

Contents

| | |
|---|------|
| Preface | xi |
| Acknowledgments | xiii |
| | |
| Chapter 1 THE CIRCULATORY SYSTEM | |
| 1. Anatomy | 1 |
| 2. The Triggering System | 4 |
| 3. System Operation | 7 |
| 4. Function | 10 |
| Problems | 11 |
| References | 12 |
| | |
| Chapter 2 BLOOD PRESSURE MEASUREMENT | |
| 1. Introduction | 13 |
| 2. Noninvasive Techniques | 14 |
| 3. Invasive Techniques | 20 |
| 4. Pressure Measurement in the Microcirculation | 42 |
| Problems | 44 |
| References | 45 |
| | |
| Chapter 3 BLOOD FLOW MEASUREMENT | |
| 1. Introduction | 48 |
| 2. Measurement of Cardiac Output | 49 |

| | |
|---|-----|
| 3. Measurement of Local Flow | 65 |
| 4. Flow Measurement in the Microcirculation | 85 |
| Problems | 98 |
| References | 98 |
| | |
| Chapter 4 THE ARTERIAL TREES | |
| 1. Introduction | 105 |
| 2. The Systemic Arterial Tree | 106 |
| 3. The Pulmonary Arterial Tree | 142 |
| Problems | 149 |
| References | 151 |
| | |
| Chapter 5 VEINS | |
| 1. Introduction | 157 |
| 2. Flow in Collapsible Tubes | 161 |
| 3. The Systemic Venous Tree | 172 |
| 4. Pulsatile Pressure and Flow in Pulmonary Veins | 176 |
| Problems | 178 |
| References | 178 |
| | |
| Chapter 6 MICROCIRCULATION | |
| 1. Introduction | 182 |
| 2. Anatomy of the Microvasculature | 183 |
| 3. Physiological Features | 184 |
| 4. Microcirculatory Dynamics | 191 |
| Problems | 195 |
| References | 196 |
| | |
| Chapter 7 THE HEART | |
| 1. Introduction | 198 |
| 2. The Frank–Starling Mechanism | 200 |
| 3. Concepts in Muscle | 205 |
| 4. The Contractile Mechanism | 215 |
| 5. The Heart as a Pump | 220 |
| 6. Indices of Myocardial “Contractility” | 231 |
| 7. The Coronary Circulation | 239 |
| Problems | 242 |
| References | 242 |
| | |
| Chapter 8 CONTROL | |
| 1. Introduction | 250 |
| 2. Baroreceptors | 256 |

Contents

ix

| | |
|--|-----|
| 3. Automated Control of Blood Pressure | 264 |
| 4. Control of Peripheral Resistance | 268 |
| 5. Cerebral Flow | 272 |
| Problem | 274 |
| References | 275 |

Chapter 9 THE CLOSED CARDIOVASCULAR SYSTEM

| | |
|---|-----|
| 1. The Circulation in Failure and during Exercise | 278 |
| 2. Explicit Introduction of the Model Concept | 286 |
| 3. Explicit Introduction of the Computer | 288 |
| 4. The Future of Cardiovascular Systems Analysis | 297 |
| Problems | 304 |
| References | 304 |

Chapter 10 CIRCULATORY ASSISTANCE

| | |
|-------------------------------------|-----|
| 1. Introduction | 309 |
| 2. Temporary Assist Devices | 311 |
| 3. Permanent Circulatory Assistance | 315 |
| 4. Total Heart Replacement | 318 |
| Problems | 323 |
| References | 323 |

| | |
|-----------------------|-----|
| Solutions to Problems | 327 |
| Index | 345 |