Contents

Prefa	E. Sietsema, Darryl Y. Sue, William W. Stringer, Susan A. Ward
Ackn	owledgments vii
Conti	Case 22: Exemional Chêst Pain Will Pales Exending estatement of the Charles of th
1	Exercise Testing and Interpretation 1 Kathy E. Sietsema, William W. Stringer, Darryl Y. Sue, Susan A. Ward
2	Physiology of Exercise 8 Susan A. Ward, Harry B. Rossiter
3	Measurements During Integrative Cardiopulmonary Exercise Testing 59 Susan A. Ward
4	Pathophysiology of Disorders Limiting Exercise 91 Darryl Y. Sue, Kathy E. Sietsema
5	Performance of Clinical Cardiopulmonary Exercise Testing 112 William W. Stringer, Janos Porszasz, Harry B. Rossiter
6	Approaches to Data Summary and Interpretation 135 Kathy E. Sietsema
7	Normal Values 159 Darryl Y. Sue
8	Clinical Applications of Cardiopulmonary Exercise Testing 189 William W. Stringer, Darryl Y. Sue
9	Diagnostic Specificity of Exercise Intolerance: A Flowchart Approach 223 Darryl Y. Sue
10	Case Presentations 229 Kathy E. Sietsema, Darryl Y. Sue Case 1: Normal Man 231 Case 2: Normal Athletic Man Case 3: Normal Woman: Air and Oxygen Breathing Studies 234 Case 4: Normal Man 239 Case 5: Fit Cyclist 242 Case 6: Normal Individual: Cycle and Treadmill Studies 246 Case 7: Normal Individual: With and Without β-Adrenergic Blockade 251 Case 8: Normal Man With and Without Acute Cigarette Smoking 256 Case 9: Active Man With Dyspnea at High Altitude 262 Case 10: Active Woman With Patent Foramen Ovale 267

Case 11: Normal Aging Athletic Man: Serial Tests Between Age 66 and 76

Case 12: Mild Airflow Obstruction and Hyperventilation 270

Case 13: A Submaximal Test 274

Case 14: A Long Test 278

Case 15: Chronic Heart Failure With Reduced Ejection Fraction 282

Case 16: Chronic Heart Failure With Reduced Ejection Fraction 285

Case 17: Chronic Heart Failure With Reduced Ejection Fraction and Pacemaker Dependence 289

Case 18: Chronic Heart Failure: Oscillatory Ventilation and Gas Exchange 294

Case 19: Chronic Heart Failure With Preserved Ejection Fraction (Exercise-Induced Pulmonary Venous Hypertension) 298

Case 20: Gas Exchange Evidence of Myocardial Ischemia 302

Case 21: Claudication: Gas Exchange Findings in Peripheral Arterial Disease

Case 22: Exertional Chest Pain With Gas Exchange Evidence of Myocardial Ischemia

Case 23: Exercise-Induced Myocardial Ischemia 310

Case 24: Myocardial Ischemia With Diffuse Distal Coronary Artery Disease 314

Case 25: Myocardial Ischemia: Development of Inducible Myocardial Ischemia Over 3 Years 317

Case 26: Atrial Septal Defect and Hemochromatosis 323

Case 27: Symptomatic Chronic Mitral Insufficiency 327

Case 28: Congenital Heart Disease: Coarctation and Ventricular Septal Defect Surgically Repaired 330

Case 29: Congenital Heart Disease: Transposition of the Great Arteries With Surgical Repair 334

Case 30: Patent Ductus Arteriosus With Left-to-Right Shunt, Presurgical Closure 337

Case 31: Patent Ductus Arteriosus With Right-to-Left Shunt (Eisenmenger Ductus Syndrome) 341

Case 32: Bicuspid Aortic Valve With Aortic Regurgitation 344

Case 33: Surgically Repaired Coarctation of the Aorta With Bicuspid Aortic Valve

Case 34: Fontan Circulation 348

Case 35: Ventricular Septal Defect With Eisenmenger Syndrome 352

Case 36: Tetralogy of Fallot, Surgically Repaired 356

Case 37: Tetralogy of Fallot, Unrepaired 360

Case 38: Amyloid Cardiomyopathy 364

Case 39: Athletic Man With Tachyarrhythmia 368

Case 40: Heart Rate Impairment Due to B-Adrenergic Blockade for Treatment of Hypertension 372

Case 41: Atrial Fibrillation With Rapid Ventricular Response During Exercise 378

Case 42: Chronotropic Insufficiency With Escape Rhythm

Case 43: Active Older Man With Second-Degree Heart Block 381

Case 44: Active Man With Cardiac Conduction Defects 385

Case 45: Early Onset of Exercise Lactic Acidosis: Differentiating Circulatory From Muscular Impairment 390

Case 46: Early Onset of Exercise Lactic Acidosis Suggesting Circulatory Impairment 395

Case 47: Mixed Connective Tissue Disease With Pulmonary Involvement 400

Case 48: Pulmonary and Systemic Vasculitis: Air and Oxygen Breathing Studies

Case 49: Idiopathic Pulmonary Arterial Hypertension 404

Case 50: Severe Pulmonary Vascular Disease Secondary to Sarcoidosis: Air and Oxygen Breathing Studies 408 413

Case 51: Pulmonary Arterial Hypertension on Multidrug Therapy

Case 52: Pulmonary Hypertension, Patent Foramen Ovale, and Exercise-Induced Right-to-Left Shunt 418

- Case 53: Idiopathic Pulmonary Arterial Hypertension Before and After Treatment
 - Case 54: Long-Standing Idiopathic Pulmonary Arterial Hypertension: Serial Tests Over 17 Years of Treatment 424
 - Case 55: Intrapulmonary Right-to-Left Shunt Due to Pulmonary Arteriovenous Fistulae 430
 - Case 56: Severe Interstitial Lung Disease 434
 - Case 57: Sarcoidosis 437
- Case 58: Interstitial Pneumonitis: Before and After Empiric Corticosteroid Therapy
- Case 59: Severe Interstitial Lung Disease: Air and Oxygen Breathing Studies
 - Case 60: Mild Pulmonary Asbestosis 441
 - Case 61: Severe Pulmonary Asbestosis 445
 - Case 62: Pleural and Pulmonary Asbestosis 449
 - Case 63: Mild Chronic Bronchitis With Normal Exercise Performance 452
 - Case 64: Emphysema With Mild Airway Obstruction 455
 - Case 65: Severe Combined Obstructive and Restrictive Lung Disease 458
 - Case 66: Severe Chronic Obstructive Lung Disease 462
 - Case 67: Emphysema, Untreated 465
 - Case 68: Severe Emphysema and Bronchitis: Air and Oxygen Breathing Studies 469
 - Case 69: Bullous Emphysema: Before and After Bullectomy 475
- Case 70: A Runner With Obstructive Lung Disease
 - Case 71: Mild Obstructive Airway Disease With Disproportionate Exertional Dyspnea 481
- Case 72: Obesity Contributing to Ventilatory Limitation
 - Case 73: Extrapulmonary Restriction: Ankylosing Spondylitis 485
- Case 74: Extrapulmonary Restriction: Scoliosis
 - Case 75: Interstitial Lung Disease and Hemidiaphragm Paralysis 489
 - Case 76: Active Man With Paralyzed Hemidiaphragm 492
 - Case 77: McArdle Disease 495
 - Case 78: Myopathy With Exertional Rhabdomyolysis 499
 - Case 79: Congenital Mitochondrial Myopathy 502
 - Case 80: Mitochondrial Myopathy 505
 - Case 81: Woman With Multiple Sclerosis and Dyspnea 508
 - Case 82: Congenital Myotonia 512
- Case 83: Mixed Disorder: Chronic Bronchitis and Obesity
 - Case 84: Mixed Disorder: Peripheral Arterial Disease, Anemia, Carboxyhemoglobinemia, and Cardiac Dysfunction 518
 - Case 85: Mixed Disorder: Mild Interstitial Lung Disease, Obstructive Airway Disease, and Myocardial Ischemia 522
 - Case 86: Chronic Heart Failure With Preserved Ejection Fraction and Obesity Hypoventilation Syndrome 525
- Case 87: Mixed Disease: Aortic Stenosis, Mitral Stenosis, and Obstructive Airway Disease
- © Case 88: Mixed Disorder: Obstructive Airway Disease, Talc Pneumoconiosis, and Pulmonary Vascular Disease
 - Case 89: Mixed Disorder: Peripheral Arterial Disease and Obstructive Lung Disease: Cycle and Treadmill Exercise 529
 - Case 90: Morbid Obesity and Aortic Valve Disease 534
 - Case 91: Morbid Obesity 537.
- Case 92: Exercise Testing for Staging and Prognosis in Chronic Heart Failure
 - Case 93: Exercise Testing for Preoperative Evaluation for Lung Cancer Resection 541
 - Case 94: Exercise Testing for Evaluation of Work Fitness: Morbid Obesity 545

- Case 95: Exercise Testing for Assessment Before and After Pulmonary Rehabilitation for Chronic Obstructive Pulmonary Disease
 - Case 96: Evaluation of Unexplained Dyspnea: A Morbidly Obese Asthmatic 548
 - Case 97: Evaluation of Unexplained Dyspnea: Chronic Thromboembolic Pulmonary Vascular Disease 552

Case 66: Severe: Chrenize Districtive hump (District

Case 69: Bullous Emphysema: Before and AfrenBullerammmavoning and supplied of the company of the

Case 35: Vermittal Mitochondiffd Myopanage gases at With Eisegge and Agolf Mitochondiff Mitochon

Case 36: Tella Cay at Fallot, Surgically Repaired 356 202 yethogoyM lphbnorhodiM:08 espo

Case 37: Tetratage of Palat. Unrepaised Bengsyd bno sisorelos elgitluM nitW noman 1:18 espo

Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Party of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 84: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder: Chronic Bronchitis and Obesity drupy application of the Case 83: Mixed Disorder 84: Mixed Disor

Case 84: Mixed Disorder: Pelipinel Anerial Diseases Anemia, Calebray Hemodiconnemia, and

Case 85; Mixed Disorder! Wild Intelligible of the Care of the Case 85; Wild Disorder of the Case 85; Mixed Disorder of the C

Case 49: Idiopathic Pulmonary Arterial Popeses i Grevial politica bara y tised o bidroM :09 espo

Case 50: Severe Pulmonary Vascular Disease Secondary to Sarc 8 30 stickle Pricing Will expo

Case 52: Pulmonachetyptised@bidd@WestentilmitoWaterfilmotoWaterfilmotowaterformung: 22 asp.)

Case 88: Mixed Disorder: Obstructive Airway Disease, Tale Preumocomosia, Iplupauly

- Case 98: Evaluation of Unexplained Dyspnea: An Obese Woman at Risk for Pulmonary Hypertension 555
- Case 99: Serial Tests: Active Man With CREST Syndrome 558
- Case 100: Serial Tests: Delayed Cardiotoxicity From Chemotherapy 563

Appendices 568

Darryl Y. Sue, Susan A. Ward



To view this case please access the eBook bundled with this text. Instructions are located on the inside front cover.

Ireal manual and an appendion (1872)