

# CANCER IMMUNOLOGY RESEARCH

Illuminating the Interplay of Cancer and the Immune System

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



**Editor-in-Chief**  
Robert D. Schreiber



**Editor-in-Chief**  
Philip D. Greenberg

## Deputy Editors

James P. Allison  
Glenn Dranoff  
Elizabeth M. Jaffee  
Robert H. Vonderheide

## Senior Editors

Maxim N. Artyomov  
Nina Bhardwaj  
Vincenzo Bronte  
Christine E. Brown  
Xuetao Cao  
Marco Colonna  
Lisa M. Coussens  
Sandra Demaria  
Olivera J. Finn  
Lawrence H. Fong  
Nir Hacohen  
F. Stephen Hodi  
Stephen C. Jameson  
Carl H. June  
Lewis L. Lanier  
Alberto Mantovani  
Cornelis J.M. Melief

Evan Newell  
Ellen Puré  
Padmanee Sharma  
Hiroshi Shiku  
Mark J. Smyth  
Pramod K. Srivastava  
Cornelia L. Trimble  
Benoit J. Van den Eynde  
Jennifer A. Wargo  
Louis M. Weiner

## Biostatistics Editor

Rosemarie Mick

## Editorial Staff

### Senior Associate Editor

Karen Honey

### Associate Editor

Adriana D. Benavides

### Managing Editor

Jason S. Woodson

### Editorial Associate

Brittany Rubio

### Special Content Manager

Chris Vesci

### Senior Production Project Editor

Corinne Mooney

In collaboration with the Cancer Research Institute

**Editorial Office:** *Cancer Immunology Research* [ISSN: 2326-6066 (Print); ISSN: 2326-6074 (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 Immunology Research*, AACR Member Services, 615 Chestnut St., 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 IMMUNOLOGY RESEARCH

## Editorial Board

Jean-Pierre Abastado  
Gregory P. Adams  
Gosse J. Adema  
Steven M. Albelda  
Frances R. Balkwill  
Robert J. Binder  
Renier Brentjens  
Joshua Brody  
Steven Burakoff  
William E. Carson  
Adelheid Cerwenka  
Lieping Chen  
Mario P. Colombo  
George Coukos  
Tanja D. de Gruijl  
Michele De Palma  
I. Jolanda de Vries  
Reno Debets  
Nora L. Disis  
Charles G. Drake  
Edgar G. Engleman  
Dean W. Felsher  
Robert L. Ferris  
Soldano Ferrone  
Ian H. Frazer  
Gordon J. Freeman  
Alan B. Frey  
Wolf H. Fridman  
Yang-Xin Fu

Dmitry I. Gabrilovich  
Luca Gattinoni  
Eli Gilboa  
Sacha Gnjjatic  
Naoto Hirano  
Yuhui Huang  
Patrick Hwu  
Darrell Irvine  
Masahisa Jinushi  
Yutaka Kawakami  
Khashayarsha Khazaie  
Alexander Knuth  
Vijay Kuchroo  
Peter P. Lee  
Haiyan Liu  
Ignacio Melero  
Miriam Merad  
Jeffrey S. Miller  
James J. Mulé  
David H. Munn  
Hiroyoshi Nishikawa  
Kunle Odunsi  
Pamela S. Ohashi  
Suzanne Ostrand-Rosenberg  
Karolina Palucka  
Drew M. Pardoll  
Mikael J. Pittet  
Scott K. Pruitt  
Gabriel A. Rabinovich

David H. Raulet  
Nicholas P. Restifo  
Cliona M. Rooney  
Alexander Y. Rudensky  
Michel Sadelain  
Ugur Sahin  
Shimon Sakaguchi  
John H. Sampson  
Noriyuki Sato  
Michael Schmitt  
Charles L. Sentman  
Arlene Sharpe  
Michail Sitkovsky  
Craig L. Slingluff  
Mark X. Sliwkowski  
Eduardo M. Sotomayor  
Daniel E. Speiser  
Melody A. Swartz  
Mario Sznol  
Hideaki Tahara  
Giorgio Trinchieri  
Shannon J. Turley  
Sjoerd H. van der Burg  
Richard G. Vile  
Eric Vivier  
Irving L. Weissman  
E. John Wherry  
Kai W. Wucherpfennig  
Cassian Yee  
Weiping Zou

## CANCER IMMUNOLOGY 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  
Sheila K. Singh  
Sheila A. Stewart  
Miguel A. Villalona-Calero  
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 of Digital Publishing

Mark Jacobson

### Director, Editorial

Robert Kruger

### Deputy 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 Immunology Research* publishes outstanding original articles reporting major advances that span the discipline of cancer immunology, from basic investigations of host-tumor interactions to developmental therapeutics in model systems, early translational studies in patients, and in-depth analysis of late-stage clinical trials. The journal also publishes reviews and opinion pieces of broad significance across the spectrum of cancer immunology research. As the premier resource for disseminating knowledge of immunology to the cancer research community, the journal catalyzes cross-disciplinary work that yields a deeper understanding of the host-tumor relationship, more potent cancer treatments, and improved clinical outcomes.

*Cancer Immunology 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://cir.msubmit.net>. Before submitting a manuscript, please read the Instructions for Authors, which is available from the journal's home page at <https://cancerimmunolres.aacrjournals.org>.

Presubmission inquiries are welcomed. For instructions on sending a presubmission inquiry to the journal, please visit the About the Journal page at <https://cancerimmunolres.aacrjournals.org/site/misc/about.xhtml>.

## Publication Charges

Articles will be published with the understanding that the author(s) will pay both a publication fee plus a display item fee. For more detail, please see the Publication Fees and Reprints page which is available at <https://aacrjournals.org/content/authors/publication-fees-and-reprints>.

## Subscription Information

### 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.

### 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).

### 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.paoletti@wt-group.com](mailto:maura.paoletti@wt-group.com).

## Copyright and Permissions

Content printed in or disseminated by *Cancer Immunology Research* is protected by copyright. Authors publishing in *Cancer Immunology Research* may either formally transfer copyright to the AACR or may select the Open Access option and publish the article under one of two Creative Commons Attribution licenses – Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) or Attribution 4.0 International (CC BY 4.0) – depending on funder requirements. Please visit <https://aacrjournals.org/content/authors/copyright-permissions-and-access>.