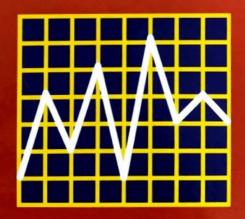
## PEDIATRIC LABORATORY EXERCISE TESTING

Clinical Guidelines



Thomas W. Rowland *Editor* 

## Contents

Preface	vii
Acknowledgment	ix
Introduction	xi
Contributors	xvii
Conducting the Pediatric Exercise Test	1
Teresa L. Tomassoni, PhD	
Indications for Exercise Testing in Children 2	
Contraindications and Special Considerations 3	
Safety Issues 3	
Physical Environment of the Laboratory 4	
Laboratory Staffing 4	
Laboratory Equipment 5	
Emergency Equipment, Supplies, and Medication 6	
Legal Aspects 6	
Pretest Procedures 7	
Preparation of the Skin and Electrode Attachment 10	
Testing Procedures 11	
Conclusion 16	
References 16	
Aerobic Exercise Testing Protocols	19
Thomas W. Rowland, MD	
Selection of the Test Protocol 21 Current Practice 22	

Cycle Versus Treadmill Tests 22 Treadmill Testing Protocols 24	
Cycle Protocols 28 Testing Protocols for Special Indications 28 Stage Duration and Work Increment 29 Importance of Warm-Up 30 Endurance Time and Aerobic Fitness 31 Defining a Maximal Exercise Effort 32	
Conclusion 35 References 36	
Pediatric Exercise Electrocardiography	43
J. Timothy Bricker, MD	7.
Data Acquisition Techniques 44  Normal Electrocardiographic Responses to Exercise 47  Stress Electrocardiography for Ischemia 52  Stress Electrocardiography for Arrhythmias 56  Conclusion 60  References 61	
<b>Blood Pressure Response to Dynamic Exercise</b>	67
Bruce S. Alpert, MD	
Mary E. Fox, MS  Technical Aspects of Measurement of Blood Pressure 68 Physiology of Blood Pressure Response 69 Healthy Control Subjects 70 Racial Differences in Systolic Blood Pressure Response 77 Congenital Heart Disease 78 Conclusion 86 References 88	
Measurement of Oxygen Consumption	91
Patty S. Freedson, PhD  Terri L. Goodman, MS  Technical Considerations: Oxygen Consumption Measurement 92 Measurement of VO <sub>2</sub> max 95 Measurement of Submaximal VO <sub>2</sub> 96 Measurement of VO <sub>2</sub> max in Children 96 Effect of Exercise Protocol on VO <sub>2</sub> max 96 Reliability of VO <sub>2</sub> max 104 Subject Selection 105 Criteria for VO <sub>2</sub> max 106	g v S

67

Norms for VO₂max in Children 106	
Conclusion 108	
References 108	
Anaerobic Threshold	115
Reginald L. Washington, MD	
Anaerobiosis, Lactate, and Gas Exchange During Exercise	115
Onset of Blood Lactate Accumulation 117	
Ventilatory Anaerobic Threshold 118	
Effects of Cardiac Malformations on the Anaerobic	
Threshold 124	
VAT and Exercise Intolerance 125	
Conclusion 126	
References 126	
Measurement of Cardiac Output	131
Reginald L. Washington, MD	
Basic Physiology 132	
Measuring Cardiac Output 133	
Chilical Value of Cardiae Guspan Determine	
Conclusion 137 References 138	
References 138	
Assessment of Exercise Pulmonary Function	141
David M. Orenstein, MD	
Normal Responses to Exercise 142	
Abnormal Responses to Exercise 145	
Performing the Exercise Test 149	
Equipment 156	
References 160	
Noncardiopulmonary Pediatric Exercise Tests	165
Oded Bar-Or, MD	
Muscle Endurance and Peak Power 166	
Growth-Hormone Deficiency Test 173	
Blood Glucose Profile During Prolonged Exercise 177	
Physiologic Cost of Locomotion 179	
Conclusion 181	
References 181	
W.L.	187

Index