The effects of different amounts of training are evaluated. The athletes' special dietary needs and how nutrients can be used to enhance performance is examined. The importance of appropriate body composition for performance is considered. Finally, the use

of ergogenic aids (substances purported to improve athletic ability) is explored.

In part VI, the unique considerations for specific populations of athletes are examined. First, the authors look at the processes of growth and development and how they affect the performance capabilities of young athletes. The changes that occur in physical performance with age are evaluated and the ways that physical activity can prolong youthfulness are explored. This part is concluded with the examination of issues and special physiological concerns of female athletes.

In the final part of the book, part VII, the authors turn their attention to the application of sport and exercise physiology to prevent and treat various diseases and the use of exercise for rehabilitation. They look at prescribing exercise to maintain health and fitness, and then they close the book with a discussion of cardiovascular disease, obesity and diabetes.

To sum it up then, this third edition of *Physiology of Sport and Exercise* offers a novel approach to the study of sport and exercise physiology. Everything is designed to better meet the needs of undergraduate students and to make learning easy and enjoyable. Although the text is comprehensive, the reader is not overwhelmed by either its size or its scope. The third edition of *Physiology of Sport and Exercise* is therefore a valuable and essential textbook for coaches and athletes who want to understand what happens in their bodies when they train and compete.

Reviewed by Jürgen Schiffer

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