

# Biological Psychiatry

*A Journal of Psychiatric Neuroscience and Therapeutics*

## Editor

John H. Krystal, MD  
Yale University School of Medicine  
VA Connecticut Healthcare System  
West Haven, Connecticut

## Deputy Editors

Anissa Abi-Dargham, MD  
New York, New York

Edward T. Bullmore, MB,  
PhD, FMedSci  
Cambridge, United Kingdom

Cameron S. Carter, MD  
Sacramento, California

Daniel Geschwind, MD, PhD  
Los Angeles, California

Paul J. Harrison, DM, FRCPsych  
Oxford, United Kingdom

Eric J. Nestler, MD, PhD  
New York, New York

Murray B. Stein, MD, MPH  
La Jolla, California

## Editorial Committee

Dennis S. Charney, MD  
New York, New York

David Goldman, MD  
Rockville, Maryland

Raquel E. Gur, MD, PhD  
Philadelphia, Pennsylvania

K. Ranga Rama Krishnan, MD  
Singapore

## Ex Officio

John G. Csernansky, MD

Ned H. Kalin, MD

Trey Sunderland, MD

## Editorial Board

Schahram Akbarian, MD, PhD  
New York, NY

Robert Freedman, MD  
Denver, CO

David A. Lewis, MD  
Pittsburgh, PA

Michael C. O'Donovan, PhD  
Cardiff, United Kingdom

Gerard Sanacora, MD, PhD  
New Haven, CT

Kazufumi Akiyama, MD, PhD  
Tochigi, Japan

Karl J. Friston, MBBS, MA, MRCPsych  
London, United Kingdom

Jeffrey A. Lieberman, MD  
New York, NY

Dost Ongür, MD, PhD  
Belmont, MA

Akira Sawa, MD, PhD  
Baltimore, MD

Amy F.T. Arnsten, PhD  
New Haven, CT

John D.E. Gabrieli, PhD  
Cambridge, MA

Barbara K. Lipska, PhD  
Bethesda, MD

Carmine M. Pariante, MD, PhD,  
MRCPsych  
London, United Kingdom

Alan F. Schatzberg, MD  
Stanford, CA

Mark Baxter, PhD  
New York, NY

Joel Gelernter, MD  
West Haven, CT

Stephen R. Marder, MD  
Los Angeles, CA

Martin P. Paulus, MD  
La Jolla, CA

Geoffrey Schoenbaum, MD, PhD  
Baltimore, MD

Carrie E. Bearden, PhD  
Los Angeles, CA

David Goldman, MD  
Rockville, MD

Athina Markou, PhD  
La Jolla, CA

Godfrey Pearlson, MD  
Hartford, CT

Yavin Shaham, PhD  
Baltimore, MD

James Blair, PhD  
Bethesda, MD

Anthony A. Grace, PhD  
Pittsburgh, PA

Graeme F. Mason, PhD  
New Haven, CT

Mary L. Phillips, MD  
Pittsburgh, PA

Larry J. Siever, MD  
Bronx, NY

Antonello Bonci, MD  
Baltimore, MD

Christian Grillon, PhD  
Bethesda, MD

Daniel H. Mathalon, MD, PhD  
San Francisco, CA

Daniel S. Pine, MD  
Bethesda, MD

Pamela Sklar, MD, PhD  
New York, NY

David L. Braff, MD  
La Jolla, CA

Ralitza Gueorguieva, PhD  
New Haven, CT

Colleen A. McClung, PhD  
Pittsburgh, PA

Mikhail Pletnikov, MD, PhD  
Baltimore, MD

Dana Small, PhD  
New Haven, CT

E. Sherwood Brown, MD, PhD  
Dallas, TX

Ahmad R. Hariri, PhD  
Durham, NC

Christopher J. McDougale, MD  
Lexington, MA

J. Daniel Ragland, PhD  
Sacramento, CA

Matthew W. State, MD, PhD  
New Haven, CT

William A. Carlezon, Jr., PhD  
Belmont, MA

Catherine J. Harmer, DPhil  
Oxford, United Kingdom

Andrew Mark McIntosh,  
MD, MRCPsych  
Edinburgh, United Kingdom

Judith L. Rapoport, MD  
Bethesda, MD

Trey Sunderland, MD  
Chevy Chase, MD

Edwin H. Cook, Jr., MD  
Chicago, IL

Markus A. Heilig, MD, PhD  
Bethesda, MD

Francis J. McMahon, MD  
Bethesda, MD

Kerry Ressler, MD, PhD  
Atlanta, GA

Stephan F. Taylor, MD  
Ann Arbor, MI

Zafiris Jeff Daskalakis,  
MD, PhD, FRCP(C)  
Ontario, Canada

Noboru Hiroi, PhD  
Bronx, NY

Andreas Meyer-Lindenberg, MD, PhD  
Mannheim, Germany

Charles F. Reynolds, III, MD  
Pittsburgh, PA

Michael E. Thase, MD  
Pittsburgh, PA

Karl Deisseroth, MD, PhD  
Stanford, CA

Paul J. Kenny, PhD  
Jupiter, FL

Emmanuel Mignot, MD, PhD  
Redwood City, CA

Trevor W. Robbins, PhD  
Cambridge, United Kingdom

Gustavo Turecki, MD, PhD  
Quebec, Canada

Ralph J. DiLeone, PhD  
New Haven, CT

Joel E. Kleinman, MD, PhD  
Bethesda, MD

Károlyi Mirnic, MD  
Nashville, TN

Jerrold F. Rosenbaum, MD  
Boston, MA

Bruce I. Turetsky, MD  
Philadelphia, PA

Ronald S. Duman, PhD  
New Haven, CT

George F. Koob, PhD  
La Jolla, CA

Lisa M. Monteggia, PhD  
Dallas, TX

David R. Rosenberg, MD  
Detroit, MI

Myrna M. Weissman, PhD  
New York, NY

Klaus P. Ebmeier, MD  
Oxford, United Kingdom

K. Ranga Rama Krishnan, MD  
Singapore

Rajesh Narendran, MD  
Pittsburgh, PA

Peter Roy-Byrne, MD  
Seattle, WA

Rachel Yehuda, PhD  
Bronx, NY

Stephen V. Faraone, PhD  
Syracuse, NY

Andrew D. Krystal, MD, MS  
Durham, NC

Alexander Neumeister, MD  
New York, NY

Katya Rubia, PhD  
London, United Kingdom

Takeo Yoshikawa, MD, PhD  
Saitama, Japan

Alex Fornito, PhD  
Victoria, Australia

Ellen Leibenluft, MD  
Bethesda, MD

Charles P. O'Brien, MD, PhD  
Philadelphia, PA

David R. Rubinow, MD  
Chapel Hill, NC

Scott J. Russo, PhD  
New York, NY

Carlos A. Zarate, Jr., MD  
Bethesda, MD

Jon-Kar Zubieta, MD, PhD  
Ann Arbor, MI

## Editorial Office

Department of Psychiatry  
The University of Texas  
Southwestern Medical Center  
6363 Forest Park Road, Suite 651  
Dallas, Texas 75235-5435 USA

Telephone: (214) 648-0880

Fax: (214) 645-9208

e-mail: [biol.psych@UTSouthwestern.edu](mailto:biol.psych@UTSouthwestern.edu)

[www.sobp.org/journal](http://www.sobp.org/journal)

**Administrative Editor** Carol A. Tamminga, MD

**Managing Editor** Rhiannon M. Bugno

**Publication Coordinator** Rosa Garces

**Founding Editor**

Joseph Wortis, MD, 1969-1992

## Aims and Scope

This international rapid-publication journal is the official journal of the Society of Biological Psychiatry. It covers a broad range of topics in psychiatric neuroscience and therapeutics. Both basic and clinical contributions are encouraged from all disciplines and research areas relevant to the pathophysiology and treatment of major neuropsychiatric disorders. Novel results of original research, in addition to Commentaries and Correspondence judged to be of high impact to the field are published, particularly those addressing genetic and environmental risk factors, neural circuitry and neurochemistry, and important new therapeutic approaches. Concise Reviews and Editorials that focus on topics of current research and interest are also published rapidly.

**Editor Emeriti**

Wagner H. Bridger, MD, 1992-1997

Richard C. Josiassen, PhD, 1997

Dennis S. Charney, MD, 1998-2006