

# CANCER PREVENTION RESEARCH

The Forefront of Prevention Science

AN OFFICIAL JOURNAL OF THE **AACR** American Association  
for Cancer Research



## Editor-in-Chief

Raymond N. DuBois



## Editor-in-Chief

Michael N. Pollak

## Special Advisors to the Editors-in-Chief

Elizabeth H. Blackburn  
Ronald M. Evans  
William N. Hait

## Deputy Editors

Marcia R. Cruz-Correa  
Ernest T. Hawk  
Avrum Spira  
Eva Szabo  
Timothy C. Wang

## Senior Editors

Adriana Albini  
Powel H. Brown  
Jack Cuzick  
Zigang Dong  
Marc Gunter  
Mark Hull  
Daehee Kang  
Thomas W. Kensler  
Mark LaBarge  
Lawrence J. Marnett  
David Sidransky  
Ignacio I. Wistuba

## Statistical Editor

J. Jack Lee

## Editorial Staff

### Associate Editor

Jing Peng

### Managing Editor

Greg Pavlovcak

### Special Content Manager

Chris Vesci

### Editorial Assistant

Darien Dillon

**Editorial Office:** *Cancer Prevention Research* [ISSN: 1940-6207 (Print); ISSN: 1940-6215 (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. Postage paid at Philadelphia, PA, and additional mailing offices. Send address changes to *Cancer Prevention Research*, Member Services, AACR, 615 Chestnut Street, 17th Floor, Philadelphia, PA 19106-4404 or E-mail: [membership@aacr.org](mailto:membership@aacr.org). Copyright 2021 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).

# CANCER PREVENTION RESEARCH

## Editorial Board

Rajesh Agarwal  
Leonard Augenlicht  
Jennifer Beane  
Raymond Bergan  
Deborah J. Bowen  
Norman F. Boyd  
Dean E. Brenner  
Karen Brown  
John Burn  
Andrew T. Chan  
Elizabeth Y. Chiao  
Margie L. Clapper  
Deirdre P. Cronin-Fenton  
K. Michael Cummings  
Mary B. Daly  
Angelo M. De Marzo  
Andrea DeCensi  
Albena T. Dinkova-Kostova  
Ethan Dmitrovsky  
Susan M. Domchek  
Steven M. Dubinett  
Isam-Eldin Eltoum  
Carol J. Fabian  
Alessandro Fatatis  
Jonine D. Figueroa  
Rebecca C. Fitzgerald  
Leslie G. Ford  
Agnès Fournier  
Stephen J. Freedland  
Christine M. Friedenreich  
Patricia A. Ganz  
Judy E. Garber  
Maura L. Gillison  
Karen Glanz  
Scarlett Lin Gomez  
Mary Gospodarowicz  
J. Silvio Gutkind  
Heather Hampel  
Samir M. Hanash

Stephen S. Hecht  
James G. Herman  
Fred R. Hirsch  
Chanita Hughes-Halbert  
Neil M. Iyengar  
Jin Jen  
V. Craig Jordan  
Humam Kadara  
Seema A. Khan  
T. Peter Kingham  
Anita Y. Kinney  
Eric A. Klein  
Ah-Ng Kong  
Ernst J. Kuipers  
Stephen Lam  
Christopher I. Li  
Karen T. Liby  
Paul J. Limburg  
Steven M. Lipkin  
Minetta C. Liu  
Karen H. Lu  
Anirban Maitra  
Sharon L. Manne  
James R. Marshall  
Frank L. Meyskens  
Altaf Mohammed  
Luis M. Montuenga  
Lorelei A. Mucci  
James L. Mulshine  
Tracy A. O'Mara  
Kenneth Offit  
Frank G. Ondrey  
Ana Patricia Ortiz  
Vassiliki Papadimitrakopoulou  
Electra D. Paskett  
John W. Pepper  
Jennifer B. Permuth  
Ulrike Peters  
Gloria M. Petersen

Natalie Porat-Shliom  
You-Lin Qiao  
Michael Quante  
Doreen Ramogola-Masire  
Chinthalapally V. Rao  
Mary W. Redman  
Mary E. Reid  
Rebecca Richards-Kortum  
Daniel W. Rosenberg  
Rajiv Sarin  
Norie Sawada  
Lecia V. Sequist  
Mark E. Sherman  
Dong M. Shin  
Imad Shureiqi  
Yu Shyr  
Shivendra V. Singh  
Samuel G. Smith  
Michael B. Sporn  
Sudhir Srivastava  
D. Cristina Stefan  
Gary Stoner  
Nanjoo Suh  
Young-Joon Surh  
Henry J. Thompson  
Ian M. Thompson  
Benjamin A. Toll  
Adetunji T. Toriola  
Asad Umar  
Toshikazu Ushijima  
Bethany Van Guelpen  
Sooryanarayana Varambally  
Eduardo Vilar  
Cynthia Vinson  
Victor G. Vogel  
Robert J. Volk  
Thomas T. Wang  
Dennis A. Wigle  
Benjamin C.Y. Wong  
Chung S. Yang

## CANCER PREVENTION RESEARCH

# Publishing Information

AN OFFICIAL JOURNAL OF THE **AACR** American Association for Cancer Research

### AACR Officers

David A. Tuveson, President  
Lisa M. Coussens,  
President-Elect  
Antoni Ribas, Past President  
William N. Hait, Treasurer  
Margaret Foti, Chief Executive Officer

### Publications Committee

Victor E. Velculescu, Chairperson  
Adriana Albini  
Laura Fejerman  
Masanori Hatakeyama  
Catriona H.M. Jamieson  
Jos Jonkers  
Virginia G. Kaklamani  
Andrew Kung  
Jonathan D. Licht  
Ira Mellman  
Gordon B. Mills  
Kunle Odunsi  
Kenneth J. Pienta  
Joshua D. Rabinowitz  
Timothy R. Rebbeck  
David L. Rimm  
Mack Roach  
Michael B. Yaffe

### 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

#### Senior Director, Marketing and Creative Services

Paul Driscoll

#### Design Staff

Susan Moore

### Scope

*Cancer Prevention Research* publishes original studies, reviews, and commentaries in the fields of cancer prevention and interception. The journal comprises preclinical, clinical, translational, and implementation research, with special attention given to molecular discoveries and an emphasis on building translational and mechanistic bridges between the basic, clinical, and population sciences. The editors welcome manuscript submissions that describe mechanisms of carcinogenesis; develop preventive interventions to intercept cancer development at early stages; or evaluate implementation of evidence-based preventive practices.

*Cancer Prevention Research* 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 <https://capr.msubmit.net>. Before submitting a manuscript, please read the Instructions for Authors, which is available from the Journal's home page at <https://cancerpreventionresearch.aacrjournals.org>.

### Publication Charges

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 Publication Fees and Reprints page which is available at <https://aacrjournals.org/content/authors/publication-fees-and-reprints>.

### Subscription Information

#### Nonmember Individuals

Subscriptions include online access only. 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)

#### 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 <https://aacr.org> for more information.

#### Single Issue Sales/Claims

Due to the impact of COVID-19, the AACR has discontinued single issue orders and fulfillment of claims through December 31, 2021.

### Advertising Information

For information about advertising in AACR journals, contact The Walchli Tauber Group, Inc., 2225 Old Emmorton Road, Suite 201, Bel Air, MD 21015; (443) 512-8899; [maura.paolletti@wt-group.com](mailto:maura.paolletti@wt-group.com).

### Copyright and Permissions

Content printed in or disseminated by *Cancer Prevention Research* is protected by copyright. Authors who wish to publish material in *Cancer Prevention Research* 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 <https://aacrjournals.org/content/authors/copyright-permissions-and-access>.