

Indian Journal of Medical and Paediatric Oncology

Editor-in-Chief Emeritus

Dr. Padmaj S. Kulkarni, MD, DM
Department of Medical Oncology,
Deenanath Mangeshkar Hospital
and Research Center, Pune,
Maharashtra, India

Editor-in-Chief

Dr. Seema Gulia, MD, DM
Department of Medical Oncology,
Tata Memorial Centre, Mumbai,
Maharashtra, India

Joint Editors

Amol Akhade, MD, DM
Department of Medical Oncology,
Nair Hospital, Mumbai,
Bethany Hospital, Thane,
Suyog Cancer Clinic, Thane,
Maharashtra, India

Tarini Prasad Sahoo, MD, DM
Department of Medical Oncology,
Silverline Hospital, Bhopal,
Madhya Pradesh, India

Editorial Advisor

Sudeep Gupta, MD, DM
Department of Medical Oncology,
Tata Memorial Centre,
Mumbai, Maharashtra, India

Section Editors

Viraj Lavingia, DNB
Director-GI Medical Oncology,
Department of Medical Oncology,
HCG Cancer Center,
Ahmedabad, Gujarat, India

Avinash Bonda, MD, DM
Department of Medical Oncology,
and Hematology, AIG Hospitals Gachibowli,
Hyderabad, Telangana, India

Sujay Srinivas, MD, DM
Department of Medical Oncology,
Bharath Hospital, Kottayam, Kerala, India

**Reshma Puranik, MD, DM, DNB, MRCP,
ECMO**
Ruby Hall Clinic, Jupiter Hospital,
Jehangir Hospital, Assistant professor at
DY Patil Medical College,
Pune, Maharashtra, India

**Sachin Khurana, MD, DM, Fellowship-
Phase 1 trials**
Department of Medical Oncology,
AIIMS, New Delhi, India

**Maya Prasad, MD, Fellowship in Pediatric
Oncology**
Department of Paediatric Oncology,
Tata Memorial Centre, Mumbai,
Maharashtra, India

Lingraj Nayak, MD, DM
Department of Medical Oncology,
Tata Memorial Centre, Mumbai,
Maharashtra, India

Nita Nair, DNB, MRCS, MCh
Department of Surgical Oncology,
Apollo Hospital, Mumbai,
Maharashtra, India

Vamshi Krishna, MD
Department of Medical Oncology and
Hematology AIG Hospital,
Gachibowli, Hyderabad, Telangana, India

Amol Akhade, MD, DM
Department of Medical Oncology,
Nair Hospital, Mumbai, Bethany Hospital,
Thane, Suyog Cancer Clinic, Thane,
Maharashtra, India

Section Advisors

Bharatsinha Bhosale, MD, DM
Department of Medical Oncology,
Bombay Hospital Medical and
Research Institute, Sunrise Oncology Day Care,
Fortis Hospital, Jaslok Hospital,
H N Reliance Hospital and Raheja Hospital,
Mumbai, Maharashtra, India

Kaustav Talapatra, MD
Department of Radiation Oncology,
Nanavati Max Super Speciality Hospital,
Mumbai, Maharashtra, India

TVSVGK Tilak, MD, DNB, DM, FRCP
Department of Medical Oncology,
Armed Forces Medical College,
Pune, Maharashtra, India

Deepti Mutreja, MD, DNB
Department of Pathology,
Armed Forces Medical College,
Pune, Maharashtra, India

Pradeep Kulkarni, MD
Consultant in Palliative Care,
Private Practice, Pune, Maharashtra, India

Reetu Jain, MD
Department of Medical Oncology,
Jaslok Hospital and Research Centre,
Mumbai, Maharashtra, India

Gaurav Prakash, MD, DM
Department of Clinical Haematology and
Medical Oncology,
Post Graduate Institute of Medical
Education & Research,
Chandigarh, Punjab, India

Deepak Dabkara, MD, DM
Department of Medical Oncology,
CHL Hospital, Indore,
Madhya Pradesh, India

Venkatraman Radhakrishnan, MD, DM
Department of Medical Oncology,
Cancer Institute (WIA),
Chennai, Tamil Nadu, India

Bivas Biswas, MD, DM
Department of Medical Oncology,
Tata Medical Center,
Kolkata, West Bengal, India

Priyanka Srivastava, MD, DNB
Department of Medical Oncology,
M.S. Patel Cancer Center,
Shree Krishna Hospital,
Karamsad, Gujarat, India

Suresh Babu MC, MD, DM
Department of Medical Oncology,
Kidwai Memorial Institute of Oncology,
Bengaluru, Karnataka, India

Joydeep Ghosh, MD, DM
Department of Medical Oncology,
Tata Medical Centre,
Kolkata, West Bengal, India

Manikandan Dhanushkodi, MD, DM, DNB
Department of Medical Oncology,
Thoothukudi Cancer Care, Thenmani
Hospital, Thoothukudi,
Tamil Nadu, India

Prasanth Ganesan, MD, DM
Department of Medical Oncology,
Jawaharlal Institute of Postgraduate
Medical Education and Research,
Puducherry, India

Amol Patel, MD, DM
Department of Medical Oncology,
INHS Asvini, Mumbai, Maharashtra, India

**Sujith Kumar Mullapally, MD,
DNB, DM**
Department of Medical Oncology,
Apollo Proton Cancer Centre,
Chennai, Tamil Nadu, India

**Venkata Pradeep Babu Koyyala, MD, DrNB,
ECMO, MNAMS**
Department of Medical Oncology,
Tezpur Cancer Centre,
Assam Cancer Care Foundation,
Assam, India

Sandip Ganguly, MD, DM
Department of Medical Oncology,
Tata Medical Centre,
Kolkata, West Bengal, India

Sunil Kumar Polipalli, MSc, PhD
Department of Cytogeneticist,
Lok Nayak Hospital & Maulana
Azad Medical College, New Delhi, India

Anupriya Kaur, MD, DM

Department of Pediatrics (Genetics),
Post Graduate Institute of Medical
Education & Research,
Chandigarh, Punjab, India

Parathan Karunakaran, MD, DM

Department of Medical Oncology,
Cancer Institute WIA,
Chennai, Tamil Nadu, India

Smita Kayal, MD, DM

Department of Medical Oncology,
Jawaharlal Institute of Postgraduate
Medical Education & Research,
Puducherry, India

Akash Kumar, MD, DM

Department of Medical Oncology,
NCI-All India Institute of Medical Sciences,
New Delhi, India

Section Advisors

**Hemant Malhotra, MD, FRCP, FRCP, FACP,
ECMO, MNAMS, FIICC, FICP, FIMSA**

Department of Medical Oncology,
Shri Ram Cancer Center, Mahatma Gandhi
Hospital, Mahatma Gandhi University of
Medical Sciences & Technology,
Jaipur, Rajasthan, India

Shripad D. Banavali, MD, BC, BE

Department of Medical Oncology,
Tata Memorial Centre,
Mumbai, Maharashtra, India

K. Govind Babu, MD, DM

Department of Medical Oncology,
St. John's Medical College Hospital and
HCG Hospital, Bengaluru, Karnataka, India

**Purvish M. Parikh, MD, DNB, FICP, PHD,
ECMO, CPI**

Department of Clinical Hematology,
Mahatma Gandhi Medical College &
Hospital, Jaipur, Rajasthan, India

Manish Agarwal, MS, DNB

Department of Surgical Oncology
(Orthopaedics),
Nanavati Max Super Speciality Hospital,
Mumbai, Maharashtra, India

Rajiv Sarin, MD, FRCR

Department of Radiation Oncology and
Cancer Genetics Unit,
Tata Memorial Centre,
Mumbai, Maharashtra, India

Kumar Prabhaskar, MD, DM, ECMO, PDCR

Department of Medical Oncology,
Tata Memorial Centre,
Mumbai, Maharashtra, India

Chirag Jyotiker Desai, MD, DM

Hemato-Oncology Clinic,
Vedanta Institute, Ahmedabad,
Gujarat, India

Senthil J. Rajappa, MD, DNB, DM

Department of Medical Oncology,
Basavataarakam Indo American Cancer
Hospital and Research Center,
Hyderabad, Telangana, India

Rakesh Jalali, MD

Department of Radiation Oncology,
Apollo Proton Cancer Centre,
Chennai, Tamil Nadu, India

Nita Nair, DNB, MRCS, MCh

Department of Surgical Oncology,
Apollo Hospital, Mumbai,
Maharashtra, India

Special Content Editors

Parikshit Prayag, MD, ABIM, ABMS

Department of Transplant Infectious
Diseases, Deenanath Mangeshkar Hospital
and Research Center, Pune,
Maharashtra, India

Sujit Nilegaonkar, DRM, DNB, LLB

Department of Nuclear Medicine,
Deenanath Mangeshkar Hospital and
Research Center,
Pune, Maharashtra, India

**Sanjay Desai, MD, DNB, MNAMS,
FVIR, FRCR**

Department of Radiation Oncology,
Deenanath Mangeshkar Hospital and
Research Center,
Pune, Maharashtra, India

Sampada Patwardhan, MD

Department of Microbiology and Hospital
Infection Control
Deenanath Mangeshkar Hospital and
Research Center, Pune,
Maharashtra, India

**Sunil Pasricha, MD, Fellowship
(Oncopathology)**

Department of Pathology,
Rajiv Gandhi Cancer Institute &
Research Centre, New Delhi, India

Ankush Jajodia, DMRD, DNB

Department of Radiology,
Rajiv Gandhi Cancer Institute and
Research Center, New Delhi, India

Web Editor

Prashant Mehta, MD, DM

Department of Haematology/Medical
Oncology and BMT, Amrita Institute of
Medical Sciences, Faridabad, Haryana, India

Associate Editors

Mahesh M. Mandolkar, MD, DNB

Department of Pathology,
Deenanath Mangeshkar Hospital and
Research Center, Pune, Maharashtra, India

Ravi Sekhar Patnaik, MD, DM, ECMO

Department of Medical Oncology,
The Brunei Cancer Centre, Brunei,
Pantai Jerudong Specialist Centre, Brunei
UBD PAPRSB Institute of Health Sciences,
Brunei

Ravi Jaiswal, MD, MRCP, ECMO, DNB

Department of Medical Oncology,
BALCO MEDICAL Centre,
Raipur, Chhattisgarh, India

Hemant Dadhich, MD, DM

Department of Medical Oncology,
Sudha Hospital & Medical Research Centre,
Kota, Rajasthan, India
Cancer Research Centre,
Kota, Rajasthan, India

Urmi Sitanshu Sheth, DNB

Medicine Fellowship of Royal College
of Pathology- Clinical Haematology,
Department of Medical Oncology,
Deenanath Mangeshkar Hospital and
Research Center,
Pune, Maharashtra, India

Vineet Govinda Gupta, MD, DM

Department of Medical Oncology,
Artemis Hospital, Gurugram,
Haryana, India

Zonal Editors

Bhavesh B Parekh, MD, DM, MBA

Department of Medical Oncology,
Shalby Multispeciality Hospital,
Ahemdabad, Gujarat, India

Tarini Prasad Sahoo, MD, DM

Department of Medical Oncology,
Silverline Hospital,
Bhopal, Madhya Pradesh, India

Linu Abraham Jacob, MD, DM

Department of Medical Oncology,
Kidwai Memorial Institute of Oncology,
Bengaluru, Karnataka, India

Randeep Singh, MD, DM, ECMO, FCCP

Department of Medical Oncology,
Narayana Superspeciality Hospital,
Oncomed Clinic, New Delhi, India

Deepak Dabkara, MD, DM

Department of Medical Oncology,
CHL Hospital, Indore, Madhya Pradesh,
India

Student Editor

Sneha Bothra Jain, MD, MRCPI, DNB, ECMO

Department of Medical Oncology,
Mittal Bhilai Hospital,
Bhilai, Chattisgarh, India

Sub-Editors

**Amrita Prayag, MS, Master of
Science (Pharmacology)**

Department of Clinical Research Unit,
Deenanath Mangeshkar Hospital and
Research Center, Pune, Maharashtra, India

Vinayak Deshpande, MScs

Department of Statistics,
Sankhya Analytical Research Pvt. Ltd.,
Medicounts Lifesciences Pvt. Ltd.,
Mumbai, Maharashtra, India

Ganesh Divekar, MBBS, MBA

Department of Clinical Operations and
Medical Services, SIRO Clinpharm Pvt. Ltd.,
Thane, Maharashtra, India

Domain Experts

Karthik Bommannan, MD, DM

Department of Oncopathology,
Cancer Institute (WIA),
Chennai, Tamil Nadu, India

Aditi Dastane, MD

Department of Molecular Diagnostic Lab and
Cancer Genetics Clinic,
Deenanath Mangeshkar Hospital and
Research Center, Pune, Maharashtra, India

Anand Raja, MS, MCh

Department of Surgical Oncology,
Cancer Institute (WIA),
Chennai, Tamil Nadu, India

Editorial Manager

Devika Joshi, MSc

Pune, Maharashtra, India

Senior Editorial Assistant

Yogesh Kembhavi, MBA

Department of Administration,
Tata Memorial Centre, Mumbai,
Maharashtra, India

Editorial Assistant

Namarata Saluja, MSc

Pune, Maharashtra, India

Ryan Varghese, BPharm

Chennai, Tamil Nadu, India

Madhura Kamat, MSc

Mumbai, Maharashtra, India

National Advisory Board

Lalit Kumar, MD, DM

Department of Medical Oncology,
All India Institute of Medical Sciences,
New Delhi, India

Rajendra Badwe, MS

Department of Surgical Oncology,
Tata Memorial Centre,
Mumbai, Maharashtra, India

B. K. Smruti, MD

Department of Medical Oncology,
Lilavati Hospital & Research Centre,
Bombay Hospital Institute of
Medical Sciences, Asian Cancer Institute,
Mumbai, Maharashtra, India

Narayanankutty Warriar, MD, DM

Department of Medical Oncology,
MVR Cancer Centre and Research Institute,
Kozhikode, Kerala, India

Lalit Mohan Sharma, MD

Department of Medical Oncology,
Sriram Cancer Centre, Mahatma Gandhi
Medical College and Hospital,
Jaipur, Rajasthan, India

Ajay Bapna, MD

Department of Medical Oncology,
Bhagwan Mahaveer Cancer Hospital &
Research Centre, Jaipur, Rajasthan, India

Surendra Beniwal, MD, DM

Department of Medical Oncology,
Acharya Tulsi Regional Cancer Treatment
and Research Centre,
Bikaner, Rajasthan, India

Rejiv Rajendranath, DM, DNB

Department of Medical Oncology,
Integrated Cancer Care Group, Apollo Cancer
Institute, Chennai, Tamil Nadu, India

Aju Mathew, MD, MPhil, FACP

Department of Medical Oncology,
Trivandrum Institute of Palliative Sciences,
Thiruvananthapuram, Kerala, India

Amit Agarwal, MD, DM, MRCP

Department of Medical Oncology,
Dr B L Kapur Hospital, New Delhi, India

Arun Seshachalam, MD, DNB, DM

Department of Medical and Pediatric Oncology,
Dr GVN Cancer Institute,
Trichy, Tamil Nadu, India

Sourav Kumar Mishra, MD, DM, ECMO

Department of Medical Oncology,
APOLLO Cancer Centre,
Bhubaneswar, Odisha, India

Vivek Agarwala, MD, DM, DNB, ECMO, MRCP

Department of Medical Oncology,
Narayana Superspeciality Hospital and
Cancer Institute, Kolkata,
West Bengal, India

Vinayak V. Moka, MD, DM

Department of Medical Oncology,
Ramaiah Medical College and Hospitals,
Bengaluru, Karnataka, India

Soumya Surath Panda, MD, DM

Department of Medical Oncology,
IMS & SUM Hospital (SOA University),
Bhubaneswar, Odisha, India

Krishna Mohan Mallavarapu, DNB, DM

Department of Medical Oncology,
Basavataarakam Indo American Cancer
Hospital, Hyderabad, Telangana, India

Rushabh Kothari, MD, DM, ECMO

Department of Medical Oncology,
Narayana Multispeciality Hospital, Oncowin
Cancer Center Ahmedabad, Gujarat, India

Anita Ramesh (Chandra), DCH, MD, DNB, DM, MSc Oncology, MBA

Department of Medical Oncology,
Saveetha University,
Saveetha Medical College and Hospital,
Thandalam Saveetha Medical Centre,
Apollo Speciality Hospital and Kauvery
Hospital, Chennai, Tamil Nadu, India

Chetan Deshmukh, MD, DM

Department of Medical Oncology,
Deenanath Mangeshkar Hospital and
Research Centre, Jehangir Hospital,
Orchids Breast Health, Sassoon General
Hospital and B J Medical College,
Pune, Maharashtra, India

Kushal Gupta, MD, DM, ECMO

Post Graduate Institute of Medical
Education & Research,
Chandigarh, Punjab, India

Shweta Bansal, DNB, Fellowship PHO-BMT

Department of Pediatric Hemato-Oncology,
Sir HN Reliance Foundation Hospital,
Mumbai, Maharashtra, India

Raju Titus Chacko, MD

Department of Medical Oncology, Christian
Medical College, Vellore, Tamil Nadu, India

Sandeep Batra, MD, DNB

Department of Medical Oncology,
Max Hospital, Gurgaon, Haryana, India

Maheboob Basade, MD

Department of Medical Oncology,
Jaslok Hospital, Mumbai, Maharashtra, India

Bharath Rangarajan, MD, DM, ECMO, PDCR

Department of Medical Oncology,
Kovai Medical Center and Hospital,
Coimbatore, Tamil Nadu, India

Prasad Narayanan, MD, DM, ECMO

Department of Medical Oncology,
Cytocare Cancer Hospital,
Bengaluru, Karnataka, India

Nikhil Ghadyalpatil, MD, DNB, MNAMS, PDCR, DM, ECMO

Department of Medical Oncology,
Yashoda Cancer Institute,
Hyderabad, Telangana, India

Chandrashekhar V. Pethe, MD, DM

Department of Medical Oncology,
Hope Cancer Institute,
Nasik, Maharashtra, India
Pravara Institute Of Medical Sciences,
Loni, Maharashtra, India

M. Vamshi Krishna, MD, DM

Department of Medical Oncology,
Apollo Cancer Institute,
Hyderabad, Telangana, India

Prakash G. Chitalkar, MD, ECMO, PDCR

Department of Medical Oncology,
Sri Aurobindo Institute of Medical
Sciences, Indore, Madhya Pradesh, India

Amish D. Vora, MD, DNB, DM

Department of Medical Oncology,
PSRI Hospital, New Delhi, India

International Advisory Board

Ghassan Abou-Alfa, MD, MBA

Department of Medical Oncology,
Memorial Sloan Kettering Cancer Center,
New York, United States of America

Ajit Venniyoor, MD, DNB, DM

Department of Medical Oncology,
National Oncology Centre, Royal Hospital
Center, Muscat, Oman

Paul Mitchell, MD, PhD, FRANZCO, FRACS, FROphth, FAFPHM

Department of Clinical Ophthalmology &
Eye Health, Westmead
Clinical School, University of Sydney,
Sydney, Australia

Rakesh M. Jamkhandikar MD, FRCR, M Med

Department of Radiology, Armed Forces
Hospital, Muscat, Oman

Apar Kishor Ganti, MD, MS

Department of Internal Medicine, Division of Oncology/Hematology, University of Nebraska Medical Center, Omaha, Nebraska

Amit Khot, MD, MRCP, FRCPATH, FRACP

Department of Haematology and Bone Marrow Transplant, Peter MacCallum Cancer Centre, Melbourne, Australia

David James Kerr, CBE, MA, MD, DSc, FRCP, FRCGP, FMedSci

Department of Cancer Medicine, University of Oxford, Oxford, England
Department of Oncology, Sichuan, Xiamen and 2nd Military Universities, China
Honorary Professor, Seoul National University, Seoul, South Korea
Korea Nuffield Division of Clinical and Laboratory Sciences, Oxford, England

Soe Aung, MB, BS, DCH, FRACGP

Independent Medical Practice Professional, Myanmar

Sanjeev Sewak, MBBS, FRACP

Department of Medical Oncology, South Eastern Private Hospital, Melbourne, Victoria, Australia

Ravindran Kanesvaran, MRCP, BSc, MD, FAMS

Department of Medical Oncology, National Cancer Centre Singapore, Duke-NUS Graduate Medical School, Singapore

Fatima Cardoso, MD, MS

Director Breast Unit, Champalimaud Clinical Center Lisbon, Portugal

Christopher Steer, FRACP

Department of Medical Oncology, Albury Wodonga Private Hospital, New South Wales, Australia

Alex A. Adjei, MD, PhD

Department of Medical Oncology and Pharmacology, Mayo Clinic, Rochester, United States

Alexandru Eniu, MD, PhD

Department of Breast Tumors, Cancer Institute "Ion Chiricuta", Cluj-Napoca, Romania

Premal H. Thaker, MD, MS

Division of Gynecologic Oncology, Washington University School of Medicine Saint Louis, United States

Etienne Brain, MD, PhD

Department of Medical Oncology, Institut Curie/Saint-Cloud, France

© 2024. The Author(s). This journal is published by Thieme under the Creative Commons license CC BY (Attribution), permitting unrestricted use, distribution, and reproduction so long as the original work is properly cited. (<https://creativecommons.org/licenses/by/4.0/>).

Indian Journal of Medical and Paediatric Oncology is published 6 times a year in February, April, June, August, October, and December by Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India. Tel: +91-120-4556600, Fax: +91-120-455-6649.

Subscription: Open access journals available online for free at <http://open.thieme.com>.

Advertisers contact: Marketing, Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India, marketing@thieme.in.

Indian Journal of Medical and Paediatric Oncology is indexed in *Emerging Sources Citation Index* and SCOPUS. Thieme Medical Publishers is a member of the CrossRef initiative.

Editorial comments should be sent to journals@thieme.com. The content of this journal is available online at www.thieme-connect.com/products. Visit our Web site at www.thieme.com and the direct link to this journal at www.thieme.com/ijmpo.

Typesetting: Thomson Digital, Noida, India

Printing and Binding: Replika Press Pvt. Ltd.

Printed in India