

Essentials of Medical Biochemistry

With Clinical Cases

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Much of the content and concepts for *Essentials of Medical Biochemistry: With Clinical Cases* were derived from the fourth edition of *Medical Biochemistry*. The goal has always been to integrate the principles of biochemistry into the understanding of health and disease. Students and practitioners in medicine and other health-related fields rely upon learning, mastering, and applying this knowledge with wisdom. Our goal is to weave the essentials of medical biochemistry with other basic and clinical science disciplines into a tapestry of understanding and to encourage the lifelong learning of the biochemistry required to solve challenges in the maintenance of good health and in thwarting illnesses.

The discipline of medical biochemistry is often compartmentalized and perceived as the memorization of a plethora of reactions assembled into metabolic pathways. However, the memorization aspect becomes irrelevant when biochemistry is integrated by bridging gaps with other basic and clinical disciplines. This will inspire students to appreciate that metabolic pathways are molecular families that are integrated to provide optimal biochemical responses; perturbations in these pathways can lead to metabolic disorder. Learning should be enjoyable and foster the student to solve clinical problems with the knowledge they have acquired. The landscape and understanding of medical biochemistry and related disciplines are inexorably advancing and becoming increasingly relevant in the appreciation of preservation of homeostasis. These advances have led to new diagnostic procedures, therapeutic interventions using specific targeted therapies (e.g., tyrosine kinase inhibitors and monoclonal antibodies), and an overall understanding of health and disease. The goal of this book is to illustrate these concepts in tandem with clinical aspects.

The organization of topics is designed to lead the student logically through the biochemical organization of cells (Chapter 1). Emphasis is placed on the structures and functions of the molecular components of cells and on metabolic controls. The text begins with a discussion of water, acids, bases, and buffers, amino acids, proteins and the bioenergetics of biological systems (Chapters 2–5). This is followed by a discussion of important aspects of enzymology (Chapters 6 and 7). Carbohydrate biochemistry (Chapters 8–10, 12, 14) is integrated with chapters that discuss gastrointestinal digestion (Chapter 11), oxidative phosphorylation (Chapter 13), and protein metabolism

(Chapter 15). Three chapters on lipids (Chapters 16–18) are integrated with chapters covering contractile systems (Chapter 19) and metabolic homeostasis (Chapter 20).

The principles of molecular biology, including nucleic acid chemistry and the regulation of gene expression and protein synthesis, are presented in Chapters 21–24. These are followed by chapters on nucleotide, hemoglobin, and heme metabolism (Chapters 25–27). The endocrine system and its organs are discussed in Chapters 28–32. Molecular immunology is presented in Chapter 33, and the biochemistry of hemostasis is discussed in Chapter 34. The last section deals with mineral and vitamin metabolism and electrolyte balance (Chapters 35–37).

The importance of human nutrition is emphasized throughout the text and has not been relegated to a single chapter. Likewise, hereditary disorders are discussed, along with other clinical examples that relate the relevant biochemistry to diagnosis and treatment. The key points are listed at the beginning of each chapter.

Clinical case studies (chapter 38) were selected to illustrate and exemplify the necessity of biochemical knowledge in the understanding and solving of clinical problems. All of these cases include chapter numbers for the integration of subject topics, teaching points, and additional supplemental enrichment references. Many of these case studies are abstracted from previously published articles and they are presented with a synopsis of the case. Some cases were derived from cumulative clinical laboratory medicine experience of the authors and their collaborators. While reviewing clinical cases, it is essential to become aware of the caveats that may exist in distinguishing between normal and abnormal reference intervals for biochemical parameters, because a normal value does not necessarily exclude the disease in question. References for additional case studies and for supplementary enrichment learning are also provided. In our estimation, a thoughtful and thorough review of these cases within the context of the subject material presented in the various chapters should enable the student to appreciate, understand, and develop skills in clinical problem solving. Furthermore, these case studies provide illustrations for anchoring patient history with quantifiable laboratory studies in formulating problem solving.

The Companion web site (<http://booksite.academicpress.com/bhagavan/>) includes supplemental information

that should be integrated into the overall learning process of medical biochemistry. Multiple-choice questions are provided in an interactive framework and are intended to assess comprehension of content required for the development of problem-solving skills.

Our view of discovery and its application of knowledge in medical biochemistry to health and disease reflects the following quotation: “We should talk about research as a

seamless whole, a continuum of effort that flows from fundamental discoveries with no obvious application inexorably to the prevention and treatment of human diseases”; from Gregory A. Petsko’s ‘No Stone Unturned’ in the May 2010 issue of the American Society for Biochemistry and Molecular Biology’s *ASBMB Today*, page 4.

For access to online material associated with this book, please visit <http://booksite.academicpress.com/bhagavan/>.

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