

# Cancer Epidemiology Biomarkers & Prevention

July/August 1993  
Volume Two • Number Four  
Pages 299-402  
ISSN 1055-9965



A Publication of the  
American Association for Cancer Research  
Cosponsored by the  
American Society of Preventive Oncology

## AMERICAN CANCER SOCIETY CLINICAL AWARDS

The American Cancer Society is proud to announce its Clinical Awards for 1994 funding: the Clinical Oncology Fellowship (COF), the Clinical Oncology Career Development Award (CDA), and the Cancer Control Career Development Award for Primary Care Physicians (CCCCDA).

The COF is a one-year institutional award intended to support a multidisciplinary training experience for physicians and dentists preparing for a leadership career in academic oncology. The Fellowship is expected to provide unique training in addition to that which is normally provided in postgraduate training programs designed to fulfill requirements of specialty boards. The COF stipend is \$10,000 per year.

The CDA is a three-year award given to promising junior faculty who will pursue academic careers in clinical oncology. A successful application must describe in detail a supervised program that will develop the candidate's clinical expertise and his/her capacity to perform independent clinical/laboratory research. The annual stipend for the CDA is \$25,000 for the first year, and \$30,000 and \$35,000 for the second and third years, respectively.

In order to encourage and support activities in cancer control, the Society offers a **limited** number of CCCDA's to physicians specializing in primary care. It is anticipated that physicians trained under these two-year grants will improve cancer control through involvement in primary care practice, education, and research activities related to cancer control. These awards are intended to develop academic leaders in primary care specialties emphasizing cancer control.

Please note that candidates for these awards must be citizens or permanent residents of the United States. The application deadlines for each of these awards are as follows:

Clinical Oncology Fellowship: July 1, 1993  
Clinical Oncology Career Development Award: August 1, 1993  
Cancer Control Career Development Award: August 15, 1993

To request additional information or application materials for these programs, contact the office of:

Virginia Krawiec, M.P.A.  
Professional Education Department  
American Cancer Society, Inc.  
1599 Clifton Road, N.E.  
Atlanta, GA 30329-4251  
404-329-5734

## AMERICAN CANCER SOCIETY

### CLINICAL ONCOLOGY FELLOWSHIPS

The American Cancer Society is pleased to announce the 1994 Clinical Oncology Fellowships (COF). The COF is intended to support a multidisciplinary training experience for physicians and dentists preparing for a leadership career in academic oncology. The program may include training in cancer control, prevention, detection, diagnosis, therapy, rehabilitation, and research. The Fellowship is expected to provide unique training in addition to that which is normally provided in postgraduate training programs designed to fulfill requirements of specialty boards, and it is available to citizens or permanent residents of the United States only.

Applications are to be submitted by institutions (not prospective fellows) by July 1, 1993 for fellowships to begin July 1, 1994. The stipend for this one-year award is \$10,000.

To request further information or application materials, please contact the office of:

Virginia Krawiec, M.P.A.  
Professional Education Department  
American Cancer Society, Inc.  
1599 Clifton Road, N.E.  
Atlanta, GA 30329-4251  
404-329-5734

## AMERICAN CANCER SOCIETY

### CLINICAL ONCOLOGY CAREER DEVELOPMENT AWARDS

The American Cancer Society is pleased to announce the 1994 Clinical Oncology Career Development Award (CDA). This award is intended to encourage and develop promising candidates who will pursue academic careers in clinical oncology. Through the CDA, the Society seeks to support individuals in supervised programs that will develop the candidate's clinical expertise and his/her capacity to perform independent clinical and/or laboratory research.

These awards are intended to support the early development of careers in academic clinical oncology; thus physicians who already have well established careers with substantial research funding should not apply. In addition, candidates for these awards must be citizens or permanent residents of the United States.

This is a three-year award. The stipend for the award is \$25,000 for the first year, \$30,000 for the second, and \$35,000 for the third. The application deadline is August 1, 1993 for awards to begin July 1, 1994.

To request further information or application materials, please contact the office of:

Virginia Krawiec, M.P.A.  
Professional Education Department  
American Cancer Society, Inc.  
1599 Clifton Road, N.E.  
Atlanta, GA 30329-4251  
404-329-5734

## AMERICAN CANCER SOCIETY

### CANCER CONTROL CAREER DEVELOPMENT AWARD FOR PRIMARY CARE PHYSICIANS

The American Cancer Society is pleased to announce the 1994 Cancer Control Career Development Award for Primary Care Physicians (CCCCDA). This award is intended to develop academic leaders in primary care specialties emphasizing cancer control: family practice, general internal medicine, obstetrics and gynecology, and pediatrics. Through the CCCDA, the Society seeks to support individuals in supervised programs that will develop the candidate's clinical and teaching expertise and his/her capacity to perform independent clinical research in cancer control. It is anticipated that physicians trained under these awards will improve cancer control through involvement in primary care practice, education, and research activities related to cancer control.

Candidates for first year Cancer Control Career Development Awards for Primary Care Physicians may not have an academic rank above that of Assistant Professor and must not be tenured or be the section head (or equivalent) in his/her discipline. These awards are intended to support the early development of academic careers which place emphasis on cancer control; physicians with well established careers and substantial research funding should not apply. In addition, candidates for these awards must be citizens or permanent residents of the United States.

This is a two-year award. The stipend for the award is \$25,000 for the first year and \$30,000 for the second. The application deadline is August 15, 1993 for awards to begin July 1, 1994.

To request further information or application materials, please contact the office of:

Virginia Krawiec, M.P.A.  
Professional Education Department  
American Cancer Society, Inc.  
1599 Clifton Road, N.E.  
Atlanta, GA 30329-4251  
404-329-5734

# Cancer Epidemiology & Prevention

## Biomarkers

A Publication of the American Association for Cancer Research ■ Cosponsored by the American Society of Preventive Oncology

### **American Association for Cancer Research, Inc.**

**Executive Director and  
Director of Publications**  
Margaret Foti

#### *Publications Staff*

**Associate Director  
of Publications**  
Mary Anne Mennite

**Manager, Editorial Services**  
Heide M. Pusztay

**Editorial Assistants**  
Susan L. Arns  
Grace Jeromski  
Margaret E. Pinto

**Supervisor, Manuscript Processing**  
Margaret A. Pickels

**Assistant Supervisor, Manuscript  
Processing**

Theresa A. Griffith

**Editorial Secretaries**  
Mary Ellen Purring  
Valerie L. Taylor  
Andrea Conrad

#### *Administrative Staff*

**Associate Director of  
Administration**  
Adam D. Blistein

**Senior Accountant**  
Anthony P. Blengino

**Financial Assistant**  
George L. Moore

**Meetings Coordinator**  
Jeffrey M. Ruben

**Meeting Planner**  
Carole Kanoff

**Public Information Coordinator**  
Jenny-Anne Martz

**Executive Assistant for Programs**  
Ruth E. Fortson

**Administrative Assistant**  
Robin E. Felder

**Systems Specialist**  
Lydia I. Rodriguez

**Secretary**  
Malika L. Wright

**Editorial Secretary**  
Diana F. Certo

#### **Office of the Editor-in-Chief**

**Editorial Secretary**  
Cheryl C. Carter

**Editor-in-Chief**  
Pelayo Correa

#### **Associate Editors**

Webster K. Cavenee  
Joseph F. Fraumeni, Jr.  
Ellen R. Gritz  
Curtis C. Harris  
Frederick P. Li  
W. Thomas London  
Thomas E. Moon  
James A. Swenberg  
Steven R. Tannenbaum  
Alice S. Whittemore  
Mimi C. Yu

#### **Assistant Editor**

Elizabeth T. H. Fontham

#### **Editorial Advisory Board**

David B. Abrams  
Bruce K. Armstrong  
Helmut Bartsch  
Valerie Beral  
John S. Bertram  
Joan R. Bloom  
William J. Blot  
John D. Boice, Jr.  
George E. Bonney  
Ricardo R. Brentani  
W. Robert Bruce  
Eva Buiatti  
Neil E. Caporaso  
Lan Bo Chen  
Philip Cole  
K. Michael Cummings  
Susan J. Curry  
Eduardo DeStefani  
Paul F. Engstrom  
Virginia L. Ernster  
Yu Tang Gao  
E. Robert Greenberg  
Raymond S. Greenberg  
Peter Greenwald  
John D. Groopman  
F. Peter Guengerich  
Clark W. Heath, Jr.  
Stephen S. Hecht  
Kari Hemminki  
Rolando Herrero  
Elizabeth A. Holly  
Lars-Erik Holm  
Robert N. Hoover  
Geoffrey R. Howe  
Barbara S. Hulka  
Ronald H. Jensen  
Fred F. Kadlubar  
Mary Claire King  
Leo J. Kinlen  
Alfred G. Knudson, Jr.  
Laurence N. Kolonel  
Lance A. Liotta  
Martin Lipkin  
Richard R. Love  
Thomas Mack  
Frank L. Meyskens, Jr.  
Christopher J. Mischejda  
John D. Minna  
Ruggero Montesano  
John J. Mulvihill  
Nubia Muñoz  
Alfred I. Neugut  
Abraham M. Y. Nomura  
Gilbert S. Omenn

C. Tracy Orleans  
David L. Page  
Frederica Perera  
Nicholas L. Petrakis  
John P. Pierce  
Miriam C. Poirier  
John D. Potter  
Ross Prentice  
Barbara Rimer  
George C. Roush  
Jose Russo  
Jonathan M. Samet  
Rodolfo Saracci  
Mark H. Schiffman  
David Schottenfeld  
Paul A. Schulte  
Roy E. Shore  
Margaret R. Spitz  
Louise C. Strong  
Takashi Sugimura  
G. Marie Swanson  
Cesar Victora  
Jürgen Wahrendorf  
Nicholas Wald  
Lee W. Wattenberg  
I. Bernard Weinstein  
John H. Weisburger  
Noel S. Weiss  
Walter C. Willett  
Rodger J. Winn  
Gerald N. Wolgan  
Sandra R. Wolman  
Ernst L. Wynder  
Witold Zatonski  
Harald zur Hausen

**Cancer Epidemiology, Biomarkers & Prevention** is published bimonthly, one volume per year, by the American Association for Cancer Research, Inc. Except for members of the American Association for Cancer Research, all subscriptions are payable in advance to Waverly Press, Inc., 428 E. Preston St., Baltimore, Maryland 21202-3993, to which all business communications, remittances (in United States currency or its equivalent), and subscription orders should be sent. In Japan, send orders and inquiries to (sole agent): USACO Corporation, Tsutsumi Bldg., 13-12, Shimbashi 1-chome, Minato-ku, Tokyo 105, Japan; Tel. (03) 502-6471. Nonmembers of the American Association for Cancer Research within the United States may subscribe to Volume 2 of **Cancer Epidemiology, Biomarkers & Prevention** at the rate of \$85.00 (individual nonmembers) or \$150.00 (institutional nonmembers), including postage. Institutional and individual nonmembers outside of the United States should add \$20.00 to their respective rates to offset second-class postage costs. Air mail and other means of delivery are available at extra charge; contact Waverly Press for information. Changes of address notification should be sent 60 days in advance and include both old and new addresses. Member subscribers should send address changes to: Member Services, American Association for Cancer Research, Inc., Public Ledger Bldg., 620 Chestnut St., Suite 816, Philadelphia, PA 19106-3483. Nonmember subscribers should notify Waverly Press of changes of address. Copies of the journal which are undeliverable because of address changes will be destroyed.

Copyright © 1993 by the American Association for Cancer Research, Inc.



19WK-AEX-FXPP



## Notice to Members of the American Association for Cancer Research

Officers for 1993-1994

President: Margaret L. Kripke, M.D. Anderson Cancer Center, Houston, TX 77030

President-Elect: Edward Bresnick, Dartmouth-Hitchcock Medical Center, Lebanon, NH 03756

Treasurer: Thomas J. King, Georgetown University Medical Center, Washington, DC 20007

Executive Director: Margaret Foti, AACR, Public Ledger Building, Suite 816, Philadelphia, PA 19106-3483

---

### Annual Dues

The annual dues of active members of the American Association for Cancer Research are \$135.00 and they include a subscription to one AACR journal. The member rate for each additional journal is \$45.00. Corresponding members of the Association will be charged an appropriate fee to offset second-class postage costs. Payment of dues and changes of address of members of the Association should be sent promptly to Margaret Foti, Executive Director, American Association for Cancer Research, Public Ledger Building, 620 Chestnut Street, Suite 816, Philadelphia, PA 19106-3483; Telephone: (215)440-9300; FAX: (215)440-9313.

---

### Back Issues and Single Copy Sales of the Journal

Copies of back stock of the journal may be ordered from Waverly Press, Inc. As long as supplies permit, single copies will be sold by this company at \$12.50 per copy. Orders outside the U.S. add \$1.50/copy to offset postage costs.

---

### Advertisements

Advertisement insertion orders and copy must be received 60 days prior to the date of issue in which the advertisement is to be published. The journal is mailed on approximately the 10th day of the month of issue. Inquiries about advertising should be directed to: Elizabeth Mosko, Williams and Wilkins, 428 E. Preston Street, Baltimore, MD 21202-3993. Telephone: (410)528-4005.

---

### Copyright and Copyright Clearance Center

Authors who wish to publish in *Cancer Epidemiology, Biomarkers & Prevention* must formally transfer copyright to the proprietor of the journal, the American Association for Cancer Research, Inc. It is understood by this transfer that the authors relinquish all exclusive rights of copyright ownership, including the rights of reproduction, derivation, distribution, sale, and display.

Authors who prepared their articles as part of their official duties as employees of the U.S. Federal Government are not required to transfer copyright to the American Association for Cancer Research, Inc., since these articles are considered to be in the public domain. In the case of articles supported by federal grants or contracts, copyright transfer to the American Association for Cancer Research, Inc., is required. The federal government may retain a nonexclusive license to publish or republish such material.

The journal will routinely allow authors (or others with the permission of the authors) to include select parts of a copyrighted article in reviews, books, or subsequent papers, upon written request to the AACR Director of Publications. Requests to reproduce an article in its entirety will be considered on an individual basis and permission may be granted contingent upon payment of an appropriate copyright fee. All reproduction requests must include a brief description of intended use and a

stamped, self-addressed envelope. Third parties should obtain the approval of the authors *before* corresponding with the AACR.

Copies of articles for which the American Association for Cancer Research, Inc. owns the copyright may be made for personal or internal use, provided that the copier pay the per-copy fee of \$2.00 through the Copyright Clearance Center, Inc. This Center is a nonprofit organization through which individuals and institutions may reimburse a copyright owner for photocopying journal articles beyond what is defined as "fair use" in Sections 107 and 108 of the Copyright Revision Act of 1978.

Those who wish to photocopy articles may report the number of copies they have made, together with the fee code 1055-9965/93 \$02.00, to: Copyright Clearance Center, Inc., 27 Congress St., Salem, MA 01970. Remittances may be sent to the Center at the time of reporting or the Center will bill the user on a monthly basis. Deposit accounts and prepayment plans may also be arranged.

---

**No responsibility is accepted by the Editors, by the American Association for Cancer Research, Inc., by the American Society of Preventive Oncology, or by Waverly Press, Inc. for the opinions expressed by contributors or for the content of the advertisements.**

---

*Cancer Epidemiology, Biomarkers & Prevention* is indexed in *Chemical Abstracts*, *Current Contents/CM<sup>®</sup>*, *Index Medicus*, and *MEDLINE*. This journal is printed on acid-free paper.

---

*Cancer Epidemiology, Biomarkers & Prevention* (ISSN 1055-9965) is published bimonthly for \$80 (for members of the American Association for Cancer Research) or for \$85 (individual nonmembers) and \$150 (institutional nonmembers) per year by the American Association for Cancer Research, Inc. Second-class postage paid at Baltimore, MD and additional mailing offices. POSTMASTER: Send address changes to *Cancer Epidemiology, Biomarkers & Prevention*, c/o Waverly Press, Inc., 428 East Preston Street, Baltimore, MD 21202-3993.