

THE MOTIVATIONAL IMPACT OF NICOTINE AND ITS ROLE IN TOBACCO USE

The Nebraska Symposium on Motivation

Series Editor: **Debra A. Hope**, *University of Nebraska, Lincoln, Nebraska*

MOTIVATIONAL ASPECTS OF PREJUDICE AND RACISM

Edited by Cynthia Willis-Esqueda

THE MOTIVATIONAL IMPACT OF NICOTINE AND ITS ROLE IN TOBACCO USE

Edited by Rick A. Bevins and Anthony R. Caggiula

THE MOTIVATIONAL IMPACT OF
NICOTINE AND ITS ROLE IN
TOBACCO USE

Edited by

Rick A. Bevins
*Department of Psychology,
University of Nebraska-Lincoln*

and

Anthony R. Caggiula
*Department of Psychology,
University of Pittsburgh*

 Springer

Editors:

Rick A. Bevins
Department of Psychology
University of Nebraska
Lincoln, NE
USA
rbevins1@unl.edu

Anthony R. Caggiula
Department of Psychology
University of Pittsburgh, PA,
USA
tonypsy@pitt.edu

ISBN: 978-0-387-78748-0

e-ISBN: 978-0-387-78749-7

DOI: 10.1007/978-0-387-78748-0

Library of Congress Control Number: 2008937207

© 2009 Springer Science+Business Media, LLC

All rights reserved. This work may not be translated or copied in whole or in part without the written permission of the publisher (Springer Science+Business Media, LLC, 233 Spring Street, New York, NY 10013, USA), except for brief excerpts in connection with reviews or scholarly analysis. Use in connection with any form of information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed is forbidden.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

Printed on acid-free paper

springer.com

Preface

The volume editors for this 55th volume of the Nebraska Symposium on Motivation are Rick Bevins and Tony Caggiula. The volume editors coordinated the symposium that lead to this volume including selecting and inviting the contributors and coordinating all aspects of editing. My thanks go to the Rick and Tony and to our contributors for excellent presentations and chapters.

This Symposium series is supported by funds provided by the Chancellor of the University of Nebraska-Lincoln, Harvey Perlman, and by funds given in memory of Professor Harry K. Wolfe to the University of Nebraska Foundation by the late Professor Cora L. Friedline. We are extremely grateful for the Chancellor's generous support to the Symposium series and for the University of Nebraska Foundation's support via the Friedline bequest. This symposium volume, like those in the recent past, is dedicated to the memory of Professor Wolfe, who brought psychology to the University of Nebraska. After studying with Professor Wilhelm Wundt, Professor Wolfe returned to his native state, to establish the first undergraduate laboratory in psychology in the nation. As a student at Nebraska, Professor Friedline studied psychology under Professor Wolfe.

Lincoln, Nebraska

Debra A. Hope

Contributors

Michael T. Bardo

Department of Psychology, University of Kentucky, Lexington, KY 40536-0082, USA, mbardo@uky.edu

Rick A. Bevins

Department of Psychology, 238 Burnett Hall, University of Nebraska-Lincoln, Lincoln, NE 68588-0308, USA, rbevins1@unl.edu

Darlene H. Brunzell

Department of Pharmacology & Toxicology, Robert Blackwell Smith Building, Virginia Commonwealth University Richmond, Virginia 23298-0613, USA

Anthony R. Caggiula

Department of Psychology, University of Pittsburgh, Pittsburgh, PA 15260, USA, Tonypsy@pitt.edu

Nadia Chaudhri

Ernest Gallo Clinic and Research Center, University of California, San Francisco, San Francisco, CA

Peter A. Crooks

Department of Pharmaceutical Sciences, College of Pharmacy, University of Kentucky, Lexington, KY 40536-0082, USA

John A. Dani

Department of Neuroscience, Menninger Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, Houston, Texas 77030, USA, jdani@cns.bcm.edu

Eric C. Donny

Department of Psychology, University of Pittsburgh, Pittsburgh, PA 15260, USA

Linda P. Dvoskin

Department of Pharmaceutical Sciences, College of Pharmacy, University of Kentucky, Lexington, KY 40536-0082, USA, ldvoskin@email.uky.edu

Katherine C. Goedecker

Department of Psychological Sciences, Purdue University, West Lafayette,
IN 47907 USA

B. Matthew Joyce

Department of Pharmaceutical Sciences, College of Pharmacy, University
of Kentucky, Lexington, KY 40536-0082, USA

Xiu Liu

Department of Psychology, University of Pittsburgh, Pittsburgh, PA 15260, USA

Athina Markou

Department of Psychiatry, School of Medicine, University of California, San Diego,
La Jolla, CA 92093-0603, USA, amarkou@ucsd.edu

Nichole M. Neugebauer

Department of Psychology, University of Kentucky, Lexington, KY 40536-0082,
USA

Matthew I. Palmatier

Department of Psychology, Kansas State University, 492 Bluemont Hall,
Manhattan, Kansas 66506-5302, USA

Neil E. Paterson

Department of Psychiatry, School of Medicine, University of California, San Diego,
La Jolla, CA 92093-0603, USA

Kenneth A. Perkins

Western Psychiatric Institute & Clinic, University of Pittsburgh School of Medicine,
Pittsburgh, PA 15213, USA, perkinska@upmc.edu

Marina R. Picciotto

Department of Psychiatry, Yale University School of Medicine, New Haven,
CT 06508, USA, Marina.Picciotto@Yale.edu

Marharyta Pivavarchyk

Department of Pharmaceutical Sciences, College of Pharmacy, University
of Kentucky, Lexington, KY 40536-0082, USA

Andon N. Placzek

Department of Neuroscience, Menninger Department of Psychiatry and Behavioral
Sciences, Baylor College of Medicine, Houston, Texas 77030, USA

Jed E. Rose

Center for Nicotine and Smoking Cessation Research, Duke University Medical
Center, Durham, NC 27705, USA, rose0003@mc.duke.edu

Paul Schnur

National Institute on Drug Abuse, National Institutes of Health, Department
of Health and Human Services, Bethesda, MD 20892, Bethesda, MD 20892, USA

Alan F. Sved

Department of Neuroscience, University of Pittsburgh, Pittsburgh, PA 15260, USA

Stephen T. Tiffany

Department of Psychology, University at Buffalo, the State University of New York,
Buffalo, NY 14260-4110, USA, stiffany@buffalo.edu

Mathew W. Warthen

Department of Psychology, University of Utah, Salt Lake City, UT84112, USA

Zhenfa Zhang

Department of Pharmaceutical Sciences, College of Pharmacy, University
of Kentucky, Lexington, KY 40536-0082, USA

Guangrong Zheng

Department of Pharmaceutical Sciences, College of Pharmacy, University
of Kentucky, Lexington, KY 40536-0082, USA

Contents

| | |
|--|-----|
| 1 Nicotine, Tobacco Use, and the 55th Nebraska Symposium on Motivation | 1 |
| Rick A. Bevins and Anthony R. Caggiula | |
| 2 Synaptic Plasticity Within Midbrain Dopamine Centers Contributes to Nicotine Addiction | 5 |
| Andon N. Placzek and John A. Dani | |
| 3 Molecular Mechanisms Underlying the Motivational Effects of Nicotine | 17 |
| Darlene H. Brunzell and Marina R. Picciotto | |
| 4 Targeting Reward-Relevant Nicotinic Receptors in the Discovery of Novel Pharmacotherapeutic Agents to Treat Tobacco Dependence ... | 31 |
| Linda P. Dwoskin, Marharyta Pivavarchyk, B. Matthew Joyce, Nichole M. Neugebauer, Guangrong Zheng, Zhenfa Zhang, Michael T. Bardo, and Peter A. Crooks | |
| 5 Multiple Motivational Forces Contribute to Nicotine Dependence | 65 |
| Athina Markou and Neil E. Paterson | |
| 6 The Role of Nicotine in Smoking: A Dual-Reinforcement Model | 91 |
| Anthony R. Caggiula, Eric C. Donny, Matthew I. Palmatier, Xiu Liu, Nadia Chaudhri, and Alan F. Sved | |
| 7 Altering the Motivational Function of Nicotine through Conditioning Processes | 111 |
| Rick A. Bevins | |
| 8 New Findings on Nicotine Addiction and Treatment | 131 |
| Jed E. Rose | |

9 Sex Differences in Nicotine Reinforcement and Reward: Influences on the Persistence of Tobacco Smoking 143
Kenneth A. Perkins

10 The Functional Significance of Craving in Nicotine Dependence 171
Stephen T. Tiffany, Mathew W. Warthen, and Katherine C. Goedeker

11 The Motivational Impact of Nicotine and Its Role in Tobacco Use: Final Comments and Priorities 199
Michael T. Bardo and Paul Schnur

Index 207