

Jopling's

# Handbook of Leprosy

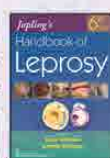
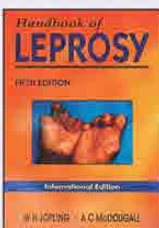
### Highlights of the Seventh Edition

- Numerous new clinical images and schematic diagrams added to chapters
- Underlining of important text
- Cross citations between chapters to help readers get broader perspectives
- **Diagnosis:** Addition of sections on nerve biopsy procedure, electrophysiological studies and nerve imaging
- **Immunopathogenesis:** Easy to comprehend text, punctuated with illustrations, covering complexities of immunology of leprosy and reactions and latest developments
- **Drug resistance:** Recent developments with detailed clinical relevance
- **Chemoprophylaxis, immunoprophylaxis and immunotherapeutics:** Addition of recent developments and literature
- **Nerve function assessment and muscle testing:** New schematic and clinical images; detailed descriptions of nerve course and innervations
- **Disability and deformities section:** New orthoses have been detailed, and more images on surgical correction of deformities added

### About William H Jopling and Jopling's Handbook of Leprosy Through The Generations

WH Jopling was born in Italy in 1911. He was an astute clinician and an avid teacher and researcher. Dr Jopling's association with leprosy began during his tenure as Government Medical Officer in the Southern Rhodesia (now Zimbabwe) Medical Service. Following his years there, he returned to London and worked at The Hospital for Tropical Diseases where he was later appointed as Consultant Leprologist. He also held the post of Consultant in tropical dermatology at St John's Hospital for Diseases of the Skin. His most memorable contribution to Leprology would be the classification with which his name is associated (and which is still widely followed and cited), and of course, **Jopling's Handbook of Leprosy!** The first edition of **Jopling's Handbook of Leprosy** was published in 1971, followed by four more editions over the next 25 years. The fifth edition came out in 1996, a year before the death of Dr Jopling. Subsequently, owing to high demand for the book, the same was reprinted several times till 2018.

We are fortunate to have been entrusted with the responsibility of carrying forward the legacy of this book. We brought out a thoroughly updated sixth edition in 2020, while keeping the classical clinical descriptions meticulously detailed by Dr Jopling intact. We also retained large sections on diagnostic aspects from previous sections, mainly with respect to the slit-skin smears, while older tests of less utility now have been tabulated at the end of the chapter for historical relevance. Our understanding on immunopathogenesis of leprosy and leprosy reactions has seen major changes over the past few decades and hence these sections have been updated. Although treatment text has also been thoroughly revised, here too the readers will notice that all relevant text from previous editions has been retained. In short, we have attempted to attain a perfect balance of the old with the new to provide our readers with an up-to-date text, which should be sufficient for MD training and those in leprosy care.



7<sup>th</sup> Edn

7<sup>th</sup> Edn

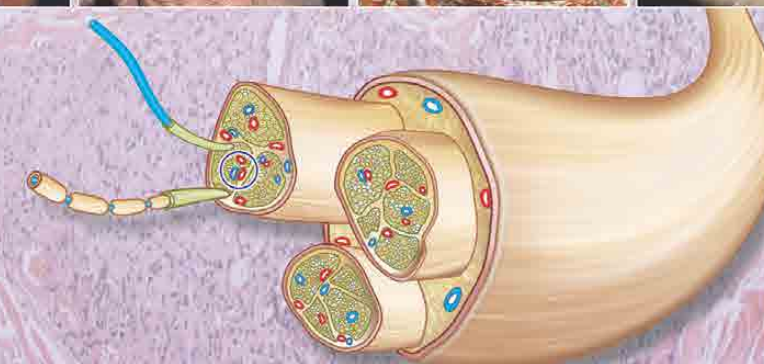
Jopling's

Handbook of Leprosy

International Edition  
Jopling's

7<sup>th</sup> Edn

# Handbook of Leprosy



**CBS Publishers & Distributors Pvt Ltd**  
4819/XI, Prahlad Street, 24 Ansari Road, Daryaganj, New Delhi 110 002, India  
E-mail: delhi@cbspd.com, customercare@cbspd.com; Website: www.cbspd.com  
New Delhi | Bengaluru | Chennai | Kochi | Kolkata | Lucknow | Mumbai  
Hyderabad | Jharkhand | Nagpur | Patna | Pune | Uttarakhand



Scan for price of this book and catalogue

ISBN: 978-93-5466-686-5



Editors  
Sardana  
Khurana



Editors

**Kabir Sardana  
Ananta Khurana**



Dedicated to Education  
CBS Publishers & Distributors Pvt Ltd



**Other Outstanding CBS Books in Dermatology by Prof Kabir Sardana**



**About the Editors**

**Kabir Sardana** MD, DNB, MNAMS is the author of the best selling books on dermatology listed on amazon.in. He began writing on common disorders like eczema, acne and pigmentary disorders and then books for MBBS and MD students. His aim is to avoid copy pasting "data rich" text while simplifying complex text with images and artist-drawn diagrams, to enable readers to grasp complex topics. He is an author of multiple books with some on the top 10 selling books listed on amazon.in. He has more than 280 published papers on PubMed with a focus on infectious diseases, systemic drugs, acne and immunopathogenesis of dermatological disorders. He belongs to a 3rd generation Armed Forces family settled in Dehradun and topped the UPSC interview for selection for the post of Assistant Professor in Dermatology in 2006. This was preceded by his medical training at MAMC and LHMC-New Delhi. He has worked as faculty at MAMC-New Delhi, CNBC-Delhi and at present he heads the department of dermatology at RML Hospital, New Delhi.



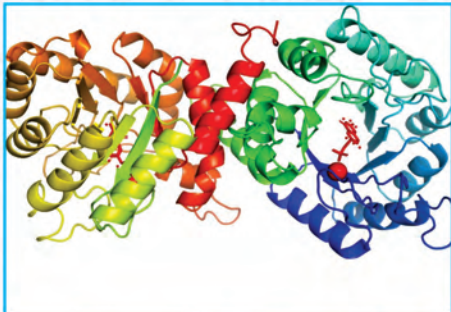
**Ananta Khurana** MD, DNB, MNAMS completed her MD in Dermatology, Venereology and Leprosy in 2010 and is currently Professor in the Department of Dermatology, Venereology and Leprosy at Dr Ram Manohar Lohia Hospital and Atal Bihari Vajpayee Institute of Medical Sciences, New Delhi, India, since 2014. She has edited 5 books, including the 6th edition of *Jopling's Handbook of Leprosy*, and has 81 PubMed articles to her credit. She has a keen interest in research, especially related to clinically relevant and therapeutic scenarios. She dedicates this book to all leprosy patients fighting the infection and bearing the stigma our society still unfortunately attaches to the disease.



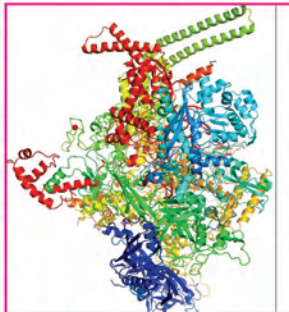
*Jopling's*

7<sup>th</sup>  
Edn

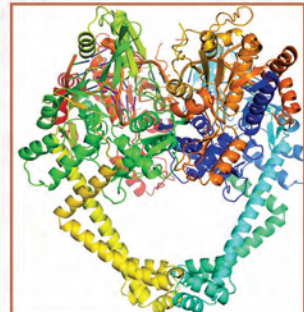
Handbook of  
**Leprosy**



Dihydropteroate synthase dapsone



RNA polymerase rifampicin



Gyrase ofloxacin

*Jopling's*

7<sup>th</sup>  
Edn

# Handbook of Leprosy

*Editors*

**Kabir Sardana** MD DNB MNAMS

Director-Professor

Central Health Services

Ministry of Health and Family Welfare

Head, Department of Dermatology, Venereology and Leprosy

Dr Ram Manohar Lohia Hospital and

Atal Bihari Vajpayee Institute of Medical Sciences (ABVIMS)

New Delhi, India

Professor of Dermatology, Indraprastha University

Associate Professor of Dermatology, Delhi University

**Ananta Khurana** MD DNB MNAMS

Professor

Department of Dermatology, Venereology and Leprosy

Dr Ram Manohar Lohia Hospital and

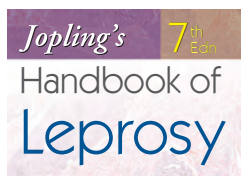
Atal Bihari Vajpayee Institute of Medical Sciences (ABVIMS)

New Delhi, India



**CBS Publishers & Distributors** Pvt Ltd

New Delhi • Bengaluru • Chennai • Kochi • Kolkata • Lucknow • 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 editors 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 editors will not be held responsible for any inadvertent errors or inaccuracies.

ISBN: 978-93-5466-686-5

Copyright © Editors and Publisher

#### Seventh Edition: 2023

First Edition: 1971

Second Edition: 1978

Third Edition: 1984

Fourth Edition: 1988

Fifth Edition: 1996

Sixth Edition: 2020

Revised Sixth Edition: 2021

The Fifth Edition of the book was brought out by CBS Publishers & Distributors under the arrangement with WH Jopling and AC McDougall (1995).

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 editors 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: 011-23289259, 23266861

Website: [www.cbspd.com](http://www.cbspd.com)

e-mail: [delhi@cbspd.com](mailto:delhi@cbspd.com)

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

Ph: 011-4934 4934

Fax: 011-4934 4935

e-mail: [publishing@cbspd.com](mailto:publishing@cbspd.com); [publicity@cbspd.com](mailto:publicity@cbspd.com)

#### Branches

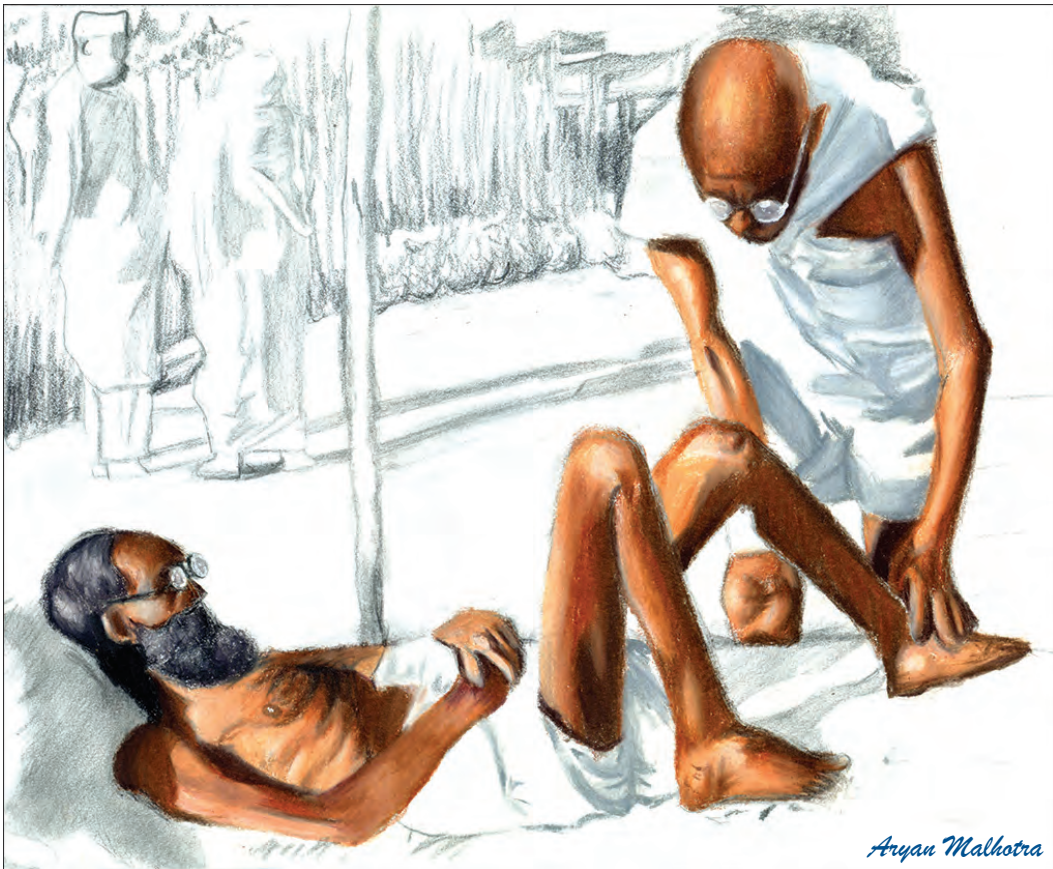
- **Bangaluru:** Seema House 2975, 17th Cross, K.R. Road, Banasankari 2nd Stage, Bengaluru 560 070, Karnataka, India  
Ph: +91-80-26771678/79 Fax: +91-80-26771680 e-mail: [bangalore@cbspd.com](mailto:bangalore@cbspd.com)
- **Chennai:** 7, Subbaraya Street, Shenoy Nagar, Chennai 600 030, Tamil Nadu, India  
Ph: +91-44-26680620, 26681266 Fax: +91-44-42032115 e-mail: [chennai@cbspd.com](mailto:chennai@cbspd.com)
- **Kochi:** 42/1325, 1326, Power House Road, Opp KSEB, Power House, Ernakulam, Kochi, 682 018, Kerala, India  
Ph: +91-484-4059061-65.67 Fax: +91-484-4059065 e-mail: [kochi@cbspd.com](mailto:kochi@cbspd.com)
- **Kolkata:** 147, Hind Ceramics Compound, 1st Floor, Nilgunj Road, Belghoria, Kolkata 700 056, West Bengal, India  
Ph: +91-33-25633055/56 e-mail: [kolkata@cbspd.com](mailto:kolkata@cbspd.com)
- **Lucknow:** Basement, Khushnuma Complex, 7-Meerabai Marg (behind Jawahar Bhawan), Lucknow 226 001, UP, India  
Ph: +91-522-4000032 e-mail: [tiwari.lucknow@cbspd.com](mailto:tiwari.lucknow@cbspd.com)
- **Mumbai:** PWD Shed, Gala no. 25/26, Ramchandra Bhatt Marg, Next to JJ Hospital Gate no. 2, Opp. Union Bank of India, Noorbaug, Mumbai 400 009, Maharashtra, India  
Ph: +91-22-66661880/89 e-mail: [mumbai@cbspd.com](mailto:mumbai@cbspd.com)

#### Representatives

- |                    |              |                    |              |                      |              |
|--------------------|--------------|--------------------|--------------|----------------------|--------------|
| • <b>Hyderabad</b> | 0-9885175004 | • <b>Jharkhand</b> | 0-9811541605 | • <b>Nagpur</b>      | 0-9421945513 |
| • <b>Patna</b>     | 0-9334159340 | • <b>Pune</b>      | 0-9923910676 | • <b>Uttarakhand</b> | 0-9716462459 |

Printed at Magic International Pvt. Ltd., Greater Noida, UP, India

to  
*Mohandas Karamchand Gandhi*  
*who devoted his life to the care and rehabilitation of leprosy patients.*



MK Gandhi returned to India in 1932 and started his Satyagraha campaign. He and other leaders were arrested and locked up in Yerwada Central Jail in Pune. While in jail, Gandhi inquired about Parchure Shastri who was also arrested along with others. Parchure Shastri was a well-read learned man and very knowledgeable about the Vedas. The jail superintendent told Gandhiji that "Parchure had leprosy and is thus kept in another section of the jail." Gandhiji was utterly shocked! The image depicts MK Gandhi taking care of the wounds of Parchure Shastri, an extraordinary act in the era where leprosy was believed to be highly infectious despite the use of dapsone and those suffering from the disease were ostracised by the society.





## List of Contributors

**Ananta Khurana** MD DNB MNAMS

Professor  
Department of Dermatology,  
Venereology and Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Aishwarya Muddebihal** MD

Senior Resident  
Department of Dermatology  
Hindu Rao Hospital and North DMC Medical  
College, New Delhi

**Anil Dhal** MS

*Former:* Professor of Excellence  
Department of Orthopedics  
Maulana Azad Medical College and Associated  
LN & GB Pant Hospitals, New Delhi

**Aparna Govindan** MD

Associate Professor  
Department of Pathology  
Government Medical College  
Kozhikode

**Atul Shah** MS

Ex-Professor of Plastic Surgery  
Grant Medical College and Sir JJ Group of  
Hospitals and Consultant Plastic Surgeon  
Nanavati Super Specialty Hospital, Mumbai

**Babu Govindan** MPT (Ortho)

Physiotherapist  
Training Coordinator  
The Leprosy Mission Hospital, Naini  
Prayagraj, Uttar Pradesh

**Chetan Rajput** MD

Associate Professor  
SBH Govt Medical College  
Dhule, Maharashtra

**C Ruth Butlin** MRCGP MA MBBCh

Retired staff of the Leprosy Mission International  
Honorary Medical Advisor to DBLM Hospital  
Bangladesh

**David Scollard** MD PhD

Former Director  
National Hansen's Disease Programs (USA)  
Co-Editor, International Textbook of Leprosy

**Debajyoti Chatterjee** MD DM (Histopathology)

Assistant Professor  
Department of Histopathology  
Postgraduate Institute of Medical Education and  
Research (PGIMER)  
Chandigarh, India

**Divya Kamat** MD

Specialist Dermatologist  
Aster Clinic, Union Medical Center  
Al Karama, Dubai, UAE

**Gaurish R Laad** MD

Consultant Dermatologist  
Sushruta Nursing Home  
Ponda, Goa

**Kabir Sardana** MD DNB MNAMS

Director-Professor and Head  
Department of Dermatology,  
Venereology and Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Karthikeyan Govindasamy** BOT MPH

Occupational Therapist  
Research Coordinator  
The Leprosy Mission Trust India  
CNI Bhavan, New Delhi

**Krishna Garg** MS PhD FIMSA MAMS FAMS FASI

Ex-Professor and Head  
Department of Anatomy  
Lady Hardinge Medical College  
New Delhi

**Mallika Lavania** BSc MSc PhD

Scientist  
The National Institute of Virology, Pune  
Former Scientist-In-Charge, Stanley Browne  
Research Laboratory, The Leprosy Mission  
Trust India, New Delhi

**Margreet Hogeweg** MS

(Reviewer: Ocular Leprosy)  
Former Ophthalmic Advisor  
The Netherlands Leprosy Relief Association  
The Netherlands

**Namrata Chhabra** MD  
Associate Professor  
Department of Dermatology and Venereology  
All India Institute of Medical Sciences, Raipur

**Neela Shah**  
Ex-Managing Director  
Novartis Comprehensive Leprosy Care  
Association, 202 A Wing Rushi Tower  
Lokhandwala Complex, Andheri West, Mumbai

**Pooja Arora Mrig** MD DNB MNAMS  
Professor  
Department of Dermatology,  
Venereology and Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Premanshu Bhushan** MD  
Senior Consultant and Faculty  
PN Behi Skin Institute and School of Dermatology  
GK1, New Delhi

**Sarita Sanke** MD DNB MRCP  
Assistant Professor  
Department of Dermatology and Venereology  
LHMC and Associated Hospitals, New Delhi

**Sarita Sasidharanpillai** MD  
Associate Professor  
Department of Dermatology and Venereology  
Government Medical College  
Kozhikode

**Savitha B**  
Senior Resident  
Department of Dermatology, Venereology and  
Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Sujay Khandpur** MD DNB MNAMS  
Professor  
Department of Dermatology and Venereology  
All India Institute of Medical Sciences, New Delhi

**Surabhi Sinha** MD DNB MNAMS  
Specialist and Professor  
Department of Dermatology,  
Venereology and Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Taru Garg** MD  
Director-Professor  
Department of Dermatology and Venereology  
LHMC and Associated Hospitals  
New Delhi

**Tarun Narang** MD MNAMS  
Associate Professor  
Department of Dermatology,  
Venereology and Leprosy  
PGIMER, Chandigarh, India

**Utpal Sengupta** MVSC PhD (Path)  
Consultant, Stanley Browne Research Laboratory  
The Leprosy Mission Trust India, New Delhi

**Vinita Puri** MS  
Professor and Head  
Department of Plastic Reconstructive  
Surgery and Burns  
Seth GS Medical College and KEM Hospital  
Parel, Mumbai, India

**Vishal Thakur** MD  
Assistant Professor  
Department of Dermatology,  
Venereology and Leprosy  
AIIMS, Bhubaneswar, India

**WH Jopling**  
Formerly Consultant Leprologist  
Hospital for Tropical Diseases, London  
Consultant in Tropical Dermatology  
St John's Hospital for Diseases of the Skin, London  
(Deceased)

**Yasim Khan** MS DNB MNAMS  
Assistant Professor  
Hamdard Institute of Medical Sciences and  
Research  
Hamdard Nagar, New Delhi

### Photocredits

**Aastha Agarwal** MD DNB  
Senior Resident  
Department of Dermatology  
Pt Madan Mohan Malviya Hospital, New Delhi

**A. Colin McDougall**  
Department of Dermatology  
John Radcliffe Hospital, Oxford, UK

**Aryan Malhotra** (*Dedication Image*)  
Class X, DPS Noida  
Sector 30 (UP)

**Arvind Ahuja**  
Professor and Head  
Department of Pathology  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Barbara Stryjewska** MD  
National Hansen's Disease Program  
9181 Interline Avenue  
Baton Rouge, Louisiana, United States

**Carlos Franco-Paredes** MD MPH

Department of Microbiology, Immunology, and Pathology  
Colorado State University, Fort Collins, CO, USA; and  
Hospital Infantil de Mexico Federico Gomez, Mexico

**Chetan Rajput** MD

Associate Professor  
SBH Govt Medical College  
Dhule, Maharashtra

**David Webster**

Department of Dermatology  
John Radcliffe Hospital, Oxford, UK

**Deepak Kumar**

Associate Professor, Department of Preventive Medicine  
and Rehabilitation  
AIIMS, Deoghar

**Diksha Agrawal** MD DNB

Assistant Professor  
Department of Dermatology  
Venkateshwara Institute of Medical Sciences  
Uttar Pradesh

**Jaison A Barreto** MD PhD

Chief of Epidemiology  
Lauro de Souza Lima Institute  
Bauru, Sao Paulo, Brazil

**Jyoti Garg**

Professor  
Department of Neurology  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Karthikeyan Govindasamy** BOT MPH

Occupational Therapist  
Research Coordinator  
The Leprosy Mission Trust India  
CNI Bhavan, New Delhi

**Kavin Bhogar**

Junior Resident  
Department of Ophthalmology  
Department of Dermatology, Venereology and Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Konchok Dorjay** DVD DNB

Dermatologist  
Sonam Nurboo Memorial Hospital  
Leh, Ladakh

**Meena Khurana**

Technical Supervisor  
Department of Neurology  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Prashant Jakhmola**

TLM Hospital  
Shahdara, New Delhi

**Priyaranjan**

Senior Resident, PMR  
AIIMS, Deoghar

**Pramanjan Kumar**

Prosthetics and Orthotics  
AIIMS, Deoghar

**Purnima Paliwal** MD

Specialist, Department of Pathology  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Saviitha B**

Senior Resident  
Department of Dermatology, Venereology and Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari Vajpayee  
Institute of Medical Sciences (ABVIMS)  
New Delhi

**SK Malhotra** MBBS MD

Professor  
Department of Dermatology, Venereology and Leprosy  
Government Medical College  
Amritsar, Punjab

**Kumari Ritu**

Junior Resident  
Department of Dermatology, Venereology and Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

**Sunita**

EEE Technician  
Department of Neurology  
Dr Ram Manohar Lohia Hospital and Atal Bihari  
Vajpayee Institute of Medical Sciences (ABVIMS)  
New Delhi

---

**Proofing Acknowledgments**

---

**Saviitha B**

Senior Resident  
Department of Dermatology, Venereology and Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari Vajpayee  
Institute of Medical Sciences (ABVIMS)  
New Delhi

**Kumari Ritu**

Junior Resident  
Department of Dermatology, Venereology and Leprosy  
Dr Ram Manohar Lohia Hospital and Atal Bihari Vajpayee  
Institute of Medical Sciences (ABVIMS)  
New Delhi



## Foreword



प्रो.(डॉ.) अतुल गोयल

**Prof. (Dr.) ATUL GOEL**  
MD (Med.)

स्वास्थ्य सेवा महानिदेशक  
**DIRECTOR GENERAL OF HEALTH SERVICES**



भारत सरकार  
स्वास्थ्य एवं परिवार कल्याण मंत्रालय  
स्वास्थ्य सेवा महानिदेशालय  
Government of India  
Ministry of Health & Family Welfare  
Directorate General of Health Services

I feel privileged to pen the Foreword to the seventh edition of *Jopling's Handbook of Leprosy*, a disease, which finds a mention in annals of history as well as mythology. Leprosy as a disease also depicted in famous and awarded movies like 'Ben-Hur (1959)' and 'Kingdom of Heaven (2005)'. What these movies highlighted was the stigma attached to the disease and how 'Lepers' were cured by 'God'. Up to 1959, understanding of the disease was limited.

Currently leprosy is scientifically a much better understood disease. This has also reduced the stigma associated with the disease. It is unfortunate that India still has a relatively large burden of leprosy, despite effective chemotherapy. The reason perhaps lies in the continuous transmission that happens in many areas spread across the country.

In today's world where dermatology is being picked up as a subject due to the glamour associated with cosmetology and hair transplantation, etc, it is remarkable that Dr Kabir Sardana and Dr Ananta Khurana have taken upon themselves the non-glamorous task of editing a book on leprosy, a disease that does not interest most modern dermatologists who see in dermatology a lucrative and easy career as a doctor. As they mention in their preface about contributors (who should be the ones who see and manage cases), I would also wish them to be active partners in the Directorate and Ministry's Leprosy Eradication Program that would be a job as interesting, if not more, than editing a book.

**Prof (Dr) Atul Goel**

Director General of Health Services  
Government of India

*“ Because things are the way they are,  
Things will not stay the way they are ”*

**—Bertolt Brecht**  
Playwright

## Preface to the Seventh Edition

*Jopling's Handbook of Leprosy* has been read and referred to by generations of dermatologists across the country and outside and is probably one of the most acclaimed texts on leprosy. The sixth edition came after a huge gap of 25 years from the last edition. The fifth edition had been reprinted 14 times from 1996 till 2019, with no additions/changes in text. The aim of seventh edition is to retain the original concepts and the clinical content of the previous editions and in addition updating the book with the enormous advancements made since, while keeping the text concise and the book handy and easy to read. The reader will note that the original table of contents has been enlarged encompassing the additions to the text.

The seventh edition builds on the updates covered by the sixth edition and a special focus in this edition has been on making text more reader friendly with addition of many new clinical images, schematic diagrams and underlining of important text.

We have added multiple new clinical images in clinical leprosy, while most of the classical text on clinical leprosy from the previous editions is retained. The readers will appreciate the revisions and additions in section on immunopathogenesis of leprosy reactions wherein we have tried to make the topic easier to comprehend and have added newer developments. Sections on nerve biopsy procedure, electrophysiological studies and nerve imaging have been added in the chapter on diagnosis, with an aim to provide readers practical and clinically useful information on these topics. Multiple new images have been added to the histopathology section as well. The treatment of type 1 and type 2 reactions has been updated in respective chapters. Newer developments in drug resistance in leprosy have been included in Chapter "Clinical Relevance of Antimicrobial Resistance". Chapter 7.1, covering treatment of leprosy and special scenarios, has also been updated and newer recommendations and regimens have been added. Recent data has been added and discussed in Chapter "Chemoprophylaxis, Immunoprophylaxis and Immunotherapeutics in Leprosy" and Chapter "Neural Involvement and its Management" has been thoroughly revised. The drug formulary which was appended with treatment section previously has been shifted to "Appendix" at the end of the book. Chapter "Other Aspects of Treatment" has also been revised to make it more understandable and useful to the practising clinicians. Newer accommodative orthoses have been detailed in Chapter 8.3, and more images on surgical correction of deformities have been added in Chapter 8.5. The readers will also appreciate the new schematic and clinical images, and simplified text, in Chapter "Nerve Function Assessment and Muscle Testing". We have also added diagrams and text on course and supply of major nerves involved in leprosy within this chapter, to make the neurological involvement and clinical nerve testing easier to comprehend. The readers will also note addition of images and more scenarios in Chapter "Differential Diagnosis".

We believe a book on leprosy should have contributors who see and manage cases and not just those who interpret data which is a mechanical and "hands off" way of

tackling a disease. This accounts for our contributors who range from dermatologists, physicians, scientists, rehabilitation experts and those who have worked on core aspects of the disease. Some of our contributors have doubled up both as contributors and reviewers and we are grateful to Dr M Hogeweg and Dr Cynthia Butlin for their constructive criticism.

We thank Rachna Misra and her student Aryan Malhotra for the artistic rendition of the dedication image of the Father of the Nation.

A big thanks to the fabulous team at CBS Publishers & Distributors, especially to Mr YN Arjuna Senior Vice-President—Publishing, Editorial and Publicity, Mrs Ritu Chawla General Manager—Production, Mr SK Verma Vice-President, Marketing and Operations, and Mr Vikrant Sharma for the dedicated reformatting, Mr Sanjay Chauhan (Sanju) for the artistic depiction and image balancing, Mr Neeraj Prasad for layout/cover design and to Mr Prasenjit Paul (copy editor) for the meticulous proofreading; all of whom have been tolerating our efforts and edits for the last 3 months!

For the postgraduates, we reiterate that there is no replacement for reading books which cannot replace webinars.

As Mark Twain said “The (person) who does not read, has no advantage over the (person) who cannot read.”

We hope the updated *Jopling’s Handbook of Leprosy* 7th edition proves to be useful for postgraduates, academicians, practitioners and field workers alike and helps in understanding and tackling this ancient disease.

**Kabir Sardana**  
**Ananta Khurana**  
Joplingleprosy@cbspd.com





## Preface to the First Edition

For a long time I have been impressed by the demand for information on leprosy from all sections of the medical and nursing professions, and I have attempted, in this Handbook, to give the basic facts about the disease and its management as clearly and concisely as possible. During my visit to leprosy centres in Africa in 1968, I noted the responsible work undertaken by paramedical workers and their eagerness to do it well; I have particularly in mind the medical assistants in-charge of rural clinics or travelling in Land-Rovers as members of mobile medical teams, and I hope that these workers and their counterparts in other developing regions will find in this volume the help they need.

As regards the medical profession, I hope that this Handbook will give the student and general practitioners a better understanding of leprosy, and will also have an appeal to the specialist on whom the diagnosis of the disease may fall, especially the dermatologist and the neurologist.

I would like to thank my son-in-law, Mr David Dartnall, for the drawings and diagrams, and I am grateful to Dr Colin McDougall and Dr Tin Shwe for helpful criticism and advice.

**WH Jopling**, 1971



# Contents

|   |             |
|---|-------------|
| <i>List of Contributors</i>   | <i>vii</i>  |
| <i>Foreword by Prof (Dr) Atul Goel</i>                              | <i>xi</i>   |
| <i>Preface to the Seventh Edition</i>                               | <i>xiii</i> |
| <i>Preface to the First Edition</i>                                 | <i>xv</i>   |
| <hr/>   |             |
| <b>1. History and Epidemiology of Leprosy</b>                       | <b>1</b>    |
| <i>Ananta Khurana</i>   |             |
| <b>2. The Disease</b>   | <b>6</b>    |
| 2.1 Clinical Leprosy 6  |             |
| <i>WH Jopling, Kabir Sardana, Premanshu Bhushan, Ananta Khurana</i> |             |
| 2.2 Relapse, Reactivation, Reaction and Reinfection 64              |             |
| <i>C Ruth Butlin</i>  |             |
| 2.3 Leprosy in Children 78  |             |
| <i>Taru Garg, Sarita Sanke</i>                                      |             |
| 2.4 Pure Neuritic Leprosy 91  |             |
| <i>Tarun Narang, Debajyoti Chatterjee, Vishal Thakur</i>            |             |
| 2.5 Special Scenarios and Populations 99                            |             |
| <i>Kabir Sardana, Ananta Khurana</i>                                |             |
| <b>3. Diagnostic Tests and Histopathology</b>                       | <b>104</b>  |
| 3.1 Diagnostic Tests 104  |             |
| <i>Ananta Khurana</i>   |             |
| 3.2 Histopathology of Leprosy 127                                   |             |
| <i>Sarita Sasidharanpillai, Aparna Govindan, Sujay Khandpur</i>     |             |
| <b>4. Microbiology and Immunopathogenesis</b>                       | <b>160</b>  |
| 4.1 Bacteriology of Leprosy 160                                     |             |
| <i>Ananta Khurana</i>   |             |
| 4.2 Transmission of Leprosy 168                                     |             |
| <i>Ananta Khurana</i>   |             |
| 4.3 Immunology of Disease 178                                       |             |
| <i>Ananta Khurana, Kabir Sardana</i>                                |             |
| 4.4 <i>M. Leprae</i> and Nerve Injury 194                           |             |
| <i>Kabir Sardana, David Scollard</i>                                |             |
| 4.5 Immunopathogenesis of Reactions 202                             |             |
| <i>Ananta Khurana, Kabir Sardana</i>                                |             |
| <b>5. Reactions in Leprosy</b>                                      | <b>217</b>  |
| 5.1 Overview and Type 1 Reactions 217                               |             |
| <i>Kabir Sardana, Surabhi Sinha, Ananta Khurana</i>                 |             |

|            |  |     |            |
|------------|--|-----|------------|
| 5.2a       | Type 2 Lepra Reaction  | 241 |            |
|            | <i>Tarun Narang, Divya Kamat</i>   |     |            |
| 5.2b       | Management of Type 2 Lepra Reaction  | 247 |            |
|            | <i>Tarun Narang, Divya Kamat</i>   |     |            |
| 5.3        | Lucio Leprosy, Lucio Phenomenon and Acute Exacerbation   | 257 |            |
|            | <i>Kabir Sardana, Premanshu Bhushan</i>  |     |            |
| <b>6.</b>  | <b>Drug Resistance in Leprosy</b>  |     | <b>260</b> |
| 6.1        | Drug Resistance  | 260 |            |
|            | <i>Mallika Lavania, Utpal Sengupta</i>   |     |            |
| 6.2        | Clinical Relevance of Antimicrobial Resistance (AMR)   | 271 |            |
|            | <i>Kabir Sardana, Ananta Khurana, Aishwarya Muddebihal</i>   |     |            |
| <b>7.</b>  | <b>Medical Management and Prophylaxis</b>  |     | <b>277</b> |
| 7.1        | Chemotherapy of Leprosy and Special Situations   | 277 |            |
|            | <i>Kabir Sardana, Premanshu Bhushan, Ananta Khurana</i>  |     |            |
| 7.2        | Neural Involvement and its Management  | 311 |            |
|            | <i>Kabir Sardana, Ananta Khurana, Premanshu Bhushan</i>  |     |            |
| 7.3        | Chemoprophylaxis, Immunoprophylaxis and Immunotherapeutics in Leprosy  | 324 |            |
|            | <i>Ananta Khurana, Kabir Sardana, Namrata Chhabra</i>  |     |            |
| <b>8.</b>  | <b>Other Aspects of Treatment</b>  |     | <b>338</b> |
| 8.1        | Deformities in Leprosy and their Management  | 338 |            |
|            | <i>Kabir Sardana, Premanshu Bhushan</i>  |     |            |
| 8.2        | Physiotherapy and Orthoses   | 354 |            |
|            | <i>Atul Shah, Neela Shah</i>   |     |            |
| 8.3        | Self-Care, Footwear and Assistive Devices  | 368 |            |
|            | <i>Karthikeyan Govindasamy, Babu Govindan, Neela Shah</i>  |     |            |
| 8.4        | Management of Anaesthetic Deformities of Hands and Feet  | 379 |            |
|            | <i>Karthikeyan Govindasamy, Babu Govindan</i>  |     |            |
| 8.5        | Surgical Management of Neuritis (Nerve Decompression Surgeries) and Common Paralytic Deformities of Hands and Feet | 387 |            |
|            | <i>Anil Dhal, Yasim Khan</i>   |     |            |
| 8.6        | Correction of Deformities of Face in Leprosy   | 399 |            |
|            | <i>Atul Shah, Vinita Puri</i>  |     |            |
| 8.7        | Ocular Complications and Management  | 409 |            |
|            | <i>Kabir Sardana, Ananta Khurana, Margreet Hogeweg</i>   |     |            |
| <b>9.</b>  | <b>Differential Diagnosis</b>  |     | <b>413</b> |
|            | <i>Pooja Arora Mrig, Kabir Sardana, Ananta Khurana</i>   |     |            |
| <b>10.</b> | <b>Nerve Function Assessment and Muscle Testing</b>  |     | <b>446</b> |
|            | <i>Surabhi Sinha, Krishna Garg, Ananta Khurana</i>   |     |            |
|            | <i>Appendix</i>  |     | <b>475</b> |
|            | History and Examination  | 475 |            |
|            | <i>Gaurish R Laad, Savitha B</i>   |     |            |
|            | Drug Formulary   | 483 |            |
|            | <i>Kabir Sardana, Savitha B</i>  |     |            |
|            | <i>Index</i>   |     | <b>503</b> |