



Pediatric Blood & Cancer

Volume 63, Issue S3, November, 2016

Abstracts From the 48th Congress of the International Society of Paediatric Oncology (SIOP)
Dublin, Ireland

October 19–22, 2016

PETER E. NEWBURGER, M.D.

EDITOR-IN-CHIEF

WILEY

ISSN 1545-5017

Discover this journal online at
 **WILEY**  **ONLINE LIBRARY**
wileyonlinelibrary.com/journal/pbc

PEDIATRIC BLOOD & CANCER

Official Journal of



The American Society of Pediatric Hematology/Oncology and
The International Society of Paediatric Oncology

Editor-in-Chief

Peter E. Newburger, M.D.

University of Massachusetts Medical School, Worcester, Massachusetts

Deputy Editor

Thomas Gross, M.D., Ph.D.

Rockville, Maryland

Associate Editors

Melissa Hudson
St. Jude Children's Research Hospital, Memphis, Tennessee

Donna Neuberg
Dana Farber Cancer Institute, Boston, Massachusetts

Russell Ware
Cincinnati Children's Hospital, Cincinnati, Ohio

Daniel Wechsler
Duke University School of Medicine, Durham, North Carolina

Allen Yeoh
National University of Singapore, Singapore

Guy Young
Children's Hospital of Los Angeles, Los Angeles, California

C. Michel Zwaan
Erasmus MC-Sophia Children's Hospital, Rotterdam, The Netherlands

Section Editors

Clinical Practice Guidelines
Lillian Sung
Hospital for Sick Children, Toronto, Ontario, Canada

On Children, Blood, and Cancer
David N. Korones
University of Rochester Medical Center, Rochester, New York

Editorial Board

Peter Adamson, Philadelphia, Pennsylvania
Bharat R. Agarwal, Mumbai, India
Todd Alonzo, Arcadia, California
Peter Ambros, Vienna, Austria
John Anderson, London, United Kingdom
Maurizio Aricò, Florence, Italy
Daniel Aronson, Amsterdam, The Netherlands
Andrea Biondi, Monza, Italy
Francine Blei, New York, New York
Paula Bolton-Maggs, Manchester, United Kingdom
Joachim Boos, Münster, Germany
Silvia Brandalise, São Paulo, Brazil
George Buchanan, Dallas, Texas
Gabriele Calaminus, Münster, Germany
William Carroll, New York, New York
Victoria Castel, Valencia, Spain
Eric J. Chow, Seattle, Washington
Seth Corey, Chicago, Illinois
Alan Craft, Newcastle Upon Tyne, United Kingdom
Timothy Cripe, Columbus, Ohio
Stella Davies, Cincinnati, Ohio
Michael DeBaun, Nashville, Tennessee
Beatriz de Camargo, São Paulo, Brazil
Meenakshi Devidas, Gainesville, Florida
François Doz, Paris, France
Hassan El Sohl, Riyadh, Kingdom of Saudi Arabia
James Feusner, Oakland, California
Jonathan Fish, New York, New York
Didier Frappaz, Lyon, France
Lindsay Frazier, Boston, Massachusetts

Carolyn Freeman, Montreal, Quebec, Canada
Norbert Graf, Homburg, Germany
Daniel Green, Memphis, Tennessee
GP Hadley, Durban, South Africa
Jane Hankins, Memphis, Tennessee
Henrik Hasle, Aarhus, Denmark
Doug Hawkins, Seattle, Washington
Eiso Hiya, Hiroshima, Japan
Hiroki Hori, Mie, Japan
Stephen Hunger, Philadelphia, Pennsylvania
Hitoshi Ikeda, Saitama, Japan
Paul Imbach, Basel, Switzerland
Ronald Jaffe, Pittsburgh, Pennsylvania
Charles Keller, San Antonio, Texas
Csongar Kiss, Debrecen, Hungary
Heinrich Kovar, Vienna, Austria
Thomas Kühne, Basel, Switzerland
Beverly Lange, Philadelphia, Pennsylvania
Chi-kong Li, Hong Kong
Jeffrey Lipton, New York, New York
David Loeb, Baltimore, Maryland
Karen Marcus, Boston, Massachusetts
Katherine Matthay, San Francisco, California
Linda McAllister-Lucas, Ann Arbor, Michigan
Jaume Mora, Barcelona, Spain
Brigitta Mueller, St. Petersburg, Florida
Akira Nakagawara, Chiba, Japan
Ellis Neufeld, Boston, Massachusetts
Robert Noll, Pittsburgh, Pennsylvania
Kevin Oeffinger, New York, New York
Tom Olson, Atlanta, Georgia
Julie Panepinto, Milwaukee, Wisconsin
Louise Parker, Halifax, Nova Scotia, Canada
Andrea Patenaude, Boston, Massachusetts

Giorgio Perilongo, Padova, Italy
Rob Pieters, Rotterdam, The Netherlands
Ian Pollack, Pittsburgh, Pennsylvania
Michael Pulsipher, Los Angeles, California
Charles Quinn, Cincinnati, Ohio
Bhaskar Rao, Memphis, Tennessee
Jean Raphael, Houston, Texas
Yaddanpudi Ravindranath, Detroit, Michigan
Gregory Reaman, Washington, DC
Dirk Reinhardt, Hannover, Germany
Jörg Ritter, Münster, Germany
Leslie Robison, Memphis, Tennessee
Carlos Rodriguez-Galindo, Memphis, Tennessee
Katrín Scheinmann, Hamilton, Ontario, Canada
Kjeld Schmiegelow, Copenhagen, Denmark
Anjali Sharathkumar, Chicago, Illinois
Jordan Shavit, Ann Arbor, Michigan
Stephen Shochat, Memphis, Tennessee
Malcolm Smith, Rockville, Maryland
Richard Spicer, Bristol, United Kingdom
Richard Spoto, Los Angeles, California
Roly Squire, Leeds, United Kingdom
Hannah Tamary, Petah Tikva, Israel
Yongmin Tang, Hangzhou, China
Jakub Tolar, Minneapolis, Minnesota
Jeffrey Toretsky, Washington, DC
Marry van den Heuvel, Rotterdam, The Netherlands
Cynthia Wetmore, Atlanta, Georgia
Jeremy Whelan, London, United Kingdom
Joanne Wolfe, Boston, Massachusetts
Jason Yustein, Houston, Texas

Managing Editor

Emily Hammond

PEDIATRIC BLOOD & CANCER

Official Journal of



Affiliated with: The European Society for Paediatric Haematology and Immunology, The Histiocyte Society, The International Society of Paediatric Surgical Oncology, and The Japanese Society for Pediatric Hematology and Oncology

ASPHO/SIOP Joint Publications Committee

Jeffrey Lipton, New Hyde Park, NY, USA
Amy Billett, Boston, MA, USA
Rob Pieters, Rotterdam, The Netherlands
Greg Reaman, Washington, DC

The American Society of Pediatric Hematology/Oncology (ASPHO)

President - Amy Billett, Boston, MA, USA
Vice President - Patrick Leavey, Dallas, TX, USA
Secretary-Treasurer - Ellis Neufeld, Boston, MA, USA

Histiocyte Society

President - Carlos Rodriguez-Galindo, Memphis, TN, USA
President-Elect - Milen Minkov, Vienna, Austria
Secretary - Michael Jordan, Cincinnati, OH, USA

International Society of Paediatric Surgical Oncology (IPSO)

President - Steve Shochat, Memphis, TN, USA
Secretary - Chan Hon Chui, Singapore

International Society of Paediatric Oncology (SIOP)

President - Giorgio Perilongo, Padua, Italy
Secretary - Paul Rogers, British Columbia, Canada
Chair of the Scientific Committee - François Doz, Paris, France

The European Society for Paediatric Haematology and Immunology (ESPHI)

President - Christoph Dame, Berlin, Germany
Secretary - Antonis Kattamis, Athens, Greece

The Japanese Society for Pediatric Hematology and Oncology (JSPHO)

Copyright and photocopying

Copyright © 2016 Wiley Periodicals, Inc. a Wiley Company. All rights reserved. No part of this publication may be reproduced, stored or transmitted in any form or by any means without the prior permission in writing from the copyright holder. Authorization to copy items for internal and personal use is granted by the copyright holder for libraries and other users registered with their local Reproduction Rights Organisation (RRO), e.g. Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, USA (www.copyright.com), provided the appropriate fee is paid directly to the RRO. This consent does not extend to other kinds of copying such as copying for general distribution, for advertising or promotional purposes, for creating new collective works or for resale. Special requests should be addressed to: permissions@wiley.com.

Pediatric Blood & Cancer (Online ISSN 1545-5017, print ISSN 1545-5009, Wiley Online Library, www.wileyonlinelibrary.com/journal/pbc), is published in fifteen issues per year (monthly, with two issues in June and three in November) by Wiley Periodicals, Inc., through Wiley Subscription Services, Inc., a Wiley Company, 111 River Street, Hoboken, NJ 07030. **Subscription Prices for 2016 are:** Online Only: Volume 63, 2016; 15 issues: \$6,015 in U.S., \$6,015 in Canada and Mexico, £3,068 in the U.K., €3,881 in the Euro zone, and \$6,015 ROW. Prices are exclusive of tax. Asia-Pacific GST, Canadian GST/HST and European VAT will be applied at the appropriate rates. For more information on current tax rates, please go to www.wileyonlinelibrary.com/tax-vat. The price includes online access to the current and all online back files to January 1st 2012, where available. For other pricing options, including access information and terms and conditions, please visit www.wileyonlinelibrary.com/access. **Print on Demand:** This journal is available Print on Demand (POD) from our supplier Sheridan. To place your order please contact your usual agent or Sheridan directly at <http://www.sheridan.com/LPM/Wiley>. POD copies are available from Sheridan at 100% of the Online Only list price. Where the subscription price includes print issues, and delivery is to the recipient's address, delivery terms are Delivered At Place (DAP); the recipient is responsible for paying any import duty or taxes. Title to all issues transfers FOB our shipping point, freight prepaid. We will endeavour to fulfil claims for missing or damaged copies within six months of publication, within our reasonable discretion and subject to availability. **Back issues:** Single issues from prior year volumes are available at the current single issues prices from cs-journals@wiley.com. Earlier issues may be obtained from Periodicals Service Company, 351 Fairview Avenue - Ste 300, Hudson, NY 12534, USA. Tel: +1 518 822-9300, Fax: +1 518 822-9305, Email: psc@periodicals.com. **Contact details Journal Customer Services:** For ordering information, claims and any enquiry concerning your journal subscription please go to www.wileycustomerhelp.com/ask or contact your nearest office: **Americas:** Email: cs-journals@wiley.com; Tel: +1 781 388 8598 or 1 800 835 6770 (Toll free in the USA & Canada). **Europe, Middle East and Africa:** Email: cs-journals@wiley.com; Tel: +44 (0) 1865 778315. **Asia Pacific:** Email: cs-journals@wiley.com; Tel: +65 6511 8000. **Japan:** For Japanese speaking support, Email: cs-japan@wiley.com; Tel: +65 6511 8010 or Tel (toll-free): 005 316 50 480. **Visit our Online Customer Help** available in 7 languages at www.wileycustomerhelp.com/ask. **Special Personal Subscription Rate:** Subscriptions at the personal rate must be paid by personal cheque, credit card, bank draft, or money order. All subscriptions outside U.S. will be sent by air. Payments must be made in U.S. dollars drawn on a U.S. bank. To receive the "Physicians in Training" rate, orders should be accompanied by the signature of the residency coordinator on institutional letterhead. Only available in North America. **Advertising inquiries** should be addressed to Advertising Sales Manager, c/o John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, 1748-8832, fax (201) 748-6207. **Offprint sales and inquiries Commercial Reprints:** Email: corporatealesusa@wiley.com; corporatealesusa@wiley.com; or corporatealesusa@wiley.com. **Author Reprints (50 - 500 Copies):** Order online: <http://www.sheridanreprints.com/orderForm.html>; Email: cjones@tsp.sheridan.com. **Corporate Citizenship:** Wiley's Corporate Citizenship initiative seeks to address the environmental, social, economic, and ethical challenges faced in our business and which are important to our diverse stakeholder groups. Since launching the initiative, we have focused on sharing our content with those in need, enhancing community philanthropy, reducing our carbon impact, creating global guidelines and best practices for paper use, establishing a vendor code of ethics, and engaging our colleagues and other stakeholders in our efforts. Follow our progress at www.wiley.com/go/citizenship. **Medical Disclaimer:** All articles published, including but not limited to original research, clinical notes, editorials, reviews, reports, letters, and book reviews, represent the opinions and views of the authors and do not reflect any official policy or medical opinion of the institutions with which the authors are affiliated or of the Publisher unless this is clearly specified. Articles published herein are intended to further general scientific research, understanding, and discussion only and are not intended and should not be relied upon as recommending or promoting a specific method, diagnosis, or treatment by physicians for any particular patient. While the Editor and Publisher believe that drug selections and dosages and the specifications and usage of equipment and devices as set forth herein are in accord with current recommendations and practice at the time of publications, they accept no legal responsibility for any errors or omissions, and make no warranty, express or implied, with respect to material contained herein. Publication of an advertisement or other discussions of products in the Journal should not be construed as an endorsement of the products or the manufacturers' claims. Readers are encouraged to contact the manufacturers with any questions about the features or limitations of the products mentioned. **Disclaimer:** The Publisher, Societies, and Editors cannot be held responsible for errors or any consequences arising from the use of information contained in this journal; the views and opinions expressed do not necessarily reflect those of the Publisher, Societies, and Editors, neither does the publication of advertisements constitute any endorsement by the Publisher, Societies, and Editors of the products advertised. **Change of Address:** Please forward to the subscriptions address listed above 6 weeks prior to move; enclose present mailing label with change of address. **Claims for Missing Issues:** Claims for undelivered copies will be accepted only after the following issue has been received. Please enclose a copy of the mailing label or cite your subscriber reference number in order to expedite handling. Missing copies will be supplied when losses have been sustained in transit and where reserve stock permits. Send claims c/o John Wiley & Sons, Inc. Attn: Journals Admin Dept UK, 111 River Street, Hoboken, NJ 07030, (201) 748-6645. **Cancellations:** Subscription cancellations will not be accepted after the first issue has been mailed. **Postmaster:** Send address changes to PEDIATRIC BLOOD & CANCER, John Wiley & Sons Inc., C/O The Sheridan Press, PO Box 465, Hanover, PA 17331. **Online Open:** Pediatric Blood & Cancer accepts articles for Open Access publication. Please visit <http://olabout.wiley.com/WileyCDA/Section/id-406241.html> for further information about OnlineOpen. **Indexed by:** Biological Abstracts® (Thomson ISI), BIOSIS Previews® (Thomson ISI), CAB Abstracts® (CABI), CINAHL: Cumulative index to Nursing & Allied Health Literature (EBSCO), Current Awareness in Biological Sciences (Elsevier), Current Contents®/Clinical Medicine (Thomson ISI), Current Opinion in Pediatrics (Lippincott Williams & Wilkins), EMBASE/Excerpta Medica (Elsevier), Index Medicus/ MEDLINE/PubMed (NLM), Journal Citation Reports/Science Edition (Thomson ISI), Leeds Medical Information (University of Leeds), PASCAL Database (INIST/CNRS), Science Citation Index Expanded™ (Thomson ISI), Science Citation Index® (Thomson ISI), SIIC Databases (Sociedad Iberoamericana de Informacion Científica), VINITI (All-Russian Institute of Science & Technological Information), Web of Science® (Thomson ISI). **Print Details:** Printed in the USA by The Sheridan Group. Access to this journal is available free online within institutions in the developing world through the HINARI initiative with the WHO. For information, visit www.who.int/hinari/en/. **Production Editor:** pbcprod@wiley.com. For submission instructions, subscription and all other information visit: www.wileyonlinelibrary.com/journal/pbc



PEDIATRIC BLOOD & CANCER

Continuing and Expanding the Scope of Medical & Pediatric Oncology, Established 1975



Affiliated with: The European Society for Paediatric Haematology and Immunology, The Histiocyte Society, The International Society of Paediatric Surgical Oncology, and The Japanese Society for Pediatric Hematology and Oncology

Volume 63, Number S3

November, 2016

Abstracts From the 48th Congress of the International Society
of Paediatric Oncology (SIOP)
Dublin, Ireland
October 19–22, 2016

SIOP 2016 Scientific Programme+Index..... S5–S321