# **Acknowledgments**

This monograph was developed by the National Cancer Institute under the general direction of **Stephen E. Marcus**, Monograph Series Editor, and Senior Scientific Editor **Gary E. Swan**, along with Scientific Editors **Timothy B. Baker**, **Laurie Chassin**, **David V. Conti**, **Caryn Lerman**, and **Kenneth A. Perkins**.

# **Monograph Series Editor**

# Stephen E. Marcus, Ph.D.

Epidemiologist
Tobacco Control Research Branch,
Behavioral Research Program
Division of Cancer Control and Population
Sciences
National Cancer Institute
National Institutes of Health
Bethesda, MD

# **Senior Scientific Editor**

# Gary E. Swan, Ph.D.

Director Center for Health Sciences SRI International Menlo Park, CA

# **Scientific Editors**

# Timothy B. Baker, Ph.D.

Professor Center for Tobacco Research & Intervention Department of Medicine School of Medicine and Public Health University of Wisconsin Madison, WI

## Laurie Chassin, Ph.D.

Regents Professor of Psychology Department of Psychology Arizona State University Tempe, AZ

# David V. Conti, Ph.D.

Assistant Professor Zilkha Neurogenetic Institute Keck School of Medicine Department of Preventive Medicine Division of Biostatistics University of Southern California Los Angeles, CA

# Caryn Lerman, Ph.D.

Mary W. Calkins Professor
Department of Psychiatry and Annenberg
Public Policy Center
Deputy Director, Abramson Cancer Center
University of Pennsylvania
Philadelphia, PA

#### Kenneth A. Perkins, Ph.D.

Professor of Psychiatry University of Pittsburgh Pittsburgh, PA

# Authors

# Janet Audrain-McGovern, Ph.D.

Associate Professor Department of Psychiatry University of Pennsylvania Philadelphia, PA

## Erik Augustson, Ph.D., M.P.H.

Tobacco Control Research Branch Behavioral Research Program National Cancer Institute Rockville, MD

# Timothy B. Baker, Ph.D.

Professor

Center for Tobacco Research & Intervention Department of Medicine School of Medicine and Public Health University of Wisconsin Madison, WI

# Andrew W. Bergen, Ph.D.

Director, Molecular Genetics Program Center for Health Sciences SRI International Menlo Park, CA

## Neal L. Benowitz, Ph.D.

Professor of Medicine, Psychiatry and Biopharmaceutical Sciences Chief, Clinical Pharmacology University of California, San Francisco San Francisco, CA

# Laura Jean Bierut, M.D.

Professor of Psychiatry Washington University School of Medicine St. Louis, MO

# Avshalom Caspi, Ph.D.

Professor

Departments of Psychology & Neuroscience and Psychiatry & Behavioral Sciences, and Institute for Genome Sciences & Policy **Duke University** Durham, NC

and

Social, Genetic, and Developmental Psychiatry Research Centre Institute of Psychiatry King's College London England

# Laurie Chassin, Ph.D.

Regents Professor of Psychology Department of Psychology Arizona State University Tempe, AZ

# David V. Conti. Ph.D.

Assistant Professor Zilkha Neurogenetic Institute Keck School of Medicine Department of Preventive Medicine Division of Biostatistics University of Southern California Los Angeles, CA

# Patrick J. Curran, Ph.D.

Professor Department of Psychology The University of North Carolina at Chapel Hill Chapel Hill, NC

# Stephen E. Gilman, Sc.D.

Assistant Professor Department of Society, Human Development, and Health Department of Epidemiology Harvard School of Public Health Boston, MA

# Thomas J. Gould, Ph.D.

Associate Professor of Psychology Center for Substance Abuse Research Director of the Brain, Behavior, and Cognition Area of Psychology Temple University Philadelphia, PA

## Kristina M. Jackson, Ph.D.

Associate Professor (Research) Department of Community Health Center for Alcohol and Addiction Studies Brown University Providence, RI

# Jaakko Kaprio, M.D., Ph.D.

Department of Public Health Faculty of Medicine University of Helsinki and Department of Mental Health and

Alcohol Research National Public Health INsttute Helsinki, Finland

# Caryn Lerman, Ph.D.

Professor

Department of Psychiatry University of Pennsylvania Tobacco Use Research Centers Philadelphia, PA

# Christina N. Lessov-Schlaggar, Ph.D.

Genetic Epidemiologist SRI International Menlo Park, CA

# Juan Pablo Lewinger, Ph.D.

Assistant Professor Department of Preventive Medicine University of Southern California Los Angeles, CA

# Hermine H. Maes, Ph.D.

Associate Professor
Department of Human and Molecular
Genetics and Massey Cancer Center
Virginia Institute for Psychiatric and
Behavioral Genetics
Virginia Commonwealth University
Richmond, VA

# Terrie E. Moffitt, Ph.D.

Professor

Departments of Psychology & Neuroscience and Psychiatry & Behavioral Sciences, and Institute for Genome Sciences & Policy

**Duke University** 

Durham, NC

and

Social, Genetic, and Developmental Psychiatry Research Centre Institute of Psychiatry King's College London

England

# Michael C. Neale, Ph.D.

Professor

Departments of Psychiatry and Human Genetics Virginia Institute for Psychiatric and Behavioral Genetics

Virginia Commonwealth University Richmond, VA

# Joel T. Nigg, Ph.D.

Professor

Department of Psychiatry

Oregon Health & Sciences University

Portland, OR

# Kenneth A. Perkins, Ph.D.

Professor of Psychiatry University of Pittsburgh Pittsburgh, PA

## Clark C. Presson, Ph.D.

Professor

Department of Psychology Arizona State University Tempe, AZ

## Richard Rende, Ph.D.

Associate Professor of Psychiatry and Human Behavior The Warren Alpert Medical School of Brown University Research Psychologist Transdisciplinary Research Group Butler Hospital Providence, RI

## Scott W. Rogers, Ph.D.

Professor

Neurobiology & Anatomy University of Utah Salt Lake City, UT

# Richard J. Rose, Ph.D.

Professor Emeritus Department of Psychological and Brain Sciences Indiana University

## Kenneth J. Sher. Ph.D.

Bloomington, IN

Curators' Professor of Psychological Sciences University of Missouri-Columbia Columbia, MO

# Steven J. Sherman, Ph.D.

Professor

Department of Psychological and Brain Sciences Indiana University Bloomington, IN

# Alexandra E. Shields, Ph.D.

Director

Harvard/MGH Center on Genomics. Vulnerable Populations & Health Disparities Boston, MA

# Cheryl Slomkowski, Ph.D.

Assistant Professor Psychiatry and Human Behavior Brown University Medical School Providence, RI

# Gary E. Swan, Ph.D.

Director

Center for Health Sciences SRI International Menlo Park, CA

# Paul D. Thomas. Ph.D.

**Evolutionary Systems Biology Group** Artificial Intelligence Center SRI International Menlo Park, CA

# Rachel F. Tyndale, M.Sc., Ph.D.

Canada Research Chair in Pharmacogenetics Section Head Pharmacogenetics Centre for Addiction and Mental Health Professor Department of Pharmacology University of Toronto Toronto, Ontario, Canada

# Michael Vanvukov, Ph.D.

Associate Professor Departments of Pharmaceutical Sciences. Human Genetics, and Psychiatry University of Pittsburgh Pittsburgh, PA

# Kav Wanke. Ph.D., M.P.H.

Office of Behavioral and Social Sciences Research Office of the Director National Institutes of Health Bethesda, MD

## R. J. Wirth. Ph.D.

Statistician FPG Child Development Institute The University of North Carolina at Chapel Hill Chapel Hill, NC

# Reviewers

#### Rebecca Ashare

**Doctoral Candidate** Department of Psychology University at Buffao, SUNY Buffalo, NY

# David Balfour. Ph.D.

Professor of Behavioural Pharmacology Psychiatry Sectrion, Centre for Neuroscience College of Medicine, Dentistry, and Nursing University of Dundee Dundee, United Kingdom

# Neal L. Benowitz, Ph.D.

Professor of Medicine, Psychiatry and Biopharmaceutical Sciences Chief, Clinical Pharmacology University of California, San Francisco San Francisco, CA

#### Lisa Bero. Ph.D.

Professor

Department of Clinical Pharmacy School of Pharmacy and Institute for Health Policy Studies School of Medicine University of California, San Francisco San Francisco, CA

# Daniel M. Bolt, Ph.D.

Professor School of Education Department of Educational Psychology University of Wisconsin Madison, WI

#### Dorret Boomsma. Ph.D.

Professor, Department of Biological Psvchology Vrije Universiteit Amsterdam Amsterdam, Netherlands

## Naomi Breslau, Ph.D.

Professor

Department of Epidemiology Michigan State University East Lansing, MI

# Nilanjan Chatterjee, Ph.D.

Senior Investigator
Division of Cancer Epidemiology and
Genetics
National Cancer Institute
Rockville, MD

# Ralph J. Coates, Ph.D.

Associate Director for Science National Center for Public Health Genomics Centers for Disease Control and Prevention Atlanta, GA

# Kevin P. Conway, Ph.D.

Deputy Director Division of Epidemiology, Services and Prevention Research National Institute on Drug Abuse Bethesda, MD

# K. Michael Cummings, Ph.D, M.P.H.

Department of Health Behavior Division of Cancer Prevention and Population Sciences Roswell Park Cancer Institute Buffalo, NY

# Lisa C. Dierker. Ph.D.

Professor of Psychology Department of Psychology Wesleyan University Middletown, CT

## Joseph DiFranza, M.D.

Professor
Department of Family Medicine and
Community Health
University of Massachusetts Medical School
Worcester, MA

# Conor Dolan, Ph.D.

Department of Psychology University of Amsterdam Amsterdam, Netherlands

#### David J. Drobes. Ph.D.

Professor, Oncologic Sciences & Psychology University of South Florida Senior Member, Tobacco Research and Intervention Program Moffitt Cancer Center Tampa. FL

# Phyllis Ellickson, Ph.D.

Senior Behavioral Scientist RAND

Santa Monica, CA

#### Stanton Glantz, Ph.D.

Professor of Medicine

American Legacy Foundation Distinguished Professor in Tobacco Control Department of Medicine Division of Cardiology University of California, San Francisco San Francisco, CA

# George J. Hammons, Ph.D.

Professor and Chair Department of Chemistry Philander Smith College Little Rock, AR

# Larry W. Hawk, Ph.D.

Associate Professor Department of Psychology The University of Buffalo, SUNY Buffalo, NY

# Kenneth S. Kendler, M.D.

Director

Virginia Institute for Psychiatric and Behavioral Genetics Rachel Brown Banks Distinguished Professor of Psychiatry Medical College of Virginia Virginia Commonwealth University Richmond, VA

# Barbara A. Koenig, Ph.D.

Professor of Medicine Departments of Medicine and Psychiatry Mayo Clinic College of Medicine Rochester, MN

#### Pamela Madden. Ph.D.

Associate Professor in Psychiatry Washington University in St. Louis Department of Psychiatry Washington University School of Medicine St. Louis, MO

# Athina Markou, Ph.D.

Professor Department of Psychiatry School of Medicine University of California, San Diego La Jolla, CA

# Michael J. Marks. Ph.D.

University of Colorado Institute for Behavioral Genetics Boulder, CO

## Colleen M. McBride

Chief & Senior Investigator National Human Genome Research Institute National Institutes of Health Bethesda, MD

# Paras Mehta, Ph.D.

Associate Professor University of Houston Department of Psychology Houston, TX

# Robin J. Mermelstein. Ph.D.

Director, Institute for Health Research and Policy Professor, Psychology Department Clinical Professor, Community Health Sciences University of Illinois at Chicago

#### Marcus Munafo. Ph.D.

Chicago, IL

Reader in Biological Psychology Department of Experimental Psychology University of Bristol Bristol, United Kingdom

# Joel T. Nigg, Ph.D.

Professor Department of Psychiatry Oregon Health & Sciences University Portland, OR

# Mark Parascandola, Ph.D., M.P.H.

Epidemiologist Tobacco Control Research Branch National Cancer Institute National Institutes of Health Rockville, MD

# Ovide Pomerieau, Ph.D.

Professor University of Michigan Ann Arbor, MI

# Soo Hyun Rhee, Ph.D.

Assistant Professor Department of Psychology and Neuroscience University of Colorado Boulder, CO

# Jed E. Rose, Ph.D.

Professor, Department of Psychiatry and Behavioral Sciences Director, Center for Nicotine and Smoking Cessation Research Duke University Medical Center Durham, NC

# Nancy L. Saccone, Ph.D.

Assistant Professor of Genetics Department of Genetics Division of Human Genetics Washington University in St. Louis St. Louis, MO

# John Schulenberg, Ph.D.

Professor of Psychology Research Professor, Institute for Social Research and Center for Human Growth and Development University of Michigan Ann Arbor, MI

# Alexandra E. Shields, Ph.D.

Director
Harvard/MGH Center on Genomics,
Vulnerable Populations & Health
Disparities
Boston, MA

#### Saul Shiffman. Ph.D.

Professor of Psychology, Psychiatry, and Pharmacology University of Pittsburgh Pittsburgh, PA

# Wendy Slutske, Ph.D.

Professor

University of Missouri-Columbia Department of Psychological Sciences Columbia, MO

# Mariana C. Stern

Assistant Professor
Preventive Medicine (Division of
Epidemiology)
Keck School of Medicine
University of Southern California/Norris
Comprehensive Cancer Center
Los Angeles, CA

#### Duncan C. Thomas. Ph.D.

Professor, Co-Director Biostatistics Division Preventive Medicine Division of Biostatistics Keck School of Medicine University of Southern California Los Angeles, CA

# Rachel F. Tyndale, M.Sc., Ph.D.

Canada Research Chair in Pharmacogenetics Section Head Pharmacogenetics Centre for Addiction and Mental Health Professor Department of Pharmacology University of Toronto Toronto, Ontario, Canada

# Cornelia Ulrich, Ph.D.

Member

Cancer Prevention Program Fred Hutchinson Cancer Research Center Seattle. WA

## Jennifer B. Unger, Ph.D.

Professor of Community and Global Health Claremont Graduate University Claremont, CA

#### Michael Vanvukov. Ph.D.

Associate Professor Departments of Pharmaceutical Sciences, Human Genetics, and Psychiatry University of Pittsburgh Pittsburgh, PA

#### Robert West, Ph.D.

Professor of Health Psychology and Director of Tobacco Studies Department of Epidemiology and Public Health Health Behaviour Research Centre University College London London, England

# Helene R. White, Ph.D.

Professor

Center of Alcohol Studies Rutgers, The State University of New Jersey Piscataway, NJ

# Michael Windle, Ph.D.

Chair, Rollins Professor Department of Behavioral Sciences and Health Education Rollins School of Public Health Atlanta, GA

# John Witte, Ph.D., M.S.

Professor and Associate Director Epidemiology/Biostatistics & Institute for Human Genetics University of California, San Francisco San Francisco, CA

The editors would like to acknowledge the publication support services provided for this monograph:

# American Institutes for Research

Margot Raphael, Project Director and Managing Editor Allan R. Clyde, Editor Bethany Meissner, Project Assistant Matthew Mowczko, Publication Production

# **Cygnus Corporation**

Jennifer Bishop, Publications Manager Patricia Spellman, Copyeditor Mary Bedford, Proofreader

Preparation of this monograph was supported by the American Institutes for Research under Contract No. N02-PC-25041 to the National Cancer Institute.