

Contents

Preface vii
Series Preface ix
Acknowledgments xi

Section I Cardiovascular Physiology 1

Chapter 1	Essentials of the Cardiovascular System	3
	Components of the Cardiovascular System	5
	Cardiovascular Responses to Exercise	12
	Summary	12
Chapter 2	The Heart as a Pump	13
	Gross Anatomy of the Heart	13
	Cardiac Cycle	15
	The Ventricular Pressure–Volume Loop	17
	Cardiac Output	18
	Distribution of Cardiac Output	21
	Coronary Blood Supply	23
	Measuring Cardiac Function	26
	Summary	29
Chapter 3	Cardiac Myocytes	31
	Microscopic Anatomy of Cardiac Myocytes	31
	Excitation–Contraction Coupling	36
	Mechanisms of Contraction	37
	Metabolic Requirements	40
	Summary	40
Chapter 4	Electrical Activity of the Heart	43
	Ion Basis of Electrical Activity	43
	Resting Membrane Potential	44
	Action Potential	44
	Conduction System of the Heart	48
	Autorhythmicity of Conduction Cells	49
	Pacemakers of the Heart	50
	Control of Heart Rate	51
	Brain- and Receptor-Mediated Heart Rate	
	Control Mechanisms	53
	Heart Rate Variability	55
	Summary	58

Contents

Chapter 5	The Electrocardiogram	59
	The ECG Tracing	59
	Measuring the ECG	61
	Measuring Heart Rate	65
	Cardiac Rhythms	67
	Conduction Blocks	71
	Ventricular Hypertrophy	74
	ST-Segment Changes (Ischemia)	76
	Myocardial Infarction	76
	Test Considerations	79
	Common ECG Changes in Athletes	79
	Summary	81
Chapter 6	Hemodynamics and Peripheral Circulation	83
	The Pressure Differential	83
	Flow Velocity	84
	Poiseuille's Law	85
	Blood Flow	89
	Arterial Blood Pressure	92
	Pulse Waves and Wave Reflections	93
	Blood Pressure Measurement	95
	Control of Vasoconstriction and Vasodilation	97
	Reflex Control of Blood Pressure and Vasomotion	101
	Summary	103
Chapter 7	Vascular Structure and Function	105
	Structure of Blood Vessels	105
	Vascular Network	107
	Endothelium	108
	Endothelium Regulation of Vascular Tone	112
	Vascular Smooth Muscle	115
	Measuring Endothelial and Vascular Function	118
	Summary	121
Chapter 8	Hemostasis: Coagulation and Fibrinolysis	123
	Vascular Injury	125
	Platelets	126
	Coagulation	130
	Fibrinolysis—Clot Dissolution	133
	Assessing Hemostasis	134
	Summary	135
Section II	Exercise Physiology	137
Chapter 9	Cardiovascular Responses	
	to Acute Aerobic Exercise	139
	Cardiac Responses	139
	Vascular Response	144

	Hemostatic Responses	156
	Summary	162
Chapter 10	Cardiovascular Adaptations to Aerobic Training	163
	Cardiac Adaptations	163
	Vascular Adaptations	168
	Hemostatic Adaptations	175
	Summary	178
Chapter 11	Cardiovascular Responses to Acute Resistance Exercise.	179
	Cardiac Responses	180
	Vascular Responses	184
	Hemostatic Responses	189
	Summary	192
Chapter 12	Cardiovascular Adaptations to Resistance Training.	193
	Cardiac Adaptations	193
	Vascular Function	197
	Hemostatic Adaptations With Resistance Training	201
	Summary	201
	Glossary 203	
	Recommended Readings 207	
	References 209	
	Index 223	
	About the Authors 227	