

# Molecular Cancer Research

Defining the Molecular Basis of Malignancy and Progression

# AACR

American Association  
for Cancer Research

AN OFFICIAL JOURNAL OF THE AMERICAN ASSOCIATION FOR CANCER RESEARCH

## Editor-in-Chief

**Karen E. Knudsen**

## Deputy Editor

William C. Hahn

## Senior Editors

Lawrence H. Boise

Robert Bristow

Jason S. Carroll

Jose R.

Conejo-Garcia

Yves A. DeClerck

J. Alan Diehl

Heide L. Ford

W. Lee Kraus

Massimo Loda

James J. Manfredi

Elaine R. Mardis

Steven B. McMahon

Mark A. Rubin

Toshiyasu Taniguchi

Scott A. Tomlins

Jean Y.J. Wang

Ashani T. Weeraratna

## Editorial Board

Andrew E. Aplin

Steven E. Artandi

Rene Bernards

Carlos Caldas

George A. Calin

Charles E. Chalfant

Junjie Chen

Edwin Cheung

Scott D. Cramer

James A. DeCaprio

James V. DeGregori

Yali Dou

Giulio F. Draetta

Donald L. Durden

Martin Eilers

Christine M. Eischen

Alessandro Fatatis

Felix Y. Feng

Michelangelo Fiorentino

Elsa R. Flores

Christopher A. French

Serge Y. Fuchs

Frank B. Furnari

Todd R. Golub

Joe W. Gray

H. Leighton Grimes

Thomas Helleday

Elizabeth P. Henske

Mien-Chie Hung

Jos Jonkers

Scott H. Kaufmann

Khandan Keyomarsi

Joseph L. Kissil

Ralf Kittler

Steven J. Kridel

Natasha Kyprianou

Xiaole Shirley Liu

Gregory D. Longmore

David Macpherson

Christopher A. Maher

Maureen E. Murphy

Senthil K. Muthuswamy

Michael Ohh

Joseph T. Opferman

Renata Pasqualini

Charles W.M. Roberts

Ze'ev Ronai

Martine F. Roussel

Kevin Ryan

William P. Schieman

Sabina Signoretti

Chi Wai Eric So

Makoto Mark Taketo

Andrew Thorburn

Axel Ullrich

Sooryanarayana  
Varambally

Karen H. Vousden

Geoffrey M. Wahl

Qianben Wang

Stephen J. Weiss

Xiaolu Yang

## Editorial Staff

### Associate Editor

Lucas J. Brand

### Associate Managing Editor

Jen Zimmerman

### Editorial Associate

Karen Quann

### Special Content Manager

Chris Vesce

### Senior Production Editor

Gregory Cosby

**Editorial Office:** *Molecular Cancer Research* [ISSN: 1541-7786 (Print); 1557-3125 (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 *Molecular Cancer Research*, 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).

Molecular Cancer Research

# Publishing Information

**AACR**  
American Association  
for Cancer Research

Print ISSN: 1541-7786 • Online ISSN: 1557-3125

## 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  
William Pao  
Gloria M. Petersen  
David R. Piwnicka-Worms  
Charles W.M. Roberts  
Alice T. Shaw  
Lillian L. Siu  
Saraswati V. Sukumar  
Toshikazu Ushijima

## Publishing Staff

### Publisher

Christine B. Rullo

### 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,

### Production

David Livewell

### 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

*Molecular Cancer Research* publishes articles describing novel basic cancer research discoveries of broad interest to the field. Studies must be of demonstrated significance, and the Journal prioritizes analyses performed at the molecular and cellular level that reveal novel mechanistic insight into pathways and processes linked to cancer risk, development, and/or progression. Areas of emphasis include all cancer-associated pathways (including cell-cycle regulation; cell death; chromatin regulation; DNA damage and repair; gene and RNA regulation; genomics; metabolism; oncogenes and tumor suppressors; signal transduction; and tumor microenvironment), in addition to studies describing new molecular mechanisms and interactions that support cancer phenotypes.

*Molecular Cancer 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 <http://mcr.msubmit.net>. Before submitting a manuscript, please read the Instructions for Authors, which is available from the Journal's home page at <http://mcr.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://mcr.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 *Molecular Cancer Research* is protected by copyright. Authors who wish to publish material in *Molecular Cancer 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 <http://aacrjournals.org/content/authors/copyright-permissions-and-access>.