Textbook of

Third Edition

Edition

Textbook of Modern

Pharmacology

Modern Pharmacology

for MBBS Students

Pharmacology Made Easier

Salient features

- The book explains only the drugs in current use. Decade-old, unimportant drugs or miscellaneous drugs are excluded from the classification.
- To bring in brevity and simplicity, only the clinically important pharmacokinetic properties of the drugs are explained.
- Basic mechanism of action, essential for the undergraduate students, is given in depth. Molecular mechanism of drugs, which is important for postgraduate students only, is omitted in the book.

M Muniappan PhD (Pharmacology) is ex-Professor, Department of Pharmacology, Sree Balaji Medical College and State PILLED Deemed to be University).



G Somasundaram MD

is Professor and Head, Department of Pharmacology, SLIMS, Puducherry (affiliated to BIHFR. Deemed to be University).



RSivaraj MD, DIH

is Professor and Head, Department of Pharmacology, Arupadai Veedu Medical College and Hospital, Kirumampakkam, Puducherry (Vinayaka Mission's Research Foundation, Deemed to be University).







CBS Publishers & Distributors Pvt Ltd

4819/XI, Prahlad Street, 24 Ansari Road, Daryaganj, New Delhi 110 002, India E-mail: delhi@cbspd.com, cbspubs@airtelmail.in; Website: www.cbspd.com New Delhi | Bengaluru | Chennai | K<mark>ochi | Kolkata | M</mark>umbai







Textbook of Third Edition Modern Pharmacology

for MBBS Students

Pharmacology Made Easier

As per the latest syllabus prescribed by MCI



M Muniappan **G** Somasundaram R Sivaraj



Third Edition

Textbook of Modern Pharmacology for MBBS Students

Pharmacology Made Easier

As per the latest syllabus prescribed by MCI

M Muniappan PhD (Pharmacology)

Ex-Professor
Department of Pharmacology
Sree Balaji Medical College and Hospital
(BIHER, Deemed to be University)
Chennai

G Somasundaram MD

Professor and Head Department of Pharmacology SLIMS, Puducherry (BIHER, Deemed to be University)

R Sivaraj MD, DIH

Professor and Head Department of Pharmacology Arupadai Veedu Medical College and Hospital Kirumampakkam, Puducherry Vinayaka Mission's Research Foundation (Deemed to be University under Section 3 of the UGC Act, 1956)

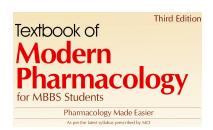


CBS Publishers & Distributors Pvt Ltd

New Delhi • Bengaluru • Chennai • Kochi • Kolkata • Mumbai Hyderabad • Jharkhand • Nagpur • Patna • Pune • Uttarakhand

Disclaimer

Science and technology are constantly changing fields. New research and experience broaden the scope of information and knowledge. The authors have tried their best in giving information available to them while preparing the material for this book. Although all efforts have been made to ensure optimum accuracy of the material, yet it is quite possible some errors might have been left uncorrected. The publisher, the printer and the authors will not be held responsible for any inadvertent errors, omissions or inaccuracies.



ISBN: 978-93-89688-01-6

Copyright @ Authors and Publisher

Third Edition: 2021 First Edition: 2018 Second Edition: 2019

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system without permission, in writing, from the authors and the publisher.

Published by Satish Kumar Jain and produced by Varun Jain for

CBS Publishers & Distributors Pvt Ltd

4819/XI Prahlad Street, 24 Ansari Road, Daryaganj, New Delhi 110 002, India.

Ph: 23289259, 23266861, 23266867 Website: www.cbspd.com

Fax: 011-23243014 e-mail: delhi@cbspd.com; cbspubs@airtelmail.in.

Corporate Office: 204 FIE, Industrial Area, Patparganj, Delhi 110 092

Ph: 4934 4934 Fax: 4934 4935 e-mail: publishing@cbspd.com; publicity@cbspd.com

Branches

- Bengaluru: Seema House 2975, 17th Cross, K.R. Road, Banasankari 2nd Stage, Bengaluru 560 070, Karnataka Ph: +91-80-26771678/79 Fax: +91-80-26771680 e-mail: bangalore@cbspd.com
- Chennai: 7, Subbaraya Street, Shenoy Nagar, Chennai 600 030, Tamil Nadu
- Ph: +91-44-26680620, 26681266 Fax: +91-44-42032115 e-mail: chennai@cbspd.com
- Kochi: 42/1325, 1326, Power House Road, Opp KSEB, Kochi 682 018, Kerala, India
- Ph: +91-484-4059061-65,67 Fax: +91-484-4059065 e-mail: kochi@cbspd.com
- Kolkata: 6/B, Ground Floor, Rameswar Shaw Road, Kolkata-700014 (West Bengal), India Ph: +91-33-2289-1126, 2289-1127, 2289-1128 e-mail: kolkata@cbspd.com
- Mumbai: 83-C, Dr E Moses Road, Worli, Mumbai-400018, Maharashtra
- Ph: +91-22-24902340/41 Fax: +91-22-24902342 e-mail: mumbai@cbspd.com

Representatives

 Hvderabad 0-9885175004 Jharkhand 0-9811541605 Nagpur 0-9421945513 0-9334159340 Pune 0-9623451994 Uttarakhand 0-9716462459

Printed at Goyal Offset Printers, GT Karnal Road, Industrial Area, Delhi, India



Sree Balaji Medical College & Hospital

SREE BALAJI MEDICAL COLLEGE & HOSPITAL SREE BALAJI MEDICAL COLLEGE & HOSPITAL SREE BALAJI MEDICAL

A constituent college of

BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH

(Declared as Deemed to be University under section 3 of UGC Act, 1956)

(Vide Notification No.F.9-5/2000-U.3, Ministry of Humand Resource Development, Govt. of India, dated 4th July, 2002)

Phone: 044-42911000, Telefax:044-22415051 Website: www.sbmch.ac.in 7, Works Road, Chromepet, Chennai 600 044, Tamil Nadu

FOREWORD



earlier and am delighted with the success of the first edition. I have great pleasure to write the foreward for the 2nd edition of this book titled TEST BOOK OF MODERN PHARMACOLOGY authored by Dr. M. Muniappan, Ph.D, Dr. R. Sivaraj, M.D., and Dr. Somasundaram, M.D., and edited by Dr. N.S. Muthiah, MD., all senior faculty of Pharmacology of repute.

This book will be useful for the undergraduates as well as Post
Graduate students in order to learn the latest and modern
Pharmacology to prescribe the needy patients. Medical
knowledge and practice change constantly. This book is
designed to provide accurate, authoritative information about
the subject matter. This book is a valuable addition to the
already existing books of Pharmacology.

Dr. P. SAIKUMAR, M.D., Ph.D.,
DEAN - SBMCH

Dr. G. M. Yahya, M.B.B.S., M.sc. Professor of Pharmacology Dean, Thanjavur Medical College & Hospital (Retd.)



"Amir Mahal" 257 Bharathi Salai Royapettah Chennai - 600 014 Ph: 044-4215 8463

Date: 17-07-2018

FOREWORD

It gives me immense pleasure to write the foreword for this book in pharmacology, authored by Dr. M. Muniappan and edited by Dr. N.S. Muthiah.

It is the short, concise book of pharmacology concentrating more on commonly used approved drugs in the treatment of common clinical conditions. It is more like clinically oriented without much detail about pharmacokinetics, chemistry etc., of the drugs.

In a short book of this nature, there may be some deficiencies. The students may refer to the standard books for more information. The author has taken lot of pains to write this text to make the subject of pharmacology more interesting by illustrations, designs and diagrams.

I have no doubt that this book will help the medical students and general practitioners to read, understand, apply the knowledge of pharmacology in the treatment of sick patients to cure and reduce their sufferings.

The science of pharmacology has progressed, tremendously in all directions over half a century. So, my sincere advice to the medical students and the young medical practitioners is to be in touch in clinical pharmacology and recent advances to be a successful clinician which will be useful to them.

The country in general and Chennai, Tamil Nadu in particular is on the world medical map because of the hard dedicated work of some of the physicians and surgeons. Follow them as example and reach their standard.

DR. G. M. YAHYA, M.B.B.S., M.Sc.,
PROFESSOR OF PHARMACOLOGY

PROFESSOR OF PHARMACOLOGY

Dean, Thanjavur Medical Gollege & Hospitals

(RE1D.)

Amir Mahal, Pycrofts Road, Royapettah: Chennai - 600 014

CONTRIBUTORS

The following professors have contributed some topics and also given good suggestions to improve the standard of this book:

- Dr. N.Venkatadri, M.D., Professor & Head, Department of Pharmacology, Sathyasai Medical College, Chennai
- ▶ Dr A. Ruckmani, M.D., Professor & Head, Department of Pharmacology, Chettinad Institute of medical Sciences & Research, Chennai.
- ▶ Dr. P. Durairajan, M.D., Professor and Head, Department of Pharmacology, Muthukumaran Medical College, Mangadu, Chennai.
- ▶ Dr. S. Priestly Vivek kumar, M.D., Professor and Head, Department of Pharmacology, Tagore Medical College & Hospital, Chennai.
- Dr. Thirunavukkarasu, M.D., Professor and Head, Department of Pharmacology, Saveetha Medical College and Hospital, Thandalam, Chennai.

PREFACE TO THE SECOND EDITION

Pharmacology is the dynamic medical subject. So many new chapters are added in this edition as per MCI. All the diagrams are imposed and computerized. The headings are given in different colours to make easy capture for the students.

Learning objectives are given in the beginning of every chapters, so as the students should concentrate more on those points. Unnecessary details are excluded. All the diagrams are made simple and colourful so as the students can easily understand the subject.

Every care has been taken to make the book free from the errors, but absolute perfection may not be there. Hence, error if any, may please be communicated to us.

We are thankful to Dr. Nagesh Simhadri, Assistant Professor, Tagore Medical College and Hospital, Chennai, for nice, simple computerized pictures.

M.Muniappan mmuniappan@yahoo.com

R.Sivaraj sivaraj.rangaraj@avmc.edu.in

CONTENTS

Chapters Pages

SECTION- I	GENERAL	PHARMACOLOGY

1.	Introduction				
2.	Nature and sources of drugs				
3.	Routes of administration of drugs	8			
4.	Dosage forms of drugs	13			
5.	Biological membrane and the mechanism by which the drugs cross (transported) the membrane				
6.	Absorption of drugs	26			
7.	Metabolism/ Biotransformation of drugs	34			
8.	Distribution of drugs	38			
9.	Excretion of drugs and kinetics of elimination	43			
10.	Plasma half life	47			
11.	Methods of prolonging the duration of action of drugs, therapeutic				
	index	49			
12.	Pharmacodynamic- Mechanism of action of drugs	51			
13.	Fixed dose drug combination	57			
14.	Factors modify the drug effects	58			
15.	Adverse drug effects	64			
16.	Evidence based Medicine (New Drug Development)	68			
17.	Therapeutic drug monitoring	72			
	SECTION- II AUTONOMIC NERVOUS SYSTEM				
18.	Introduction	75			
19.	Cholinergic/Parasympathomimetic drugs	81			
20.	Organophosphorous compounds poisoning, Management of				
	myasthenia gravis	88			
21.	Anticholinergic/ Antimuscarinic drugs	90			

viii

22.	Adrenergic/ Sympathomimetic drugs	95		
23.	α and β adrenergic blockers	102		
24.	4. Ocular pharmacology			
	SECTION-III PERIPHERAL NERVOUS SYSTEM			
25.	Peripherally and centrally acting skeletal muscle relaxants	113		
26.	Local Anaesthetics	118		
	SECTION- IV AUTACOIDS			
27.	Introduction, Prostaglandins, Leukotriens antagonists	123		
28.	Nonsteroidal anti-inflammatory drugs (NSAIDs)	127		
29.	Histamine and Antihistamines	133		
30.	5 HT agonists, 5 HT antagonists and Angiotensins	137		
31.	Drugs used in migraine	139		
32.	Drugs used in rheumatoid arthritis	141		
33.	Drugs used in gout			
	SECTION-V CARDIO VASCULAR SYSTEM INCLUDING DIURETICS			
34.	Drugs used in Heart failure	151		
35.	Antianginal drugs	157		
36.	Antihypertensive drugs	162		
37.	Antiarrhythmic drugs	169		
38.	Pharmacology of shock and plasma expanders	186		
39.	Drugs used in heart block, Myocardial infarction (heart attack)	188		
40.	Diuretics	190		

SECTION-VI RESPIRATORY SYSTEM

Drugs used in bronchial asthma, Chronic obstructive pulmonary 41. disease (COPD)..... 199 Treatment of cough..... 42 209 SECTION-VII CENTRAL NERVOUS SYSTEM 43. Introduction 213 44. 216 45. 222 46. 227 47. 231 48. Antiepileptic drugs 238 49. 243 Antiparkinsonism drugs..... Psychopharmacology- Antipsychotic drugs, antidepressants, antimaniac, 50. antianxiety drugs, substance abuse, cerebroactive drugs and cognitive 247 SECTION-VIII **BLOOD AND BLOOD FORMING ORGANS** Haematinics- Iron, Vit. B12, Folic acid and Erythropoietin...... 51. 259 52. Drugs used in thrombo-embolic disorders- Coagulants, anticoagulants, antiplatelets and fibrinolytic drugs 266 53. Drugs used in hyerlipidemias/ hyperlipoproteinemias 277 SECTION-IX GASTROINTESTINAL SYSTEM Treatment of peptic ulcer and related disorders 54. 287 55. 295 Antiemetic drugs Drugs used in constipation..... 300 56.

57. 58.	Antidiarrhoel agents	302
	syndrome(IBS)	305
	SECTION-X HORMONES	
59.	Introduction	309
60.	Anterior pituitary hormones	313
61.	Posterior pituitary hormones and drugs acting on uterus	317
62.	Thyroid hormones and drugs used in thyrotoxicosis	320
63.	Drugs used in diabetes mellitus and Glucagon	327
64.	Corticosteroids	339
65.	Estrogens and antiestrogens	347
66.	Progesterones and antiprogesterones	352
67.	Oral contraceptives	35€
68.	Testosterones, antiandrogens, anabolic steroids and drugs used in erectile dysfunction	360
69.	Drugs affecting Ca++ metabolism (balance)	364
	SECTION-XI CHEMOTHERAPY	
	SECTION-AI CHEMOTHERAI I	
70.	Introduction	373
71.	Sulphonamides and cotrimoxazole	379
72.	Fluoroquinolones	38
73.	β-lactam antibiotics- Penicillins and cephalosporins	384
74.	Macrolide antibiotics	39 :
75.	Glycosides and aminoglycosides antibiotics	395
76.	Broad spectrum antibiotics	398
<i>7</i> 7.	Drugs used in urinary tract infection	400
78.	Drugs used in sexually transmitted diseases	40
79.	Drugs used in malaria	402
80.	Drugs used in amoebiasis and other protozoal infections	408
81.	Antiviral drugs	413

82. 83. 84. 85. 86.	Antifungal agents. Anthelmintics. Antitubercular drugs. Antileprotic drugs Anticancer drugs	422 428 432 441 445
	SECTION-XII MISCELLANEOUS	
87.	Vaccines and antisera	457
88.	Ectoparasiticides	461
89.	Drugs used in acne vulgaris	463
90.	Drugs used in psoriasis, topical steroids	464
91.	Chelating agents	466
92.	Immunopharmacology	469
93.	Basic principles of drug interactions and their clinical significances	477
94.	Sun screens	482
95.	Vitamins	483
96.	Antiseptics and disinfectants	488
97.	Antioxidants and Gene therapy	490
98.	Critical evaluation (rationale combination of drugs) and advantages	3
	of the combinations	492
99.	Adverse Drug Reation (ADR) and Pharmacovigilance	494
100.	Geriatric and pediatric pharmacology	496
101.	Chronopharmacology	499
102.	Drug Poisoning	501
103	Herhal Medicines	503