

# 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

Elizabeth A. Platz

## Deputy Editors

Scarlett Lin Gomez  
Nicolas Wentzensen

## Senior Editors

Jiyoung Ahn  
Melissa L. Bondy  
Louise A. Brinton  
Neil E. Caporaso  
Meira Epplein  
Jo L. Freudenheim  
Patti Gravitt  
John D. Groopman  
Chanita Hughes-Halbert  
Eric Jacobs  
Ahmedin Jemal  
Anita Y. Kinney  
Loïc Le Marchand  
Christopher I. Li  
Lorelei A. Mucci  
Julie R. Palmer  
Jong Y. Park  
Emanuel F. Petricoin III  
Leslie L. Robison  
Thomas E. Rohan  
Meredith Shiels  
Shelley S. Tworoger  
Cornelia M. Ulrich  
Sally W. Vernon  
John S. Witte  
Wei Zheng

## Editorial Staff

### Managing Editor

Greg Pavlovcak

### Associate Editor

Jing Peng

### Associate Journal Manager

Crystal Cheepudom

### Special Content Manager

Chris Vesci

### Editorial Staff

Nageena Laing

### Senior Production Editor

Corinne Mooney

## Editorial Board

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

**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.; 615 Chestnut Street, 17th Floor, Philadelphia, PA 19106-4404. 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 2019 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

Elaine R. Mardis, President  
Antoni Ribas,  
President-Elect  
Elizabeth M. Jaffee,  
Past President  
William N. Hait, Treasurer  
Margaret Foti, Chief Executive  
Officer

## Publications Committee

Victor E. Velculescu, Chairperson  
Dafna Bar-Sagi  
Mary Helen Barcellos-Hoff  
Michael E. Berens  
John D. Carpten  
Maura L. Gillison  
Rakesh K. Jain  
Pasi A. Jänne  
Gerrit A. Meijer  
Gordon B. Mills  
Steffi Oesterreich  
Gloria M. Petersen  
David R. Piwnica-Worms  
William Pao  
Charles W.M. Roberts  
Alice T. Shaw  
Lillian L. Siu  
Saraswati Sukumar  
Toshikazu Ushijima

## Publishing Staff

### Publisher

Christine Battle

### Director, Journal Operations and Systems

Daniel S. Evanko

### Director, Journal Sales and Marketing

Nicola L. Hill

### Director, Digital Publishing

Mark Jacobson

### Associate Director, Production

Charlene Squibb

### Assistant Director, Journal Marketing

Joanna Arnold

### Assistant Director, Institutional Sales & Outreach

Karola Rac

### Marketing and Creative Services

#### Senior 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 <http://aacrjournals.org/content/authors/copyright-permissions-and-access>.