Biochemistry for the Medical Sciences

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FOREWORD

There are basically two kinds of textbooks of biochemistry. One is concerned primarily with molecules and reactions, the other with biochemical explanations of physiological and clinical phenomena. The former is intended for biochemists and would-be biochemists, while the latter is most profitably read by clinicians, medical students and other students of the life sciences.

This new book by Eric Newsholme and Tony Leech is clearly of the second category. Basic biochemistry is not ignored: Readers will find all the essential information about biomolecular structure and the mechanism of biochemical reactions. However, the emphasis throughout is on the biological purposes of biochemical phenomena—on metabolic pathways and their control, and on the physiological significance and clinical relevance of the topics being discussed.

Much of this book is based on a lecture course in metabolic biochemistry that Dr. Newsholme has been giving to medical students at Oxford for many years. I had the privilege of spending a sabbatical year in the Department of Biochemistry at Oxford seven years ago, and I well remember the pleasure afforded by those lectures. They were models of clarity and conciseness, and they conveyed the beauty and excitement of modern biochemistry in a way that I had never seen before. This book captures the flavor of those lectures, but of course contains far more detail and substance.

As a clinician and medical teacher, I particularly appreciate the accessibility and logical simplicity of this book. The writing is clear, direct, and economical.

Biochemistry is chemistry with a purpose, and Dr. Newsholme explains the biological purpose of every molecule and every reaction he discusses. Students of medicine will like the way he deals with the functions and regulation of metabolic pathways and their disturbance by disease and physiological stress. This is an area in which the author himself has made notable original contributions.

There are many competent introductory textbooks of biochemistry, but none more suited to the special interests of physicians and physiologists. For those seeking a lucid and readable account of the metabolic machinery of the body, this new book should be just what the doctor ordered.

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PREFACE

Biochemistry is not always the most popular subject in the medical school curriculum and the reason is not too hard to see. Now that most of the reactions of the degradative and synthetic processes occurring in man have been described it has become a requirement for medical students to demonstrate their knowledge of these pathways. The tacit assumption is that this knowledge will automatically benefit the practising physician when he comes to deal with disturbances of these processes. In fact a knowledge of pathways is no more and no less useful than a knowledge of anatomy. Both are essential but in themselves quite inadequate. What the student needs is a great deal of help in appreciating the connection between metabolic pathways and metabolic disturbances.

Twenty years ago one of us was told by his Professor that no comprehensive biochemistry text would ever again be written—the subject was too vast. This statement underestimated the organizational ability of many biochemists; at regular intervals since then many excellent biochemistry textbooks have appeared. Paradoxically, these have increased the problems of the medical student because they have made the understanding of biochemistry easier without helping the student appreciate the medical implications. In fairness, many of these implications have only emerged as a result of the spate of quantitative metabolic research taking place in the 1970s. We feel that medical students deserve a more helpful and relevant textbook and we have sought to provide it. It is our intention that it should stand alone and provide all the metabolic biochemistry needed by the first- or second-year medical student, although we would never discourage a student from undertaking wider reading!

The book falls into five parts. In the first (Chapters 1–3) those fundamental principles on which all of metabolism is based are explained as clearly as we can manage. This is followed (in Chapters 4–9) by a description of the oxidative and degradative pathways of carbohydrates and lipid metabolism, how these are controlled and integrated in health and how failures of this integration explain a number of diseases and hence how they can be treated. In the third part (Chapters 10–15) the metabolism of amino acids is introduced into the metabolic scheme and again examined from the standpoint of control and integration in health and disease. In the penultimate part (Chapters 16–19) synthetic pathways are described together with a range of clinical topics including obesity and non-insulin-dependent diabetes. Finally, the metabolism and disturbance thereof, of the molecules that integrate other processes, namely hormones and neurotransmitters, is described.

Anyone writing a textbook is faced with decisions that hitherto could always be avoided. One of the most troublesome has been nomenclature; in its present state of change we are bound to have offended someone. We have done our best to be correct but have used as the final criterion utility and clarity for the student, even if that did mean an anticipation of future trends. For the names of enzymes we have used throughout the book the trivial names recommended by the Enzyme Commission. Another contentious decision will be the inclusion of references and a bibliography. We decided that, despite our inability to offer a comprehensive bibliography, we would include a substantial number of references both to demonstrate the relevance of biochemistry to clinical work and to help those with deeper interest in any area to begin a literature search.

Few of the ideas in the book have claim to originality on our part but while we hope we have not committed plagiarism we are grateful to all those whose writings have been clear enough to enable us to make use of them.

We wish to express our gratitude to our colleagues who have, either wittingly or unwittingly, helped with the preparation of this text, in particular: Dr. B. Crabtree, Dr. H. R. Fatania, Professor M. Gelder, Dr. G. M. Hall, Dr. L. Hermansen, Professor N. L. Jones, Dr. P. Lund, Dr. J. Mellanby, Dr. B. D. Ross, Professor K. W. Taylor, Dr. D. H. Williamson.

We would also like to thank the typists who at various times were involved in the preparation of the manuscript, Clare Bass, Shirley Greenslade, Patricia Stallard and especially Andrea Bates. Finally, we thank our families for their patience and support. Many times they must have thought the writing would never end but didn't say so.

We have tried, throughout the text, to provide a balanced account of controversial areas and consider that the presentation of different views is important to reinforce the point that theories, both of biochemistry and of the nature of disease, must always be open to reinterpretation with the advancement of knowledge. It is our hope that indications of doubt that are raised in this text will provide impetus for further research by the interested student, teacher and practising physician. We have tried to write a text that will be of use and interest not only to the student but to the doctor who wishes to be brought up-to-date in this area of medicine. We hope that the enthusiasm we find for the subject is communicated to our readers and the book will be read in order, as the editorial in the *Lancet* on 'Medical Education on Trial' (*Lancet i*, 837–838, 1982) requested, to enable doctors to meet 'the challenge imposed by the rapidly changing medical scene'.

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