

TEXTBOOK OF
MEDICAL BIOCHEMISTRY

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Seventh Edition

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Textbook of Medical Biochemistry

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“Today’s Biochemistry is Tomorrow’s Medicine” rightly said by many is truly justified by “Dr (Brig) MN Chatterjea and Dr Rana Shinde in their *Textbook of Medical Biochemistry*”. Authors’ sincere efforts are appreciated both by students and faculty who have been using this book, which is meeting most of the requirements of MCI regulations. I have found lot of appreciation and greater acceptance in India and abroad for which authors have put in special efforts to cover wide spectrum of current topics in medical biochemistry through constant review and changes from time to time. This popular *Textbook of Medical Biochemistry* itself is a good guide and a tool to both undergraduate students and teachers in medical biochemistry.

Prof T Venkatesh

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I am very happy to write this foreword for this edition of the *Textbook of Medical Biochemistry*. In keeping with its prior editions, the authors have given full attention to include the advancements occurred in the field of clinical biochemistry. I am a practicing clinical chemist in community hospital who used tools in basic concepts of the subject, when teaching students the art and science of clinical biochemistry. I encourage the teachers in medical schools in India and abroad to use the book for teaching the subject of clinical biochemistry. I am a strong advocate of teaching the fundamental concepts in biochemistry to medical students, clinical laboratory technologists and clinical pathologists to advance their understanding of the subject.

The authors are well-known teachers and have spent decades in this field. The edition is loaded with relevant subject information for those who are seeking to understand medical biochemistry. I recommend the book for medical students at undergraduate as well as postgraduate levels.

I am sure the medical college community in India and abroad will welcome this edition of *Textbook of Medical Biochemistry*.

Dr Vijaykant B Kambli

PhD MBA FACB DABCC

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Former Director, Clinical Biochemistry
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The discipline of biochemistry has expanded by leaps and bounds. It is an independent subject with a separate examination in almost all medical colleges. Though there are a few books on biochemistry written by Indian authors, there is need for a comprehensive yet simplified textbook. I am happy that the *Textbook of Medical Biochemistry*, written by Dr (Brig) MN Chatterjea and Dr Rana Shinde, fulfils this need. Both authors have long experience in teaching biochemistry to undergraduates and postgraduates. They have tried their best to make the text simple and lucid and at the same time have also incorporated the recent developments in the subject. The textbook is useful not only for undergraduates but also for postgraduates in biochemistry and others registering for diplomate examination of the National Board of Examinations.

I hope the book will receive appreciation as well as encouragement from all biochemists.

Dr C Sita Devi

MD FAMS FIMSA
Vice President—Lab Services
Retd. Principal and Professor
of Biochemistry
Andhra Medical College
Vishakhapatnam

I am pleased to go through the *Textbook of Medical Biochemistry* written by Dr MN Chatterjea and Dr Rana Shinde. The book makes a lucid reading, is full of necessary facts for medical students, and the text is clinically oriented.

Both the authors are well-known teachers of repute and have really tried to make the book simple as well as useful for medical students at undergraduate and postgraduate levels.

This book, though similar to many other such textbooks, is unique for its clarity and comprehension. I am sure students and teachers will gladly accept the book.

Dr KP Sinha

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We feel it a great pleasure to present the seventh edition of our *Textbook of Medical Biochemistry* to our beloved teachers and students though the main framework of the book has been retained, extensive revisions have been made for certain chapters. The book has been trimmed and pruned wherever possible to accommodate the “new” by shedding off “old”. The book is clinically-oriented and in every chapter stress has been given to highlight the clinical aspects/significance and biomedical importance of the topics.

It has been our endeavour to provide not only basic essentials but also to include some new concepts and ideas which are essential for good students to achieve ‘distinctions’. We have tried to keep the essentials for average MBBS students in normal prints and the advanced knowledge required for good students and postgraduate students have been kept in small prints. These “extras” will help the students throughout their MBBS course. Average MBBS students can skip off the small prints.

In this edition, we have omitted the chapter on “urine analysis — chemistry and clinical significance”. We are forced to do it to give space and accommodate some new chapters. This topic is available to the students in their college “Laboratory manual” which is supplied by every medical colleges.

As per requests received from different professors/teachers, five new chapters have been added. They are:

- Polymerase Chain Reaction (PCR) and Real Time PCR
- Human Genome Project
- Gene Therapy
- Biochemistry of Cholera — Vibrio Toxins, Pathogenesis and
- Biochemistry of Ageing

The overall objective of the book has been to provide concise yet authoritative coverage of the basics of biochemistry with the clinical approach to understand disease processes. The important points which are required to be remembered by the students have been highlighted in bold prints and italics. We have retained the boxes in the beginning of each chapter which will guide the undergraduate MBBS students how much to study and learn.

We feel confident that this edition will fulfil the requirements of the undergraduates as per MCI recommendations and also meet the needs and expectations of postgraduate students in Biochemistry/Pathology/and Medicine. Colour printing has been used to make the book more attractive, easy reading and highlighting the important portions like Clinical Aspects/Significance and Biomedical Importance.

We do not claim to be perfect. Mistakes may creep in due to oversight or printing errors. We shall look forward for valuable comments and fruitful suggestions from teachers and students so that errors are rectified and suggestions are taken into account.

We sincerely thank Shri JP Vij, Dynamic CMD, Mr PG Bandhu, Director (Sales) and Mr Tarun Duneja, General Manager (Publishing) for their untiring work and keen efforts to bring out the new revised seventh edition of the book.

MN Chatterjea
Rana Shinde

Biochemistry holds a key position in the curricula of medical colleges under Indian universities, and is one of the basic preclinical science subjects for first professional MBBS students.

Biochemistry is being transformed with astonishing rapidity and current efflorescence in the knowledge in this subject has necessitated that it should be learnt separately from physiology. The three basic science subjects make a plinth for the house of medicine. A sound and comprehensive learning of biochemistry will help a medical student understand medicine and pathology more clearly.

A large number of books on biochemistry for medical students are available in the market—both international and Indian. Many of the international books are voluminous and too difficult for our students of medicine to handle and comprehend.

The *Textbook of Medical Biochemistry* for the medical students is the outcome of the joint efforts of a medical and a nonmedical biochemist, who possess considerable experience in teaching biochemistry to undergraduate and postgraduate medical students of Indian universities.

We have tried our utmost to ensure that the language used is lucid and simple, makes an easy-reading, and the text provides an intelligent and comprehensive study. At the same time, we have attempted to maintain a high standard after incorporating the recent developments and concepts.

Though the book is primarily meant for the first professional MBBS students, certain chapters have been dealt with in greater detail to meet the requirements of postgraduates, viz. MSc, MD (Biochemistry) students and those preparing for Diplomate in NBE. It meets the requirements of students of medical, dental science, agricultural science, home science, and others who have to take a basic course in biochemistry.

The text of the book is spread over 40 chapters and special mention has been made to introduce to the reader some recent topics such as cyclic nucleotides—cyclic AMP and cyclic GMP, prostaglandins, prostacyclins, thromboxanes and leukotrienes, immunoglobulins, recombinant DNA technology, clinical significance of enzymes and isoenzymes, radioisotopes and their clinical and therapeutic uses, etc.

Recently, much importance has been given to self-study by students in small groups and to avoid or to restrict to the minimum the traditional way of learning based on “didactic” lectures. Keeping this in view, we have included in the beginning of each chapter the “major concepts” and “specific objectives” of the chapter for the information of the readers so that medical students know what to study and learn. The text of each chapter has been written keeping in view the objectives so that students can make a self-study. We wish to emphasise that these are “behavioural objectives” and are self-explanatory.

In our several years of teaching experience, we have observed that medical students have a “fear-complex” that biochemistry involves too many structural formulae and chemical equations. Though this is unavoidable to some extent for proper understanding of the subject, we have tried to restrict the chemical formulae to the minimum and used them to explain certain reactions.

At the end of each chapter we have given “essay type” or “short notes type” questions which we have compiled from the examination papers of different Indian universities. It will be seen that there is repetition of some questions, but the framing of the question and language is different.

We have also tried to give some 15 to 30 MCQs (with answers at the end) in each chapter which may be useful for the medical students for their homework.

While writing the chapters and compiling the questions, we have consulted syllabi of several Indian universities to cover all the topics prescribed for undergraduate and postgraduate medical students. We have included a large number of tables and comparative discussions wherever possible to meet the needs of the students. Our aim has been to provide a comprehensive, self-contained textbook of biochemistry to effectively satisfy the curricular requirements of medical students of Indian universities.

In addition, our main target has been to make the book clinically-oriented. We have given the clinical significance and biomedical importance wherever it is applicable. Biochemical aspects of certain pathological conditions, specially those due to abnormal metabolism, have been discussed in detail. We earnestly hope that the book will be of help to both the undergraduate and postgraduate medical students and their teachers.

No one can be perfect, and there could have been some flaws or shortcomings in the book. We will welcome constructive criticism and comments, if any, along with fruitful suggestions to improve the text in its future editions.

In writing a textbook of this nature, one has to take help from others and this book is no exception. We are highly indebted to our colleagues and friends, and other authors whom we have consulted in compiling this book.

Our thanks to Mrs K.N. Valsa and Mrs Gracy for their untiring efforts and forbearance in typing the manuscript.

We are also grateful to Shri Jitendar P Vij, Managing Director, and Mr YN Arjuna, Editorial and Publishing Consultant, of Jaypee Brothers Medical Publishers for their sincere and untiring efforts in transforming the typed manuscript to printed form.

MN Chatterjea
Rana Shinde

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