

PREFACE



Knowledge of cellular and molecular physiology is fundamental to understanding tissue and organ function as well as integrative systems physiology. Pathological mechanisms and the actions of therapeutic agents can best be appreciated at the molecular and cellular level. Moreover, a solid grasp of the scientific basis of modern molecular medicine and functional genomics clearly requires an education with this level of sophistication.

The explicit objective of *Cellular Physiology and Neurophysiology* is to help medical and graduate students bridge the divide between basic biochemistry and molecular and cell biology on the one hand and organ and systems physiology on the other. The emphasis throughout is on the functional relevance of the concepts to physiology. Our aim at every stage is to provide an intuitive approach to quantitative thinking. The essential mathematical derivations are presented in boxes for those who wish to verify the more intuitive descriptions presented in the body of the text. Physical and chemical concepts are introduced wherever necessary to assist students with the learning process, to demonstrate the importance of the principles, and to validate their ties to clinical medicine. Applications of many of the fundamental concepts are illustrated with examples from systems physiology, pharmacology, and pathophysiology. Because physiology is fundamentally a science founded on actual measurement, we strive

to use original published data to illuminate key concepts.

The book is organized into five major sections, each comprising two or more chapters. Each chapter begins with a list of learning objectives and ends with a set of study problems. Many of these problems are designed to integrate concepts from multiple chapters or sections; the answers are presented in Appendix E. Throughout the book key concepts and new terms are highlighted. A set of multiple-choice review questions and answers is contained in Appendix F. A review of basic mathematical techniques and a summary of elementary circuit theory, which are useful for understanding the material in the text, are included in Appendixes B and D respectively. For convenience Appendix A contains a list of abbreviations symbols and numerical constants.

We thank our many students and our teaching colleagues whose critical questions and insightful comments over the years have helped us refine and improve the presentation of this fundamental and fascinating material. Nothing pleases a teacher more than a student whose expression indicates that the teacher's explanation has clarified a difficult concept that just a few moments earlier was completely obscure.

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