It is with great pleasure that I introduce to you the fifth edition of the *American College of Sports Medicine’s Resource Manual for Guidelines for Exercise Testing and Prescription*. For many years, this resource has served thousands of students and professionals as a valuable companion to the *ACSM Guidelines*. The editorial team members and individual chapter contributors have compiled a compendium of topics that not only extend the exercise and health related information provided in the *Guidelines*, but cover areas well beyond the scope of the *Guidelines*. Chapters are written by a prestigious group of scientists, clinicians, researchers and health/fitness practitioners. These pages contain the most current, science-based information regarding exercise and health.

There is no question that one of the greatest challenges facing our culture as we embark on the 21st century is the myriad of disorders associated with a sedentary lifestyle. While we have made substantial progress in understanding the risks associated with physical inactivity, we are far from the ultimate goal of having a society that is active at a level that promotes both health and longevity. We must continue to pursue effective strategies to mobilize the population to be more active. To achieve this goal, our society will likely benefit from a large cadre of clinical and health and fitness professionals who are thoroughly educated in the information and trained in the skills covered within this text.

As you will see, this revision of the *Resource Manual* has been reconfigured to provide a better link with content contained within the seventh edition of the *ACSM Guidelines*, enhancing its value within educational programs, and it is intended to expand upon the *Guidelines* by providing practical examples, and in most cases, offer a greater depth of coverage for each of the topics. This text has something for everyone, from serving as a primer for those in formal educational programs to serving as a science-based reference guide for the practicing professional. For this latter group, the content contained within this text can provide much needed continuing education on a wide range of topics.

So, I encourage you to venture into these pages and learn something new. No matter who your next patient or client may be, he or she will benefit from the insights you will gain from the authors of this text. Then share your new expertise and knowledge with colleagues. Together, you and other readers of the *ACSM’s Resource Manual* can make a difference in the health of Americans—one step at a time!

Mitchell H. Whaley, Ph.D., FACSM
Preface

The American College of Sports Medicine (ACSM) first published Guidelines for Exercise Testing and Prescription in 1975. After the publication of the third edition of the Guidelines, ACSM issued the first edition of the Resource Manual for Guidelines for Exercise Testing and Prescription in 1988. The original purpose of the Resource Manual was to serve as a companion to the Guidelines, and this remains a fundamental purpose of the book. Additionally, it is recognized that the Resource Manual can and should serve as a valuable aide for professionals who provide exercise services for fitness, health, and clinical reasons and for those who teach courses that are preparatory for exercise-related careers.

Changes to the Fifth Edition

A number of significant changes have been made in this edition of the Resource Manual. First, the book was substantially reorganized with the number of sections reduced to seven (from 13) and the number of chapters reduced to 50 (from 80). Most of the content areas from the fourth edition were retained, however, material that was considered not to be "resourceful" for content included in the Guidelines was eliminated. The second change is the reduction of redundant presentation of material that already exists in the Guidelines or in other chapters within the Resource Manual. Readers will find many cross-references throughout this book, which direct them to relevant material presented elsewhere in the Guidelines or the Resource Manual. The third change is a significant reordering of the presentation of material to facilitate locating the relevant resource material for sections in the Guidelines. The introductory section (Section 0) presents the scientific foundations and bases for the principles of exercise testing and training. The following four sections (I. Lifestyle Factors Associated with Health and Disease; II. Physical Fitness and Clinical and Diagnostic Assessments; III. Exercise Prescription, Exercise Programming, and Adaptations to Exercise Training; and IV. Exercise Testing and Training for Individuals with Chronic Disease) correspond to the three sections in the Guidelines (Health Appraisal, Risk Assessment, and Safety of Exercise; Exercise Testing and Exercise Prescription). The Resource Manual includes two additional sections of importance to exercise and allied health professionals: V. Human Behavioral Principles Applied to Physical Activity and VI. Exercise Program Administration. Additionally, new topics covered in the Resource Manual and those with increased emphasis are Chapter 8, Physical Activity Assessment; Chapter 17, Clinical Exercise Testing in Individuals with Disabilities Caused by Neuromuscular Disorders; Chapter 27, Applied Exercise Programming; Chapter 34, Exercise in Patients with End-Stage Renal Disease; Chapter 36, Arthritic Diseases and Conditions; Chapter 37, Neuromuscular Diseases and Exercise; Chapter 38, Immunological Conditions; Chapter 40, Channels for Delivering Behavioral Programs; and Chapter 45, Exercise Program Professionals and Related Staff.

New Features

In this edition, readers will find three new features in each chapter. A list of Key Terms and definitions is provided in each chapter, and these terms are highlighted in the text to assist readers in understanding key concepts. Each chapter also has a listing of Selected Readings for Further Study. Although the Resource Manual attempts to provide an in-depth overview of topics important to exercise testing and prescription, it is not possible to be completely comprehensive. Thus, we have provided recommendations for additional literature that will further readers’ understanding of the material presented in the chapters. In some cases, the selected readings are textbooks or textbook chapters; however, we also have provided key references from journals. The third new feature is a list of recommended websites. We have identified websites with educational content related to the topics; however, some sites are more generally related to the topic area (e.g., professional organizations) where the reader may find multiple resources.

A major point of emphasis for the editorial team was to include the most current information available and to emphasize consensus reports when they are available. For example, the authors were encouraged to incorporate the main points from all position stands of the ACSM on topics related to the content of their chapters. Additionally, consensus scientific statements, reports from expert panels, and reports from other professional organizations were reviewed and referenced as appropriate. A listing of the reports referred to in this edition is provided at the end of the preface.

It was our intention that readers can derive a good understanding of the topic from the material presented in the Resource Manual, and, when more in-depth knowledge is needed on a topic, readers are able to use the references to the consensus reports, selected readings, and websites.
Presentation of Knowledge, Skills, and Abilities

The past two editions of the Resource Manual provided a listing of specific knowledge, skills, and abilities (KSAs) at the beginning of each chapter. The ACSM Committee on Certification and Registry Boards (CCRB) performed a job task analysis survey in 2004 for all ACSM certifications and the registry. Results from this survey were used to supplement the review and revision of the KSAs. The CCRB determined that KSAs might need to be more dynamic to stay abreast with changes in knowledge and application of scientific and clinical information. Thus, this edition does not provide a direct link to specific KSAs because they may change from year to year. However, this edition of the Resource Manual does provide a listing of KSA content areas that are covered in each chapter to assist candidates in preparing for the ACSM Certification and Registry examinations.

Summary

We expect that the fifth edition of the Resource Manual will appeal to a broader audience than the previous editions because of its expanded content, reorganization, and new features. The fifth edition will certainly continue to be a valuable resource for ACSM certification and registry examination candidates and as a reference manual for those working in an occupation that uses exercise programming for health or clinical benefits. Many academic programs already use the Guidelines as a required text for the study of the effects of exercise and physical activity on health, fitness, and clinical outcomes, and we believe that the Resource Manual will be an excellent academic resource. With the simultaneous publication schedule, the reorganization of the Resource Manual to follow a similar topic order as the Guidelines, and the cross-linking of material between the Guidelines and the Resource Manual, this edition should appeal to instructors of a variety of classes in both undergraduate and graduate curricula as an excellent companion to the Guidelines.

Major Reports References in the Fifth Edition

CHAPTER 5


Hormone replacement therapy and cardiovascular disease: a statement for healthcare professionals from the American Heart Association.
Implication of recent clinical trials for the National Cholesterol Education Program adult treatment panel III guidelines.
Third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults. (Adult treatment panel III).

CHAPTER 6

AHA/ACSM: Recommendations for cardiovascular screening, staffing, and emergency policies at health/fitness facilities.
American College of Obstetricians and Gynecologists: Exercise during pregnancy and the postpartum period.
Exercise standards for testing and training: A statement for healthcare professionals from the American Heart Association.

CHAPTER 7

AHA Guidelines for Primary Prevention of Cardiovascular Disease and Stroke: 2002 Update: Consensus panel guide to comprehensive risk reduction for adult patients without coronary or other atherosclerotic vascular diseases. American Heart Association Science Advisory and Coordinating Committee.

CHAPTER 8


CHAPTER 9

American College of Endocrinology: Position statement of insulin resistance syndrome.
American Heart Association guide for improving cardiovascular health at the community level: A statement for public health practitioners, healthcare providers, and health policy makers from the American
Heart Association expert panel on population and prevention science.
Institute of Medicine, National Academy of Sciences: Dietary reference intakes energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein and amino acids.
NIH Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy: Osteoporosis prevention, diagnosis, and therapy.
Summary of the scientific conference on dietary fatty acids and cardiovascular health: Conference summary from the nutrition committee of the American Heart Association.

CHAPTER 10
Institute of Medicine: Dietary Reference Intakes [6 reports].

CHAPTER 11

CHAPTER 13

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CHAPTER 15
American Thoracic Society: Standards for the diagnosis and care of patients with chronic obstructive pulmonary disease.
American Thoracic Society/American College of Chest Physicians: ATS/ACCP statement on cardiopulmonary exercise testing.

CHAPTER 16
ACC/AHA Guidelines for the clinical application of echocardiography.
A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Clinical Application of Echocardiography). Developed in collaboration with the American Society of Echocardiography.
ACC/AHA 2002 guideline update for exercise testing: Summary article.
A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines.
American College of Cardiology/American Heart Association clinical practice guidelines: Part II (evolutionary changes in a continuous quality improvement project).
Guidelines for clinical use of cardiac radionuclide imaging. Report of the American College of Cardiology/American Heart Association Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Committee on Radionuclide Imaging). Developed in collaboration with the American Society of Nuclear Cardiology.
26th Bethesda conference: Recommendations for determining eligibility for competition in athletes with cardiovascular abnormalities.
Task Force 5: Coronary artery disease.

CHAPTER 17

CHAPTER 18
American Association of Cardiovascular and Pulmonary Rehabilitation: Guidelines for cardiac rehabilitation and secondary prevention programs.
Cardiovascular advisory panel guidelines for the medical examination of commercial motor vehicle drivers.
Exercise standards: a statement for healthcare professionals from the American Heart Association.

CHAPTER 19
ACC/AHA 2002 guideline update for the management of patients with chronic stable angina: a report of the American College of Cardiology/American Heart Association Task Force on Practice
Guidelines (Committee to Update the 1999 Guidelines for the management of Patients with Chronic Stable Angina).

CHAPTER 22
Statement on exercise: benefits and recommendations for physical activity programs for all Americans. A statement for health professionals by the Committee on Exercise and Cardiac Rehabilitation of the Council on Clinical Cardiology, American Heart Association.

CHAPTER 25
Resistance exercise in individuals with and without cardiovascular disease: benefits, rationale, safety, and prescription: An advisory from the Committee on Exercise, Rehabilitation, and Prevention, Council on Clinical Cardiology, American Heart Association; Position paper endorsed by the American College of Sports Medicine.

CHAPTER 26

CHAPTER 28
American Diabetes Association: Diabetes mellitus and exercise.
OSHA: The OSHA Bloodborne Pathogens Standard.

CHAPTER 29
27th Bethesda conference: Matching the intensity of risk factor management with the hazard for coronary disease events.
Writing Group for the Women’s Health Initiative Investigators: Risks and benefits of estrogen plus progestin in healthy postmenopausal women: principal results from the Women’s Health Initiative controlled trial.

CHAPTER 30
ACC/AHA guidelines for the evaluation and management of chronic heart failure in the adult.
ACC/AHA guideline update for the management of patients with unstable angina and non-ST-segment elevation myocardial infarction.
American College of Cardiology/American Heart Association Task Force on Practice Guidelines/European Society of Cardiology Committee for Practice Guidelines and Policy Conferences (Committee to Develop Guidelines for the Management of Patients with Atrial Fibrillation); North American Society of Pacing and Electrophysiology. ACC/AHA/ESC Guidelines for the Management of Patients with Atrial Fibrillation: Executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines and Policy Conferences (Committee to Develop Guidelines for the Management of Patients with Atrial Fibrillation). Developed in collaboration with the North American Society of Pacing and Electrophysiology.
American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Committee on the Management of Patients with Chronic Stable Angina: ACC/AHA 2002 guideline update for the management of patients with chronic stable angina—Summary article: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on the Management of Patients with Chronic Stable Angina).
American Heart Association Council on Clinical Cardiology Subcommittee on Exercise, Rehabilitation, and Prevention, American Heart Association Council on Nutrition, Physical Activity, and Metabolism Subcommittee on Physical Activity: Exercise and physical activity in the prevention and treatment of atherosclerotic cardiovascular disease: a statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity).
Guidelines for the management of patients with valvular heart disease: executive summary. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Management of Patients with Valvular Heart Disease).

National Heart, Lung and Blood Institute, American College of Cardiology Foundation. Women's Ischemic Syndrome Evaluation: Current status and future research directions: report of the National Heart, Lung and Blood Institute workshop.


Safety and utility of exercise testing in emergency room chest pain centers: An advisory from the Committee on Exercise, Rehabilitation, and Prevention, Council on Clinical Cardiology, American Heart Association.

CHAPTER 31

Cardiac rehabilitation clinic practice guidelines no. 17. Rockville, MD; U.S. Department Of Health And Human Services, Public Health Service Agency For Health Care Policy And Research And The National Heart, Lung And Blood Institute, 1995.


CHAPTER 32


ATS Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories: ATS statement: guidelines for the six-minute walk test.

ATS/ACCP statement on cardiopulmonary exercise testing.

Expert Panel Report 2: Guidelines for the diagnosis and management of asthma.

Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. NHLBI and WHO Global Initiative for Chronic Obstructive Lung Disease.

Pulmonary rehabilitation: Joint ACCP/AACVPR evidence-based guidelines. ACCP/AACVPR Pulmonary Rehabilitation Guidelines Panel.

American College of Chest Physicians. American Association of Cardiovascular and Pulmonary Rehabilitation.


CHAPTER 33


CHAPTER 34


CHAPTER 35


National Institutes of Health: Osteoporosis prevention, diagnosis, and therapy. NIH Consensus Statement.


CHAPTER 36

American College of Rheumatology: Guidelines for the management of rheumatoid arthritis.

The orthopaedic forum: NIH consensus statement on total knee replacement.

CHAPTER 38

World Health Organization consensus statement. Consultation on AIDS and sports.

CHAPTER 40


CHAPTER 43

Depression in Primary Care: Volume 1. Detection and diagnosis. Clinical practice guideline.

CHAPTER 47
American College of Cardiology/American Heart Association: Guidelines for the evaluation and management of chronic heart failure in the adult.
American College of Cardiology/American Heart Association: Guidelines for the management of patients with acute myocardial infarction.
American College of Cardiology/American Heart Association: 2002 guidelines for the management of patients with chronic stable angina.
Core components of cardiac rehabilitation/secondary prevention program.

CHAPTER 49

CHAPTER 50
American Association for Cardiovascular and Pulmonary Rehabilitation: Core competencies for cardiac rehabilitation specialists.
American Heart Association: Guidelines for cardiopulmonary resuscitation and emergency cardiac care.
American Heart Association: The AHA medical/scientific statement on cardiac rehabilitation programs.
American Heart Association: The AHA medical/scientific statement on exercise.
National Strength and Conditioning Association: Strength and conditioning professional standards and guidelines.
This section is probably the most difficult to write as there have been so many people that deserve recognition and thanks for their support of this project. I will make an earnest attempt to recognize all those that played a significant role; however, my thanks go out to many more unnamed individuals for their assistance. Also, the order of presentation of those mentioned is not based on their level of support or importance, as all played a significant role.

This is the fifth edition of this Resource Manual. I certainly want to recognize all those that contributed to this book in the past. Having such excellent content to work with made the revision process much easier. I want to especially thank Jeff Roitman, the Senior Editor of the third and fourth editions. Jeff’s assistance and guidance with learning the editorial process was invaluable.

Thanks to Mitch Whaley, senior editor of the seventh edition of the ACSM’s Guidelines for Exercise Testing and Prescription. You recruited your Associate Editors, Pete Brubaker and Bob Otto, wisely. I have so much respect for all three of you and appreciate you involving me in the editorial review sessions for the Guidelines, it certainly helped the Resource Manual editorial group understand the changes being made in the Guidelines and allowed us to develop content that resources that material.

Thanks to an outstanding group of Section Editors – Alan Mikesky, Bill Kohl, Larry Hamm, Steve Glass, Carol Garber, and Kim Bonzheim. I truly enjoyed working with all of you and appreciate your willingness to volunteer your time to this project. You are all so knowledgeable, talented, and passionate about your work. You did a great job recruiting excellent authors and guiding them through the writing process. I look forward to continued professional involvement with each of you in the future.

Thanks to all of the authors for your important contributions to this Resource Manual. The readers of this book will benefit greatly from your wisdom. Your willingness to volunteer your time and expertise is very much appreciated. Thanks also to all the reviewers for their helpful comments.

Thanks to the staff of our publisher, Lippincott, Williams, and Wilkins. I received excellent support and advice from Matt Hauber, Senior Managing Editor. Matt’s promptness and expertise in handling my many queries was much appreciated. Thanks also to Sirkka Bertling, Production Editor, for her excellent assistance in getting this manuscript into the published form.

Thanks to Jeff Roitman, ACSM Publications Committee Chair and D. Mark Robertson, ACSM Assistant Executive Vice President, Publications, Editorial Services, Advancement, Membership & Chapter Services, and Pete Darcy, Executive Editor, WK Health/Lippincott Williams & Wilkins. Your behind the scenes administrative support was helpful to all of us involved with this project.

Thanks to all the dedicated professionals who work in programs that utilize physical activity and exercise to improve people’s health and quality of life. Your understanding and support of the need for rigorous academic training for individuals who work in physical activity and exercise programs will ultimately pay off in improved quality of care for our patients and clients.

To my colleagues, students, and friends at Ball State University, thank you for your support during this writing and editorial project.

To my wife, Mary, and daughters, Lauren and Bonnie, thanks for your continual love, for helping me keep things in perspective, and for being understanding of my involvement in this project.

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