

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Linda A. Dykstra		POSITION TITLE	
eRA COMMONS USER NAME dykstra		William R. Kenan Jr. Professor/Psychology; Pharmacology; Curriculum in Neurobiology	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Hope College, Holland, MI	B.A.	1966	Mathematics/Psych
University of Chicago, Chicago, IL	M.A.	1968	English Literature
University of Chicago, Chicago, IL	Ph.D.	1972	Psychopharmacology
University of North Carolina, Chapel Hill, NC	Postdoctoral	1973	Pharmacology

NOTE: The Biographical Sketch may not exceed four pages. Items A and B (together) may not exceed two of the four-page limit. Follow the formats and instructions on the attached sample.

A. Positions and Honors. List in chronological order previous positions, concluding with your present position. List any honors. Include present membership on any Federal Government public advisory committee.

Professional experience

1970-1972 NIMH Predoctoral Research Fellow, University of Chicago
 1972-1973 NIDA Postdoctoral Research Fellow, University of North Carolina, Dept of Pharmacology
 1973-1979 Assistant Professor of Psychology and Pharmacology, University of North Carolina
 1979 Visiting Assistant Professor, Harvard University, Laboratory of Psychobiology
 1979-1984 Associate Professor of Psychology and Pharmacology, University of North Carolina
 1984-present Distinguished Professor of Psychology and Pharmacology, University of North Carolina
 1985 Visiting Professor, University of Michigan, Department of Pharmacology
 1996-present Dean of Graduate School, University of North Carolina at Chapel Hill
 2001-2002 Visiting Professor, Duke University, Howard Hughes Medical Inst./Department of Cell Biology

Honors/Awards

B.A., magna cum laude
 Ford Foundation Fellow in Humanities, 1967-1968
 Research Scientist Development Award, 1977-1987
 Research Scientist Award, 1988-1993; 1993-1998
 ADAMHA Merit Award, 1988-1998
 Fellow, American Psychological Association
 Appointed: William Rand Kenan Jr. Professor 1991
 Member, American College of Neuropsychopharmacology
 President or Chair of Professional Groups:
 Psychopharmacology Division, American Psychological Association, 1988
 College on Problems of Drug Dependence, 1997-1998
 Chair, Behavioral Pharmacology Division, American Society of Pharmacology & Experimental Therapeutics, 2005
 President, Association of Graduate Schools; American Association Universities, 2006
 Chair, Executive Board, North Carolina Association Biomedical Research, 2006-07

Membership on Advisory Committees

1983-1987	NIDA Clinical and Behavioral Review Group
1991-1994	National Advisory Council on Drug Abuse
2002-current	Scientific Advisory Board, New England Regional Primate Research Center
2002-current	Executive Board, North Carolina Association Biomedical Research
2004-current	Advisory Board, Graduate Record Exam, Educational Testing Services

B. Selected peer-reviewed publications (in chronological order). Do not include publications submitted or in preparation.

Selected Publications from a list of over 150

- Carrigan, K. A. and Dykstra, L.A. (Submitted) Behavioral effects of morphine and cocaine in M1 muscarinic acetylcholine receptor-deficient mice. *Psychopharmacology*
- Fischer, B.D. and Dykstra, L.A. Interactions between an NMDA antagonist and low-efficacy opioid receptor agonists in assays of schedule-controlled responding and thermal nociception. (Submitted) *J. Pharmacol. Exp. Ther.*
- Ward, S.J. and Dykstra, L.A. (2005) The role of endogenous cannabinoids in sweet versus fat reinforcement: effect of CB1 receptor deletion, CB1 receptor antagonism (SR141716A), and CB1 receptor agonism (CP-55940). *Behav Pharmacol.* 16: 381-388.
- Allen, R.M., Carelli, R.M., Dykstra, L.A., Suchey, T.L., Everett, C.V.(2005) Effects of the competitive NMDA receptor antagonists, (-)-6-phosphonomethyl-deca-hydroisoquinoline-3-carboxylic acid (LY235959), on responding for cocaine under both fixed and progressive ratio schedules of reinforcement. *J. Pharmacol. Exp. Ther.* 315: 449-457
- Fischer, B.D., Carrigan, K.A. and Dykstra, L.A. (2005) Effects of N-methyl-D-aspartate receptor antagonists on acute morphine- and l-methadone-induced antinociception in mice. *J. Pain* 6: 425-433
- Hughes, C.E., Sigmon, S.C., Pitts, R.C. and Dykstra, L.A. (2005) Morphine tolerance as a function of ratio schedule: response requirement or unit price? *J. Exp. Anal. Behav.* 83: 281-296
- Medvedev, I.O., Bohn, L.M., Gainetdinov, R.R., Caron, M.G. and Dykstra, L.A. (2005) Characterization of conditioned place preference to cocaine in isogenic dopamine transporter knockout mice. *Psychopharmacology* 180: 408-413
- Carroll, F.I., Thomas, J.B., Dykstra, L.A., Granger, A.L., Allen, R.M., Howard, J.L., Pollard, G.T., Aceto, M.D. and Harris, L.S. (2004) Pharmacological properties of JD1c: A novel μ opioid receptor antagonist. *Eur. J. Pharmacol.* 501: 111-119
- Sotnikova, T.D., Budygin, E.A., Jones, S.R., Dykstra, L.A., Caron, M.G., Gainetdinov, R.R. (2004) Dopamine transporter-dependent and -independent actions of trace amine beta-phenylethylamine. *J. Neurochemistry* 91:362-373
- Bohn, L.M., Dykstra, L.A., Lefkowitz, R.J., Caron, M.G. and Barak, L.S. (2004) Relative efficacy is determined by the complements of the G protein-coupled receptor desensitization machinery. *Mol. Pharm.* 66:106-112
- Walker, E.A., Picker, M.J., Granger, A. and Dykstra, L.A. (2004) Effects of opioids in morphine-treated pigeons trained to discriminate among morphine, the low-efficacy agonist nalbuphine and saline. *J. Pharmacol. Exp. Ther.* 310: 150-158
- Allen, R.M., Granger, A.L. and Dykstra, L.A. (2003) The competitive NMDA receptor antagonist, LY235959, potentiates the antinociceptive effects of opioids that vary in efficacy at the mu-opioid receptor. *J. Pharmacol. Exp. Ther.* 307: 785-792
- Bohn, L.M., Gainetdinov, R.R., Sotnikova, T.D., Lefkowitz, R.J., Dykstra, L.A. and Caron, M.G. (2003) Enhanced Rewarding Properties of Morphine, but not Cocaine, in β arrestin-2 Knockout Mice. *J. Neurosci.* 23: 10265-10273
- Dykstra, L.A., Granger, A.L., Allen, R.M. Xiaoyan Zhang and Kenner C. Rice (2002) Antinociceptive effects of the selective delta opioid agonist, SNC 80, alone and in combination with mu opioids in the squirrel monkey titration procedure. *Psychopharmacology* 163; 420-429
- Allen, R.M. and Dykstra, L.A. (2002) Dextromethorphan Potentiates the Antinociceptive Effects of Morphine and the Delta-Opioid Agonists SNC80 in Squirrel Monkeys. *J. Pharmacol. Exp. Ther.* 300:435-441

- Allen, R.M. and Dykstra, L.A. (2001) N-methyl-D-aspartate receptor antagonists potentiate the antinociceptive effects of morphine in squirrel monkeys. J. Pharmacol. Exp. Ther. 298: 288-297
- Walker, E.A., Picker, M.J. and Dykstra, L.A. (2001) Three-choice discrimination in pigeons is based on relative efficacy differences among opioids. Psychopharmacol. 155:389-398
- Allen, R.M. and Dykstra, L.A. (2000) The attenuation of mu-opioid tolerance and cross-tolerance by the competitive NMDA receptor antagonist, LY23595, is related to tolerance and cross-tolerance magnitude. J. Pharmacol. Exp. Ther. 295:1012-1021
- Allen, R.M. and Dykstra, L.A. (2000) NMDA receptor antagonists potentiate the antinociceptive effects of morphine in squirrel monkeys. J. Pharmacol. Exp. Ther. 298: 1-10
- Allen, R.M. and Dykstra, L.A. (2000) Opioid tolerance and the NMDA receptor: I. Role of morphine maintenance dose in the development of tolerance and its prevention by an NMDA receptor antagonist. Psychopharmacol. 148: 59-65.
- Allen, R.M. and Dykstra, L.A. (1999) The competitive NMDA receptor antagonist LY235959 modulates the progression of morphine tolerance in rats. Psychopharmacol. 142:209-214
- West, J.P., Dykstra, L.A., and Lysle, D.T. (1999) Immunomodulatory effects of morphine withdrawal in the rat are time-dependent and reversible by clonidine. Psychopharmacol. 146:320-327.
- Walker, E.A., Tiano, M.J., Benyas, S.I., Dykstra, L.A., and Picker, M.J. (1999) Naltrexone and B-funaltrexamine antagonism of the antinociceptive and response rate-decreasing effects of morphine, dezocine, and d-propoxyphene. Psychopharmacol. 144:45-53.
- Walker, E.A., Hawkins, E.R., Tiano, M.J., Picker, M.J., and Dykstra, L.A. (1999) Discriminative-stimulus effects of nalbuphine in nontreated and morphine-treated pigeons. Pharmacol Biochem Behav. 64(2):445-448
- Pitts, R.C., Allen, R.M., Walker, E.A., and Dykstra, L.A. (1998) Cloccinamox antagonism of the antinociceptive effects of micro-opioids in squirrel monkeys. J. Pharmacol. Exp. Ther. 285: 1997-1206
- Tiano, M.J., Walker, E.A., and Dykstra, L.A. (1998) Cross-tolerance to etorphine differentiates μ -opioid agonists in a rat tail withdrawal assay. Analgesia 3:251-257.
- West, J.P., Lysle, D.T., & Dykstra, L.A. (1997). Tolerance development to morphine-induced alterations of immune status. Drug and Alc. Dep., 46, 147-157.
- Nelson, C.J., Dykstra, L.A., & Lysle, D.T. (1997). Comparison of the time course of morphine's analgesic and immunologic effects. Anesth. Analg. 85, 620-626.
- Dykstra, L.A., Preston, K.L., and Bigelow, G.E. (1997) Discriminative stimulus effects of opioids with kappa activity: Data from Laboratory Animals and Human Subjects. Psychopharmacol. 130: 14-27.
- Hughes, C.E. and Dykstra, L.A. (1997) Antagonism of the response rate-decreasing effects of meperidine and morphine by B-funaltrexamine and naltrexone in squirrel monkeys. Drug and Alc. Dep. 45: 197-206.
- Fecho, K., Maslonek, K.A., Dykstra, L.A. and Lysle, D.T. (1997) Acetylcholinesterase monoclonal antibody-induced sympathectomy: effects on immune status and acute morphine-induced immunomodulation. Brain, Behavior and Immunity 11: 167-184.
- Pitts, R.C., West, J.P., Hapke, D.M., Morgan, D., Dykstra, L.A., and Picker, M.J. (1996) Opioids and rate of positively reinforced behavior: Antagonism by B-funaltrexamine. Exp. Clin. Psychopharm. 4: 389-395.
- Powell, K.R., and Dykstra, L.A. (1996) The role of serotonin in the effects of opioids in squirrel monkeys responding under a titration procedure.II. Mu Opioids. Psychopharmacol. 126: 42-49.
- Allen, R.M., Powell, K.R., and Dykstra, L.A. (1996) Effects of morphine and 8-OH-DPAT in a squirrel monkey tail-withdrawal procedure. Analgesia 2: 145-149.
- Lysle, D.T., Hoffman, K.E., and Dykstra, L.A. (1996) Evidence for the involvement of the caudal region of the periaqueductal gray in a subset of morphine-induced alterations of immune status. J. Pharmacol. Exp. Ther. 277: 1533-1540.
- Hughes, C.E., Dykstra, L.A., and Picker, M.J. (1996) Behavioral tolerance and cross-tolerance to the response rate-decreasing effects of mu opioids in rats. Behavioral Pharmacology 7: 228-236.
- Dykstra, L.A. (1995) Opioid Analgesics. In: C.R. Schuster, S.W. Gust and M.J. Kuhar (eds.) Handbook of Experimental Pharmacology. Springer-Verlag.

C. Research Support. List selected ongoing or completed (during the last three years) research projects (federal and non-federal support). Begin with the projects that are most relevant to the research proposed in this application. Briefly indicate the overall goals of the projects and your role (e.g. PI, Co-Investigator, Consultant) in the research project. Do not list award amounts or percent effort in projects.

Principal Investigator, Opioid Analgesics: Pharmacological and Behavioral Factors, R01-DA02749-29

The specific research goals of this grant are based on evidence that the effects of opioid analgesics can be modulated by interactions between opioid and N-methyl-D-aspartate (NMDA) receptor systems. This project examines these interactions with emphasis on both the acute effects of morphine as well as the development of morphine tolerance.

Co-Investigator, Functional Genomics of Stress and Substance Abuse, Core 2: P20 MD00175-03 (EXPORT, Center of Excellence; Minority Health & Health Disparities; P.I. Ken Harewood)

The goal of this research core is to investigate the influence of prior drug exposure or stress on the reinforcing and the antinociceptive effects of opioid drugs as a function of the genomic differences between wildtype, heterozygous and homozygous strains of transgenic mice deficient in the CB1 cannabinoid receptor or gene regulatory proteins (fosB or CREB).

Director, Predoctoral Training in Interdisciplinary Research on Drug Abuse, T32-DA 07244-16-20

This program provides interdisciplinary, graduate training in areas related to drug and alcohol abuse for predoctoral students pursuing careers either in basic or in more clinically-related research on drug abuse. This training grant was recently renewed for its 4th, 5-year period.

Director, Partner of Underrepresented Scientists United for Education (PURSUE), R25 GM62010-05

The Pursue program is one of the NIH/NIGMS Bridge programs designed to encourage Hispanic and African American students to pursue doctoral training in the biomedical sciences. Our program specifically supports students from two Historically-Black Universities in North Carolina, North Carolina Central University and North Carolina A&T State University.