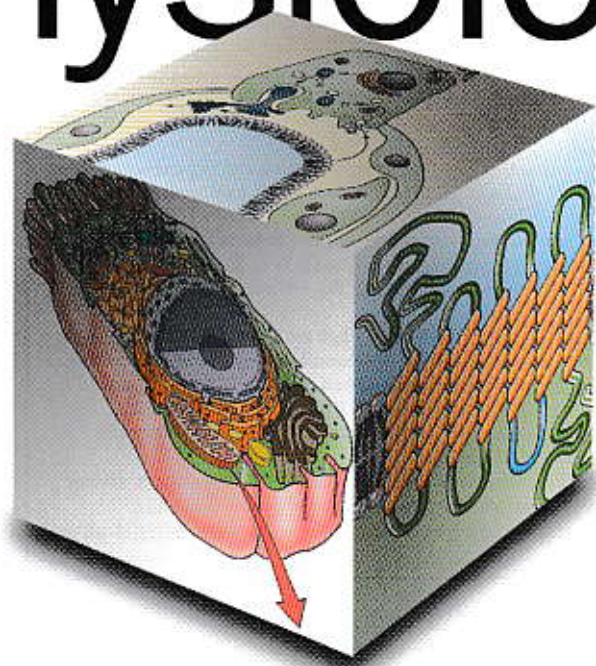


Medical Physiology



THIRD **3** EDITION

WALTER F. BORON, MD, PhD

Professor

David N. and Inez Myers/Antonio Scarpa Chairman
Department of Physiology and Biophysics
Case Western Reserve University
Cleveland, Ohio

EMILE L. BOULPAEP, MD

Professor

Department of Cellular and Molecular Physiology
Yale University School of Medicine
New Haven, Connecticut

CONTENTS

SECTION I

INTRODUCTION

- 1** Foundations of Physiology, 2
Emile L. Boulpaep and Walter F. Boron

SECTION II

PHYSIOLOGY OF CELLS AND MOLECULES

- 2** Functional Organization of the Cell, 8
Michael J. Caplan
- 3** Signal Transduction, 47
Lloyd Cantley
- 4** Regulation of Gene Expression, 73
Peter Igarashi
- 5** Transport of Solutes and Water, 102
Peter S. Aronson, Walter F. Boron, and Emile L. Boulpaep
- 6** Electrophysiology of the Cell Membrane, 141
Edward G. Moczydlowski
- 7** Electrical Excitability and Action Potentials, 173
Edward G. Moczydlowski
- 8** Synaptic Transmission and the Neuromuscular Junction, 204
Edward G. Moczydlowski
- 9** Cellular Physiology of Skeletal, Cardiac, and Smooth Muscle, 228
Edward G. Moczydlowski

SECTION III

THE NERVOUS SYSTEM

- 10** Organization of the Nervous System, 254
Bruce R. Ransom
- 11** The Neuronal Microenvironment, 275
Bruce R. Ransom
- 12** Physiology of Neurons, 295
Barry W. Connors
- 13** Synaptic Transmission in the Nervous System, 307
Barry W. Connors
- 14** The Autonomic Nervous System, 334
George B. Richerson
- 15** Sensory Transduction, 353
Barry W. Connors
- 16** Circuits of the Central Nervous System, 390
Barry W. Connors

SECTION IV

THE CARDIOVASCULAR SYSTEM

- 17** Organization of the Cardiovascular System, 410
Emile L. Boulpaep
- 18** Blood, 429
Emile L. Boulpaep
- 19** Arteries and Veins, 447
Emile L. Boulpaep
- 20** The Microcirculation, 461
Emile L. Boulpaep
- 21** Cardiac Electrophysiology and the Electrocardiogram, 483
W. Jonathan Lederer
- 22** The Heart as a Pump, 507
Emile L. Boulpaep
- 23** Regulation of Arterial Pressure and Cardiac Output, 533
Emile L. Boulpaep
- 24** Special Circulations, 556
Steven S. Segal
- 25** Integrated Control of the Cardiovascular System, 572
Emile L. Boulpaep

SECTION V

THE RESPIRATORY SYSTEM

- 26** Organization of the Respiratory System, 590
Walter F. Boron
- 27** Mechanics of Ventilation, 606
Walter F. Boron
- 28** Acid-Base Physiology, 628
Walter F. Boron
- 29** Transport of Oxygen and Carbon Dioxide in the Blood, 647
Walter F. Boron
- 30** Gas Exchange in the Lungs, 660
Walter F. Boron
- 31** Ventilation and Perfusion of the Lungs, 675
Walter F. Boron
- 32** Control of Ventilation, 700
George B. Richerson and Walter F. Boron

SECTION VI

THE URINARY SYSTEM

- 33 Organization of the Urinary System, 722**
Gerhard Giebisch, Erich E. Windhager, and Peter S. Aronson
- 34 Glomerular Filtration and Renal Blood Flow, 739**
Gerhard Giebisch, Erich E. Windhager, and Peter S. Aronson
- 35 Transport of Sodium and Chloride, 754**
Gerhard Giebisch, Erich E. Windhager, and Peter S. Aronson
- 36 Transport of Urea, Glucose, Phosphate, Calcium, Magnesium, and Organic Solutes, 770**
Gerhard Giebisch, Erich E. Windhager, and Peter S. Aronson
- 37 Transport of Potassium, 792**
Gerhard Giebisch, Erich E. Windhager, and Peter S. Aronson
- 38 Urine Concentration and Dilution, 806**
Gerhard Giebisch, Erich E. Windhager, and Peter S. Aronson
- 39 Transport of Acids and Bases, 821**
Gerhard Giebisch, Erich E. Windhager, and Peter S. Aronson
- 40 Integration of Salt and Water Balance, 836**
Gerhard Giebisch, Erich E. Windhager, and Peter S. Aronson

SECTION VII

THE GASTROINTESTINAL SYSTEM

- 41 Organization of the Gastrointestinal System, 852**
Henry J. Binder
- 42 Gastric Function, 863**
Henry J. Binder
- 43 Pancreatic and Salivary Glands, 879**
Christopher R. Marino and Fred S. Gorelick
- 44 Intestinal Fluid and Electrolyte Movement, 899**
Henry J. Binder
- 45 Nutrient Digestion and Absorption, 914**
Henry J. Binder and Charles M. Mansbach II
- 46 Hepatobiliary Function, 944**
Frederick J. Suchy

SECTION VIII

THE ENDOCRINE SYSTEM

- 47 Organization of Endocrine Control, 974**
Eugene J. Barrett

- 48 Endocrine Regulation of Growth and Body Mass, 990**
Eugene J. Barrett
- 49 The Thyroid Gland, 1006**
Eugene J. Barrett
- 50 The Adrenal Gland, 1018**
Eugene J. Barrett
- 51 The Endocrine Pancreas, 1035**
Eugene J. Barrett
- 52 The Parathyroid Glands and Vitamin D, 1054**
Eugene J. Barrett and Paula O. Barrett

SECTION IX

THE REPRODUCTIVE SYSTEM

- 53 Sexual Differentiation, 1072**
Sam Mesiano and Ervin E. Jones
- 54 The Male Reproductive System, 1092**
Sam Mesiano and Ervin E. Jones
- 55 The Female Reproductive System, 1108**
Sam Mesiano and Ervin E. Jones
- 56 Fertilization, Pregnancy, and Lactation, 1129**
Sam Mesiano and Ervin E. Jones
- 57 Fetal and Neonatal Physiology, 1151**
George Lister and Ervin E. Jones

SECTION X

PHYSIOLOGY OF EVERYDAY LIFE

- 58 Metabolism, 1170**
Gerald I. Shulman and Kitt Falk Petersen
- 59 Regulation of Body Temperature, 1193**
Shaun F. Morrison
- 60 Exercise Physiology and Sports Science, 1204**
Steven S. Segal
- 61 Environmental Physiology, 1223**
Arthur DuBois
- 62 The Physiology of Aging, 1235**
Edward J. Masoro

Index, 1249