

# Cancer Epidemiology, Biomarkers & Prevention

*Translating Science to Populations*

# AACR

American Association  
for Cancer Research

AN OFFICIAL JOURNAL OF THE AMERICAN ASSOCIATION FOR CANCER RESEARCH

## Editor-in-Chief

**Timothy R. Rebbeck**

## Deputy Editors

Electra D. Paskett  
Thomas A. Sellers

## Senior Editors

Melissa L. Bondy  
Robert M. Bostick  
Louise A. Brinton  
Neil E. Caporaso  
Jo L. Freudenheim  
Scarlett Lin Gomez  
Ahmedin Jemal  
Ellen Kampman  
Anita Y. Kinney  
Loïc Le Marchand  
Christopher I. Li  
Maria Elena Martinez  
Elaine A. Ostrander  
Jong Y. Park  
Emanuel F. Petricoin III  
Elizabeth A. Platz  
Leslie L. Robison  
Thomas E. Rohan  
Peter G. Shields  
Beti Thompson  
Cornelia M. Ulrich  
Sally W. Vernon  
Nicolas Wentzensen  
John S. Witte  
Wei Zheng

## Editorial Board

Christian C. Abnet	Peter Gann	Paul J. Limburg	Erin M. Siegel
Hans-Olov Adami	Judy E. Garber	James R. Marshall	Rashmi Sinha
Anthony J. Alberg	Graham G. Giles	Marji McCullough	Christine Skibola
Howard H. Bailey	Edward L. Giovannucci	Katherine A. McGlynn	Martyn T. Smith
Jill S. Barnholtz-Sloan	Karen Glanz	Gail E. McKeown-Eyssen	Margaret R. Spitz
Sonja I. Berndt	Alisa M. Goldstein	Amy McQueen	Janet L. Stanford
Marianne Berwick	Carolyn Gotay	Helen I. Meissner	William P. Steward
Smita Bhatia	Steven B. Gruber	Dominique S. Michaud	Rachael Stolzenberg-Solomon
Deborah J. Bowen	Susan E. Hankinson	Paola C. Muti	Suzanne M. Stratton
Otis W. Brawley	Maureen Hatch	Ronald E. Myers	Susan R. Sturgeon
W. Robert Bruce	Stephen S. Hecht	Polly A. Newcomb	Sapna Syngal
James R. Cerhan	Robert A. Hiatt	Kevin C. Oeffinger	Stephen H. Taplin
Andrew T. Chan	Ari P. Hirvonen	Olufunmilayo I. Olopade	Patricia Ann Thompson
June M. Chan	Gloria Y.F. Ho	Jamie S. Ostroff	Michael J. Thun
Shine Chang	Ashraf Hoque	David L. Page	Jasmin A. Tiro
Jenny Chang-Claude	Mohammad Obaidul Hoque	Howard L. Parnes	Amy Trentham-Dietz
Chu Chen	Ann W. Hsing	Melissa R. Partin	Mary K. Tripp
Jinbo Chen	Chanita Hughes-Halbert	Rena Pasick	Rebecca Troisi
Michael B. Cook	David J. Hunter	Alpa V. Patel	Shelley S. Tworoger
Kerry S. Courneya	Elizabeth T. Jacobs	Malcolm C. Pike	Asad Umar
Wendy Cozen	Eric J. Jacobs	Mark P. Purdue	Thomas L. Vaughan
Wendy Demark-Wahnefried	Mark A. Jenkins	You Lin Qiao	Damon J. Vidrine
Eduardo DeStefani	Esther M. John	Janet S. Rader	Paolo L. Vineis
Michael A. Diefenbach	Peter A. Kanetsky	William Rakowski	Jaye L. Viner
Zora Djuric	Daehee Kang	Juergen K.V. Reichardt	Keiji Wakabayashi
Joanne F. Dorgan	Timothy Key	Gad Rennert	Sophia S. Wang
Julie A. Douglas	Lambertus A. Kiemeny	Nathaniel Rothman	Graham W. Warren
Steven M. Dubinett	Omer Kucuk	Mack T. Ruffin	Alice S. Whittemore
Kathleen M. Egan	James V. Lacey, Jr.	Mark W. Schiffman	Walter C. Willett
Janine Einspahr	Maria T. Landi	Kathryn H. Schmitz	Xiaohong Rose Yang
Eric A. Engels	Paula M. Lantz	Marc D. Schwartz	Wei-cheng You
Meira Epplein	Carlo La Vecchia	Stephen M. Schwartz	Kai Yu
Eduardo L. Franco	DeAnn Lazovich	O. John Semmes	Zuo-Feng Zhang
Joseph F. Fraumeni, Jr.	Michael F. Leitzmann	V. Wendy Setiawan	
Karen M. Freund		Saul Shiffman	

**Editorial Office:** *Cancer Epidemiology, Biomarkers & Prevention* [ISSN: 1055-9965 (Print); 1538-7755 (Online)] is published monthly, one volume per year, by the American Association for Cancer Research, Inc. Periodicals postage paid at Philadelphia, PA, and additional mailing offices. POSTMASTER: Send address changes to *Cancer Epidemiology, Biomarkers & Prevention*, Member Services, AACR, 615 Chestnut Street, 17th Floor, Philadelphia, PA 19106-4404 or E-mail: [membership@aacr.org](mailto:membership@aacr.org). Copyright 2017 by the American Association for Cancer Research, Inc. The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

## AACR Officers

Nancy E. Davidson, President  
Michael A. Caligiuri,  
President-Elect  
José Baselga, Past President  
William N. Hait, Treasurer  
Margaret Foti, Chief Executive  
Officer

## Publications Committee

Mary Helen Barcellos-Hoff  
Alberto Bardelli  
Dafna Bar-Sagi  
Michael E. Berens  
René Bernards  
John D. Carpten  
Frederic J. de Sauvage  
Sanjiv Sam Gambhir  
Levi A. Garraway, Chairperson  
Maura L. Gillison  
Elizabeth M. Jaffee  
Pasi A. Jänne  
Roy A. Jensen  
Jonathan D. Licht  
Steffi Oesterreich  
William Pao  
Helen M. Piwnica-Worms  
Charles W.M. Roberts  
Lillian L. Siu  
David B. Solit  
Saraswati V. Sukumar  
Toshikazu Ushijima  
Victor E. Velculescu

## Publishing Staff

### Publisher

Christine B. Rullo

### Director of Journal Operations and Systems

Daniel S. Evanko

### Associate Editor

Kristen Huang

### Associate Journal Manager

Crystal Cheepudom

### Editorial Staff

Stephanie V. Seymour

### Associate Director, Production

Charlene Squibb

### Senior Production Editor

Stacey L. Reid

### Director, Digital Publishing

Robert Spanier

### Associate Director, Sales and Marketing

Nicola L. Hill

### Assistant Director, Institutional Sales & Outreach

Karola Rac

### Marketing and Creative Services Director

Paul Driscoll

### Design Staff

Susan Moore

## Scope

*Cancer Epidemiology, Biomarkers & Prevention* publishes original, peer-reviewed, population-based research on cancer etiology, prevention, surveillance, and survivorship. The following topics are of special interest: descriptive, analytical, and molecular epidemiology; biomarkers including assay development, validation, and application; chemoprevention and other types of prevention research in the context of descriptive and observational studies; the role of behavioral factors in cancer etiology and prevention; survivorship studies; risk factors; and the science of cancer health disparities. Besides welcoming manuscripts that address individual subjects in any of the relevant disciplines, *CEBP* editors encourage the submission of manuscripts with a transdisciplinary approach.

*Cancer Epidemiology, Biomarkers & Prevention* is abstracted and/or indexed in Current Contents/Clinical Medicine, MEDLINE, Science Citation Index, Scopus, and Web of Science.

## Submission of Manuscripts

Online manuscript submission is welcomed at <http://cebp.msubmit.net>. Before submitting a manuscript, please read the Instructions for Authors, which are available from the Journal's home page at <http://cebp.aacrjournals.org>.

## Publication Charges

Beginning with manuscripts submitted January 1, 2016 or after, articles will be published with the understanding that the author(s) will pay both a publication fee plus a color figure handling fee. Please see the Instructions for Authors, which are available from the Journal's home page at <http://cebp.aacrjournals.org/>.

## Subscription Information

### Nonmember Individuals

Subscriptions include print version with online access. Contacts listed below are for nonmember individual subscriptions.

### USA and Rest of World (excluding Japan)

American Association for Cancer Research, 615 Chestnut Street, Philadelphia, PA 19106; 1-855-744-4667; [pubsales@aacr.org](mailto:pubsales@aacr.org)

### Japan

[e-support@maruzen.co.jp](mailto:e-support@maruzen.co.jp); [journal@kinokuniya.co.jp](mailto:journal@kinokuniya.co.jp); [usaco@usaco.co.jp](mailto:usaco@usaco.co.jp)

International print subscriptions include cost of surface mail. Expedited mailing is available. Contact the American Association for Cancer Research for rates.

## Site Licenses

For information about institutional site licenses, contact [pubsales@aacr.org](mailto:pubsales@aacr.org).

## AACR Members

AACR members may opt to receive either a print subscription with online access to content or an online-only subscription. Contact [membership@aacr.org](mailto:membership@aacr.org) or visit the membership page at [www.aacr.org](http://www.aacr.org) for more information.

## Single Issue Sales

Subject to their availability, single or back issues may be purchased for \$60 (U.S.) or \$65 (outside the U.S.) each. The cost must be prepaid. Contact [pubsales@aacr.org](mailto:pubsales@aacr.org).

## Claims

One-time claims for missing issues made within 120 days of the issue's publication will be honored, subject to availability. No credit or refund will be given if an issue is out of print at the time of claim.

## AACR Members

[membership@aacr.org](mailto:membership@aacr.org)

## Nonmembers and Institutions

[pubsales@aacr.org](mailto:pubsales@aacr.org)

## Advertising Information

For information about advertising in AACR journals, contact Pharmaceutical Media Inc., 30 East 33rd St., 4th Floor, New York, NY 10016; 212-904-0360; [Dsimone@pminy.com](mailto:Dsimone@pminy.com).

## Copyright and Permissions

Content printed in or disseminated by *Cancer Epidemiology, Biomarkers & Prevention* is protected by copyright. Authors who wish to publish material in *Cancer Epidemiology, Biomarkers & Prevention* must formally transfer copyright to the AACR. All authors must sign copyright transfer forms before the AACR can proceed with publication.

To read the complete AACR Copyright and Permissions Policy, visit [www.aacrjournals.org/site/InstrAuthors/ifora.xhtml#copyrightpermissions](http://www.aacrjournals.org/site/InstrAuthors/ifora.xhtml#copyrightpermissions).