

Exercise Testing and Prescription

A HEALTH-RELATED APPROACH



David C. Niema

FIFTH EDITION

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A HEALTH-RELATED APPROACH

FIFTH EDITION

David C. Nieman
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*To my wife Cathy, dietitian, editor, loving
companion, and award-winning quilter*

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Preface

This textbook describes knowledge, skills, and abilities for exercise testing and prescription and reviews the health-related benefits of regular physical activity. Detailed information and norms are given for various tests of body composition and for aerobic and musculoskeletal fitness. Exercise prescription guidelines and physical activity benefits are provided for a wide variety of conditions—including obesity; coronary heart disease; stroke; colon, breast, and prostate cancer; hypertension; dyslipidemia; metabolic syndrome; type 1 and type 2 diabetes; arthritis; osteoporosis; and anxiety and depression—and for different types of individuals, such as children and youth, the elderly, pregnant women, and athletes.

The first edition of this book was published in 1986 to assist readers in preparing for certification from the American College of Sports Medicine (ACSM). Since this is still a major purpose of this book, the basic structure has been retained to ensure successful preparation for certification and ACSM's new registry for the clinical exercise physiologist (RCEP).

Since the 1980s, much progress has been made in advancing our understanding of exercise testing and prescription, the health-related benefits of regular physical activity, clinical exercise physiology, and public policy issues. This new edition presents the most current information available on each of these topics. The content is supported by more than 700 new references for a total of over 2,400 references. Approximately 50 new figures have been added to complement and support the book's new content.

ORGANIZATION

As in previous editions, the chapters are organized to present a natural progression of information. The reader will find it most satisfactory to start with Chapter 1 and continue chapter by chapter to the end of the book. The book is divided into four parts. Part I deals with public policy issues in physical activity, trends in physical activity patterns and wellness, and basic definitions. Part II describes the various tests for each of the major elements of physical fitness: cardiorespiratory endurance, body composition, and musculoskeletal fitness. Part III reviews the basics of exercise physiology, the process of writing exercise prescriptions, and the relationship between nutrition and perform-

ance. Part IV summarizes current understanding regarding the association of physical activity and heart disease, obesity, aging, osteoporosis, arthritis, psychological health, diabetes, cancer, and other concerns. In addition, a complete review of exercise risks is presented in Chapter 16. The appendix material includes numerous tables of physical fitness testing norms (which complement those found within the chapters), photos of basic calisthenics, anatomical diagrams, and a detailed listing of the energy cost of human physical activities.

NEW TO THIS EDITION

Updated content. This text is fully updated and integrated with new information from *Healthy People 2010*, ACSM exercise testing and prescription guidelines (2000); U.S. Department of Agriculture Dietary Guidelines for Americans (2000); National Cholesterol Education Program guidelines for detection and management of cholesterol; National Institutes of Health guidelines for detection and management of obesity; ACSM guidelines for exercise prescription of the elderly, individuals with type 2 diabetes, and heart disease patients; the Surgeon General's guidelines for treatment of mental health; and updated energy cost (MET values) for a wide variety of physical activities.

Physical Activity Pyramid. The new pyramid featured in this edition is central to the book's purpose. Combining lifestyle and formal exercise approaches to physical fitness, it is supported by a discussion designed to facilitate communication of key exercise prescription principles during counseling.

Focus on prevention. This edition emphasizes the prevention guidelines for all major diseases, including diabetes, cancer, heart disease, osteoporosis, and arthritis.

Expanded section on mental health. This book's content on mental health has been expanded in accordance with new data from the Surgeon General and the World Health Organization.

Boxed material. Throughout the text, boxes have been added to highlight exercise testing and prescription for a wide variety of individuals and patients.

New practical information. This new edition features practical information, such as how to select home exercise equipment, rating individuals on the Activity Pyramid, and ten new Physical Fitness Activities that offer students the opportunity to build skills and apply what they are learning.

Review Questions. Each chapter ends with Review Questions and Answers that encourage students to review the key points of the chapter. The answers are listed following the questions so that students can gain immediate feedback.

Website resources. This book includes the website addresses of many professional organizations and resources for information on health and fitness, nutrition, and many other topics.

SUCCESSFUL FEATURES

Preparation for ACSM exams. The content and focus of this text continually prepare the student for the key topics that need to be mastered to achieve ACSM certification. The book also serves as a valuable reference throughout a career in an applied fitness setting.

Health-related context. Exercise testing and prescription are presented in a health-related context that features the latest research finding on exercise and nutrition, obesity, heart disease, diabetes, cancer, and aging.

Illustrations, photographs, tables, and graphs. One of the key strengths of this book is the visually engaging presentation of material, which makes it clear and appealing to students.

Sports Medicine Insight boxes. These boxes highlight issues of current interest, such as methods of determining body composition, physical fitness in children and youth, and ACSM certification tracks.

Physical Fitness Activity feature. This tool promotes hands-on learning by encouraging the student to take part in activities such as readiness for exercise, precertification screening questionnaires, cardiorespiratory endurance testing, and assessment of muscular fitness.

NEW OR EXPANDED TOPICS

This new edition has been significantly revised and updated. The following list is a sampling of the topics that are either new to this edition or that have been explored in greater depth than in the previous edition.

Chapter 1: Health and Fitness

- Integration of *Healthy People 2010* objectives
- Updated statistics on physical activity habits of Americans
- Health promotion among youth through physical activity and sports
- Worksite physical activity and fitness programs
- Wellness successes and challenges for the future
- Barriers to exercise
- CDC survey data of fitness habits of college students

Chapter 2: Physical Fitness Defined

- Physical fitness in children and youth
- Role of physical education in fitness

Chapter 3: Testing Concepts

- Preparticipation health screening using new ACSM/AHA guidelines
- ACSM/AHA guidelines for risk factor evaluation and risk stratification
- FITNESSGRAM and President's Challenge physical fitness testing programs
- Guidelines for ACSM certification

Chapter 4: Cardiorespiratory Fitness

- Practical procedures for administering a maximal graded exercise treadmill test
- General indications from stopping an exercise test in low-risk adults
- Emergency procedures for exercise testing
- ACSM equations for estimating metabolic demands of stepping and leg and arm ergometry

Chapter 5: Body Composition

- Rationale for body composition
- Guidelines for classification of overweight and obesity
- Relationship between BMI and percent body fat in adults
- Average body fat ranges for elite athletes
- Growth charts for height, weight, and BMI for boys and girls, ages 2 to 20 years

Chapter 6: Musculoskeletal Fitness

- Flexibility testing for shoulder rotation and trunk rotation
- New equation for estimated peak power
- Activity on rating posture
- Specific norms for eleven musculoskeletal tests

Chapter 7: The Acute and Chronic Effects of Exercise

- Influence of heredity on aerobic fitness
- Extensive updating of references

Chapter 8: Exercise Prescription

- Physical activity pyramid combining lifestyle and formal exercise approaches to physical fitness
- Ways to improve lifestyle physical activity
- Using percent VO₂ reserve for exercise prescription
- Flexibility: basic types, influencing factors, and benefits
- Improving exercise prescription skills
- Model of exercise, calories burned per hour, and benefits for aerobic and muscular fitness
- Guidelines for selecting home exercise equipment

Chapter 9: Nutrition and Performance

- Nutrition in view of Dietary Guidelines for Americans and Dietary Reference Intakes
- Discussion of iron depletion
- Classification of nutritional supplements and ergogenic aids
- Facts about erythropoietin
- Creatine supplementation
- Prohormones and growth hormone
- Analyzing nutrient intake via the Internet
- Internet sources for sound nutrition information

Chapter 10: Heart Disease

- Detection, evaluation, and treatment of high blood cholesterol in adults
- Assessing ten-year coronary heart disease and stroke risk for men and women

- Clinical practice guidelines for treating tobacco use and dependence
- Statistics on smoking prevalence in the United States
- Common medications for hypertension and high blood cholesterol
- Metabolic syndrome
- Risk factors for stroke
- Extensive updating of references and figures

Chapter 11: Cancer

- Updated information from the American Cancer Society
- Recommendations for early detection of cancer in asymptomatic people
- Exercise and cancer rehabilitation featuring exercise prescription guidelines for cancer patients
- How cancer begins and how it is staged (TNM system)
- Complementary and alternative medicine in cancer treatment
- Cancer risk factors, including exposure to sunlight
- Link between obesity and cancer
- Specific cancers and relation to risk factors and physical activity

Chapter 12: Diabetes

- Prevalence and incidence of diabetes
- Screening for diabetes
- Epidemiologic studies linking physical inactivity and type 2 diabetes
- Insulin drugs and diabetes drugs
- *Healthy People 2010* objectives for diabetes
- ADA and ACSM updates on physical activity guidelines for individuals with diabetes

Chapter 13: Obesity

- Treatment for obesity, including drug therapies
- Paradigm for identification, evaluation, and treatment of obesity
- Habits associated with success in weight loss and management
- Exercise prescription guidelines for obese individuals
- Behavior change principles related to weight management

- Choosing a safe and successful weight-loss program
- Evaluation of low-carbohydrate, high-protein diets
- Role of physical activity in weight management
- Activities for estimating resting metabolic rate, counting calories and fat grams in fast food, and monitoring dietary habits

Chapter 14: Psychological Health

- Discussion of mental health in relation to data from Surgeon General and World Health Organization
- Mental disorders, anxiety disorders, depression, and diagnosis of depression and generalized anxiety disorder
- New highlights on suicide
- Facts about sleep
- How to measure anxiety

Chapter 15: Aging, Osteoporosis, and Arthritis

- Link between health habits and life expectancy
- *Healthy People 2010* goals in relation to years of healthy life and quality of life
- Sarcopenia, including its relationship to exercise
- Activities of daily living
- ACSM position statement on exercise training for older adults
- Updated data on osteoporosis: risk factors, medications, and nutrition
- Exercise prescription guidelines for prevention of osteoporosis
- NIH consensus report on osteoporosis prevention, diagnosis, and therapy
- Treatment of arthritis: new medications, exercise prescription guidelines, and potential complications

Chapter 16: Exercise Risks

- Air quality index
- Facts about asthma
- Estimation of apparent temperature
- Injury, overtraining, exercise and pregnancy, sudden death from heart attack, and exercise-induced asthma

ANCILLARIES

Downloadable ancillaries

Online ancillaries that accompany this text include a Test Bank and PowerPoint presentation. These ancillaries can be accessed by visiting this book's website at www.mhhe.com/hhp.

PowerWeb

The PowerWeb website is a reservoir of course-specific articles and current events. Students can visit PowerWeb to take a self-scoring quiz, complete an interactive exercise, click through an interactive glossary, or check the daily news. An expert in each discipline analyzes the day's news to show students how it relates to their field of study. PowerWeb also grants students full access to Dushkin/McGraw-Hill's Student Site, where they can read study tips, conduct web research, learn about different career paths, and follow fun links on the web.

FoodWise College Edition CD-ROM

Adapted from the widely tested professional version of FoodWise, this dietary analysis software has been developed for use in college courses. It offers a variety of functions based on the latest USDA data. A unique tool allows the user to add foods to the database. The program is available for Windows and networks.

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