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Academic Appointment: Duke University Medical Center, Durham, NC
Primary Appointment: Professor, Department of Psychiatry and Behavioral Sciences
Joint Appointments: Department of Pharmacology and Cancer Biology
Department of Psychological and Brain Sciences
Nicholas School of the Environment and Earth Sciences

Personal Information: Born, April 29, 1954, Pittsburgh, PA
Citizen of the USA
Married with two children

Education: 1976, B.A., Psychology, University of Rochester
1982, M.S., Physiological Psychology, University of Wisconsin
1984, Ph.D., Environmental Toxicology, University of Wisconsin

Academic Positions

1985-86: Postdoctoral Fellow, Dept. of Psychology, UCLA
1987: Visiting Scientist, Ulleråker Psychiatric Hospital, Univ. of Uppsala, Sweden
1987-89: Research Associate, Dept. of Psychology, UCLA
1989-92: Assistant Research Professor, Dept. of Psychiatry, Duke University Med Ctr
1992-1995: Assistant Professor, Department of Psychiatry, Duke University Medical Ctr
1992-1995: Assistant to the Director, Integrated Toxicology Program, Duke University Medical Ctr
1993-1998: Assistant Professor, Department of Pharmacology, Duke University Medical Ctr
1995-2001: Director, Integrated Toxicology Program, Duke University
1995-2003: Associate Professor, Dept of Psychiatry and Behavioral Sciences, Duke Univ Med Ctr
1998-present: Associate Professor, Nicholas School of the Environment, Duke University
1998-present: Associate Professor, Department of Pharmacology, Duke University Medical Ctr
2001-present: Associate Professor, Department of Psychological and Brain Sciences, Duke University
2003-present: Senior Fellow, Center for the Study of Aging and Human Development, Duke Univ
2003-present: Professor, Department of Psychiatry and Behavioral Sciences, Duke Univ Med Ctr

Awards: 1985, NIMH Postdoctoral Fellowship in Psychobiology,
Department of Psychology, University of California, Los Angeles
1987, Swedish Medical Research Council Visiting Scientist Fellowship,
Psychiatric Research Center, Ulleråker Hospital, Univ. of Uppsala, Sweden

Teaching Experience

1981-1983: Teaching Assistant, Department of Psychology, University of Wisconsin
Physiological Psychology
1987-1988: Instructor, Department of Psychology, University of California, Los Angeles

Behavioral Pharmacology
1989-1997: Departments of Psychiatry, Pharmacology and Psychology, Duke University
Toxicology, Behavioral Pharmacology, Motivation and Learning, Human Behavior

Society Neuroscience Society Neurobehavioral Teratology Society
Memberships Society of Toxicology Am Soc for the Advancement of Science
Behavioral Toxicology Society Am Soc for Pharmacology and Exp Therap

Section Editor for Reviews: Neurotoxicology and Teratology

Editor for Special Journal Issues: Drug Development Research, Medicinal Chemistry Research

Member of Editorial Board: The Journal of Pharmacology and Experimental Therapeutics
Drug Development Research

Journal	Am J Primatology	Asian Am Pac Islander J Health	Behav Brain Research
Reviewer	Behav Neural Biology	Behav Pharmacology	Behavioural Processes
	Biological Psychiatry	Brain Research	Brain Research Bulletin
	Behav Res Meth Instr Comp	Cerebral Cortex	Drug Development Res
	J Am College of Toxicology	J Pharmacol and Exp Therap	Life Sciences
	Neurobiology of Aging	Neurotoxicology	Neurotoxicology & Teratology
	Pharmacol Biochem Behav	Physiology and Behavior	Psychopharmacology
	Toxicol Applied Pharmacol	European Journal of Pharmacol	

Grant	National Institutes of Health	Environmental Protection Agency
Reviewer	National Science Foundation	Tobacco and Health Research Institute
	Department of Veterans Affairs	The Wellcome Trust
	British Medical Research Council	Alzheimer's Association
	Jeffress Trust	NATO

Member of NIDA-A NIH Study Section 1996 through 1998, Ad hoc NIH reviewer 1992-present

Research Projects

1992-present: Neurobehavioral Research Laboratory
Department of Psychiatry, Duke University Medical Center
Nicotinic neuropsychopharmacology
Cholinergic-catecholaminergic interactions in cognitive function and addiction
Cognitive effects and neural mechanisms of *Pfiesteria* toxin
Therapeutic drug treatments for dementia and toxicant-induced deficits

1989-1992: Nicotine Research Lab, VA Medical Center, Durham, NC
Department of Psychiatry, Duke University Medical Center
Persisting cognitive effects of developmental toxicant exposure
Pharmacological aids to smoking cessation
Cholinergic-dopaminergic mechanism underlying cognitive function
Nicotinic treatments for cognitive dysfunction

1988-1989: Nicotine Research Lab, VA Medical Center, Los Angeles, CA
Department of Psychology, University of California, Los Angeles
Pharmacological and conditioning factors in smoking
Cholinergic-dopaminergic interactions in cognitive function
Nicotinic involvement in cognition and weight regulation

- 1987: Psychiatric Research Ctr, Ulleråker Hospital, University of Uppsala, Sweden
Neurobehavioral toxicology of chronic neuroleptics in rats and monkeys
Dopamine and GABA systems and motor function in rats and marmosets
- 1985-1987: Psychology Department, University of California, Los Angeles
Neurobehavioral toxicity of neuroleptics on cognitive and motor function in rats
Nicotine effects on feeding and cognitive performance
ACh-DA interactions in cognitive behavior
- 1977-1984: Harlow Primate Laboratory, University of Wisconsin, Madison
Halothane neural and behavioral toxicity in rats
Lead and PCB effects on learning and memory in monkeys
ACh-DA aspects of lead effects on attention and memory in monkeys
Lead and TCDD effects on behavioral development in monkeys

US Patents: Agonist-Antagonist Combination to Reduce the Use of Nicotine and Other Drugs
Patent Numbers 5,316,759; 5,574,052; 5,703,101; 5,726,190; 5,861,422; 5,935,975 and 6,083,962
issued to Edward D Levin and Jed E Rose

Ph.D. Dissertation

The long-term effects of developmental lead exposure on learning and memory in monkeys. 1984,
Environmental Toxicology Center, University of Wisconsin, Madison.

Master's Thesis

Behavioral effects of low, chronic exposure of halothane to developing rats. 1982, Department of
Psychology, University of Wisconsin, Madison.

Articles

1. Levin ED and RE Bowman. The effect of pre- or postnatal lead exposure on Hamilton search task in monkeys. Neurobehavioral Toxicology and Teratology, 5:391-394, 1983.
2. Bushnell PJ and ED Levin. Effects of zinc deficiency on lead toxicity in rats. Neurobehavioral Toxicology and Teratology, 5:238-248, 1983.
3. Laughlin NK, RE Bowman, ED Levin and PJ Bushnell. Neurobehavioral consequences of early exposure to lead in rhesus monkeys: Effects on cognitive behaviors. In: Reproductive and Developmental Toxicity of Metals, TW Clarkson, GF Nordberg and PR Sager (eds.), Plenum Press, New York, pp. 497-515, 1983.
4. Uemura E, WP Ireland, ED Levin and RE Bowman. Effects of halothane on the development of rat brain: A Golgi study of dendritic growth. Experimental Neurology, 89:503-519, 1985.
5. Uemura E, ED Levin and RE Bowman. Effects of halothane on synaptogenesis and learning behavior in rats. Experimental Neurology, 89:520-529, 1985.
6. Levin ED, KM Boehm, WW Hagquist and RE Bowman. A Visual exploration apparatus for infant monkeys. American Journal of Primatology, 10:195-199, 1986.
7. Levin ED and RE Bowman. Scopolamine effects on Hamilton search task performance in monkeys. Pharmacology, Biochemistry and Behavior, 24:819-821, 1986.

8. Mele PC, RE Bowman and ED Levin. Behavioral evaluation of perinatal PCB exposure in rhesus monkeys: Fixed-interval performance and reinforcement omission. Neurobehavioral Toxicology and Teratology, 8:131-138, 1986.
9. Levin ED and RE Bowman. Behavioral effects of chronic exposure to low concentrations of halothane during development in rats. Anesthesia and Analgesia, 65:653-659, 1986.
10. Levin ED and RE Bowman. Long-term lead effects on the Hamilton search task and delayed spatial alternation in monkeys. Neurobehavioral Toxicology and Teratology, 8:219-224, 1986.
11. Morgan MM, ED Levin and JC Liebeskind. Analgesia produced by the anxiogenic benzodiazepine receptor blocker, Ro 15-1788. Proceedings of the Western Pharmacological Society, 29:237-240, 1986.
12. Weinstein DL, GD Ellison, R See and ED Levin. A model for tardive dyskinesia: The effects of fluphenazine decanoate in Guinea pigs. Proceedings of the Western Pharmacological Society, 29:237-240, 1986.
13. Levin ED and RE Bowman. Effects of the dopamine D₂ receptor agonist, LY 171555, on radial arm maze performance in rats. Pharmacology, Biochemistry and Behavior, 25: 1117-1119, 1986.
14. Johansson P, ED Levin, GD Ellison and L Gunne. Opposite effects of a D₁ and a D₂ agonist on oral movements in rats. European Journal of Pharmacology, 134:83-88, 1987.
15. Levin ED, D Galen and GD Ellison. Chronic haloperidol effects on radial arm maze performance and oral movements in rats. Pharmacology, Biochemistry and Behavior, 26:1-6, 1987.
16. Levin ED, RE Bowman, S Wegert and J Vuchetich. Psychopharmacological investigations of a lead-induced, long-term cognitive deficit in monkeys. Psychopharmacology, 91:334-341, 1987.
17. Levin ED, MM Morgan, C Galvez and GE Ellison. Chronic nicotine effects of food and water intake and weight regulation in rats. Physiology and Behavior, 39:441-444, 1987.
18. Ellison GD, R See, ED Levin and J Kinney. Computerized analysis of tremorous mouth movements induced by chronic haloperidol administration in rats. Psychopharmacology, 92:122-126, 1987.
19. Morgan MM, ED Levin and JC Liebeskind. Characterization of the analgesic effects of the benzodiazepine antagonist, RO 15-1788. Brain Research, 415:367-370, 1987.
20. Levin ED, M Castonguay and GD Ellison. Effects of the nicotinic receptor blocker, mecamylamine, on radial arm maze performance in rats. Behavioral and Neural Biology, 48:206-212, 1987.
21. Levy AD, RE See, ED Levin and GD Ellison. Neuroleptic-induced oral movements in rats: Methodological issues. Life Sciences, 41:1499-1506, 1987.
22. Lubisher JL, RE See, ED Levin and JC Liebeskind. The effects of D₁ and D₂ receptor antagonists on pain sensitivity and morphine analgesia in the rat. Proceedings of the Western Pharmacological Society, 30:229-232, 1987.

23. Levin ED, E Uemura, R DeLuna, P Franks and RE Bowman. Neurobehavioral effects of chronic halothane exposure during developmental and juvenile periods in the rat. Experimental Neurology, 98:584-593, 1987.
24. See RE, ED Levin and GD Ellison. Characteristics of oral movements in rats during and after chronic haloperidol and fluphenazine administration. Psychopharmacology, 94:421-427, 1988.
25. McGurk S, ED Levin and LL Butcher. Cholinergic-dopaminergic interactions in radial-arm maze performance. Behavioral and Neural Biology, 49:234-239, 1988.
26. Levin ED, M Schneider, S Ferguson, SL Schantz and RE Bowman. Behavioral effects of developmental lead exposure in rhesus monkeys. Developmental Psychobiology, 21:371-382, 1988.
27. Gunne LM, ED Levin and PE Johansson. The GABA theory of tardive dyskinesia. in: Tardive Dyskinesia: Biological Mechanisms and Clinical Aspects, ME Wolf and AD Mosnaim (eds.), American Psychiatric Association Press, Washington, DC, pp. 29-38, 1988.
28. Levin ED. Psychopharmacological effects in the radial-arm maze. Neuroscience and Biobehavioral Reviews, 12: 169-175, 1988.
29. Levin ED. Scopolamine interactions with D₁ and D₂ antagonists on radial-arm maze performance in rats. Behavioral and Neural Biology, 50: 240-245, 1988.
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31. Gunne LM, JE Häggström, P Johansson, ED Levin and L Terenius. Neurobiochemical theories of tardive dyskinesia. L'Encephale, 14:167-173, 1988.
32. Levin ED, GD Ellison, C Salem, ME Jarvik and E Gritz. Behavioral effects of acute hexamethonium in rats chronically intoxicated with nicotine. Physiology and Behavior, 44:355-359, 1988.
33. Levin ED, SL Schantz and RE Bowman. Delayed spatial alternation deficits resulting from perinatal PCB exposure in monkeys. Archives of Toxicology, 62:267-273, 1988.
34. Levin ED and RE Bowman. Long-term effects of chronic postnatal lead exposure on delayed spatial alternation in monkeys. Neurotoxicology & Teratology, 10:505-510, 1988.
35. Yirmiya R, ED Levin, CD Chapman and J Garcia. Morphological and behavioral effects of perinatal exposure to aspartame (Nutrasweet) on rat pups. Bulletin of the Psychonomic Society, 27:153-156, 1989.
36. Andersson U, JE Häggström, ED Levin, U Bondesson, M Valverius and LM Gunne. Reduced glutamate decarboxylase activity in the subthalamic nucleus in patients with tardive dyskinesia. Movement Disorders, 4:37-46, 1989.
37. Levin ED, SR McGurk, D South and LL Butcher. Effects of combined muscarinic and nicotinic blockade on choice accuracy in the radial-arm maze, Behavioral and Neural Biology, 51:270-277, 1989.

38. Levin ED and LM Gunne. Chronic neuroleptic effects on spatial reversal learning in monkeys. Psychopharmacology, 97:496-500, 1989.
39. Schantz SL, ED Levin, RE Bowman, MP Heironimus and NK Laughlin. Effects of perinatal PCB Exposure on discrimination-reversal learning in monkeys. Neurotoxicology and Teratology, 11:243-250, 1989.
40. Levin ED, JE Rose and F Behm. Controlling puff volume without disrupting smoking topography. Behavior Research Methods, Instruments and Computers, 21:383-386, 1989.
41. McGurk SR, ED Levin and LL Butcher. Nicotinic-dopaminergic relationships and radial-arm maze performance in rats. Behavioral and Neural Biology, 52:78-86, 1989.
42. Rose JE, A Sampson, ED Levin and JE Henningfield. Mecamylamine increases nicotine preference and attenuates nicotine discrimination. Pharmacology, Biochemistry and Behavior, 32:933-938, 1989.
43. Levin ED, GD Ellison, RE See, D South and E Young. D₁ and D₂ dopamine receptor interactions with pilocarpine-induced oral activity in rats Pharmacology, Biochemistry and Behavior, 33:501-505, 1989.
44. Levin ED, SR McGurk, JE Rose and LL Butcher. Reversal of a mecamylamine-induced cognitive deficit with the D₂ agonist, LY 171555. Pharmacology, Biochemistry and Behavior, 33:919-922, 1989.
45. Uemura E, ED Levin, R DeLuna and RE Bowman. Suppressive effects of halothane on reactive synaptogenesis in the dentate gyrus of rats. Brain Research, 496:317-320, 1989.
46. McGurk SR, ED Levin and LL Butcher. Radial-arm maze performance in rats is impaired by a combination of nicotinic-cholinergic and D₂ dopaminergic drugs. Psychopharmacology, 99:371-373, 1989.
47. Levin ED, RE See and D South. Effects of dopamine D₁ and D₂ receptor antagonists on oral activity in rats. Pharmacology, Biochemistry and Behavior, 34:43-48, 1989.
48. Levin ED, R DeLuna, E Uemura and RE Bowman. Long-term effects of developmental halothane exposure on radial-arm maze performance in rats. Behavioural Brain Research, 36:147-154, 1990.
49. Levin ED, J Rose, S McGurk and L Butcher. Characterization of the cognitive effects of combined muscarinic and nicotinic blockade. Behavioral and Neural Biology, 53:103-112, 1990.
50. Rose JD, ED Levin, FM Behm, C Adivi and C Schur. Transdermal nicotine facilitates smoking cessation. Clinical Pharmacology and Therapeutics, 47:323-330, 1990.
51. Levin ED, C Lee, JE Rose, A Reyes, G Ellison, M Jarvik and E Gritz. Chronic nicotine and withdrawal effects on radial-arm maze performance in rats. Behavioral and Neural Biology, 53:269-276, 1990.
52. Levin ED, PJ Bushnell and CM Baysinger. *d*-Amphetamine-induced "floating limb" syndrome in young rhesus monkeys. Psychopharmacology, 101:112-117, 1990.
53. Levin ED, JE Rose and F Behm. Development of a citric acid aerosol as a smoking cessation aid. Drug and Alcohol Dependence, 25:273-279, 1990.

54. Behm FM, ED Levin, YK Lee and JE Rose. Low-nicotine regenerated smoke aerosol reduces desire for cigarettes. Journal of Substance Abuse, 2:237-247, 1990.
55. Levin ED, FM Behm and JE Rose. The use of flavor in cigarette substitutes. Drug and Alcohol Dependence, 26:155-160; 1990.
56. Levin ED, SR McGurk, JE Rose and LL Butcher. Cholinergic-dopaminergic interactions in cognitive performance. Behavioral and Neural Biology, 54:271-299, 1990.
57. Grijalva CV, ED Levin, M Morgan, B Roland and FC Martin. Contrasting effects of centromedial and basolateral amygdaloid lesions on stress-related responses in the rat. Physiology and Behavior, 48:495-500, 1990.
58. Levin ED and JE Rose. Anticholinergic sensitivity following chronic nicotine administration as measured by radial-arm maze performance in rats. Behavioural Pharmacology, 1:511-520, 1990.
59. Levin ED and JE Rose. Interactive effects of D₁ and D₂ agonists with scopolamine on radial-arm maze performance. Pharmacology, Biochemistry and Behavior, 38:243-246, 1991.
60. Rose JE and ED Levin. Inter-relationships between conditioned and primary reinforcement in the maintenance of cigarette smoking. British Journal of Addiction, 86:605-609, 1991.
61. Schantz SL, ED Levin and RE Bowman. Long-term neurobehavioral effects of perinatal polychlorinated biphenyl (PCB) exposure in monkeys. Environmental Toxicology and Chemistry, 10:747-756 1991.
62. Levin ED, E Uemura and RE Bowman. Neurobehavioral toxicology of halothane in rats. Neurotoxicology & Teratology, 13:461-470, 1991.
63. McGurk SR, ED Levin and LL Butcher. Impairment of radial-arm maze performance in rats following lesions of the cholinergic medial pathway: Reversal by arecoline and differential effects of muscarinic and nicotinic antagonists. Neuroscience, 44:137-147, 1991.
64. Levin ED, JE Rose, F Behm and NH Caskey. The effects of smoking-related sensory cues on psychological stress. Pharmacology, Biochemistry and Behavior, 39:265-268, 1991.
65. Levin ED and JE Rose. Nicotinic and muscarinic interactions and choice accuracy in the radial-arm maze. Brain Research Bulletin, 27:125-128, 1991.
66. Rose JE and ED Levin. Concurrent agonist-antagonist administration for the analysis and treatment of drug dependence. Pharmacology, Biochemistry and Behavior, 41:219-226, 1992.
67. Levin ED, SL Schantz and RE Bowman. Use of the lesion model for examining toxicant effects on cognitive behavior. Neurotoxicology and Teratology, 14:131-141, 1992.
68. Henningfield JE, E Obarzanek, NL Benowitz, SM Hall, RC Klesges, S Leischow, ED Levin, KA Perkins, B Spring, M Stitzer, MM Ward, S Winders, P Wood, MN Woods, T Isbell and ML Klem. Task Force 2: Methods of assessment, strategies for research. Health Psychology, 11(Suppl):10-16, 1992.
69. Levin ED and RW Russell. Nicotinic-muscarinic interactions in cognitive function. In: Neurotransmitter Interactions and Cognitive Function, ED Levin, MW Decker and LL Butcher (eds.), Berkhäuser, Boston, pp. 183-195, 1992.

70. Levin ED and JE Rose. Cognitive effects of D₁ and D₂ interactions with nicotinic and muscarinic systems. In: Neurotransmitter Interactions and Cognitive Function, ED Levin, MW Decker and LL Butcher (eds.), Berkhäuser, Boston, 144-158, 1992.
71. Levin ED, MW Decker and LL Butcher. Transmitter interactions and cognitive function: Appreciation of the concert. In: Neurotransmitter Interactions and Cognitive Function, ED Levin, MW Decker and LL Butcher (eds.), Berkhäuser, Boston, 355-357, 1992.
72. McGurk, SR, ED Levin and LL Butcher. Dopaminergic drugs reverse the impairment of radial-arm maze performance caused by lesions involving the cholinergic medial pathway. Neuroscience, 50:129-135, 1992.
73. Uemura E and ED Levin. The effect of halothane on cultured fibroblasts and neuroblastoma cells. Neuroscience Letters, 145:33-36, 1992.
74. Levin ED. Nicotinic systems and cognitive function. Psychopharmacology, 108:417-431, 1992.
75. Levin ED, SJ Briggs, NC Christopher and JE Rose. Persistence of chronic nicotine-induced cognitive facilitation. Behavioral and Neural Biology, 58:152-158, 1992.
76. Seidler FJ, ED Levin, SE Lappi and TA Slotkin. Fetal nicotine exposure ablates the ability of postnatal nicotine challenge to release norepinephrine from rat brain regions. Developmental Brain Research, 69:288-291, 1992.
77. Levin ED, SJ Briggs, NC Christopher and JE Rose. Sertraline attenuates nicotine withdrawal-induced hyperphagia in rats. Pharmacology, Biochemistry and Behavior, 44:51-61, 1993.
78. Behm FM, C Schur, ED Levin, DP Tashkin and JE Rose. Clinical evaluation of a citric acid inhaler for smoking cessation. Drug and Alcohol Dependence, 31:131-138, 1993.
79. Rose JE, FM Behm and ED Levin. The role of nicotine dose and sensory cues in the regulation of smoke intake. Pharmacology, Biochemistry and Behavior, 44:891-900, 1993.
80. Levin ED, SJ Briggs, NC Christopher and JE Rose. Chronic nicotinic stimulation and blockade effects on cognitive behavior. Behavioural Pharmacology, 4:179-182, 1993.
81. Levin ED. Nicotinic involvement in cognitive function: Possible therapeutic applications. Medicinal Chemistry Research, 2:612-627, 1993.
82. Rosecrans J, ED Levin and L Karan. Nicotine as a potential therapeutic agent: A prologue. Medicinal Chemistry Research, 2:505-508, 1993.
83. Levin ED, L Karan and J Rosecrans. Nicotine: An addictive drug with therapeutic potential. Medicinal Chemistry Research, 2:509-513, 1993.
84. Levin ED. Development of treatments for toxicant-induced cognitive deficits. Neurotoxicology and Teratology, 15:203-206, 1993.
85. Levin ED and FJ Seidler. Sex-related spatial learning differences in the young adult rat after prenatal cocaine exposure. Neurotoxicology, 14:23-28, 1993.
86. Westman EC, ED Levin and JE Rose. The nicotine patch in smoking cessation: A randomized controlled trial with telephone counseling. Archives of Internal Medicine, 153:1917-1923, 1993.

87. Bushnell PJ and ED Levin. Effects of dopaminergic drugs on working and reference memory in rats. Pharmacology, Biochemistry and Behavior, 45:765-776, 1993.
88. Levin ED, NC Christopher, SJ Briggs and JE Rose. Chronic nicotine reverses working memory deficits caused by lesions of the fimbria or medial basalocortical projection. Cognitive Brain Research, 1:137-143, 1993.
89. Levin ED, SJ Briggs, NC Christopher and JE Rose. Prenatal nicotine exposure and cognitive performance in rats. Neurotoxicology and Teratology, 15:251-260, 1993.
90. Levin ED, F Behm, E Carnahan, R LeClair, R Shipley and J Rose. Clinical trials using ascorbic acid aerosol to aid smoking cessation. Drug and Alcohol Dependence, 33:211-223, 1993.
91. Rose JE, ED Levin and N Benowitz. Saliva nicotine as an index of plasma levels in nicotine skin patch users. Therapeutic Drug Monitoring, 15:431-435, 1993.
92. Levin ED, EC Westman, RM Stein, E Carnahan, M Sanchez, S Herman, FM Behm and JE Rose. Nicotine skin patch treatment increases abstinence, decreases withdrawal symptoms and attenuates rewarding effects of smoking. Journal of Clinical Psychopharmacology, 14:41-49, 1994.
93. Levin ED and B Eisner. Nicotine interactions with dopamine agonists: Effects on working memory function. Drug Development Research, 31:32-37, 1994.
94. Brucato FH, ED Levin, JE Rose and HS Swartzwelder. Intracerebroventricular nicotine and mecamylamine alter radial-arm maze performance in rats. Drug Development Research, 31:18-23, 1994.
95. Levin ED and J Rosecrans. The promise of nicotinic-based therapeutic treatments. Drug Development Research, 31:1-2, 1994.
96. Rose JE, FM Behm, EC Westman, ED Levin, RM Stein and GV Ripka. Mecamylamine combined with nicotine skin patch potentiates smoking cessation beyond nicotine patch treatment alone. Clinical Pharmacology and Therapeutics, 56:86-99, 1994.
97. Levin, ED. Nicotine effects and working memory performance. Recent Advances in Tobacco Science, 20:49-66, 1994.
98. Rose JE, FM Behm, EC Westman, ED Levin, RM Stein, J Lane and GV Ripka. Combined effects of nicotine and mecamylamine in attenuating smoking reward. Experimental and Clinical Psychopharmacology, 2:328-344, 1994.
99. Levin ED, SJ Briggs, NC Christopher and JT Auman. Working memory performance and cholinergic effects in the ventral tegmental area and substantia nigra. Brain Research, 657:165-170, 1994.
100. Andrén PE, ED Levin, U Liminga and L Gunne. Behavioral and neurochemical consequences of ibotenic acid lesion in the subthalamic nucleus in the common marmoset. Brain Research Bulletin, 36:301-307, 1995.
101. Levin ED and D Torry. Nicotine effects on memory performance. In: International Symposium on Nicotine: The Effects of Nicotine on Biological Systems II, P.B.S. Clarke, M. Quik, K. Thurau and F. Adlkofer (Eds.), Birkhäuser, Boston, 329-335, 1995.

102. Levin ED and JE Rose. Acute and chronic nicotinic interactions with dopamine systems and working memory performance. In: Annals of the New York Academy of Sciences, Vol 757, Functional Diversity of Interacting Receptors, A. Lajtha and L. Abood (eds.), The New York Academy of Sciences, New York, pp 245-252, 1995.
103. Rose JE, ED Levin, F Behm, E Westman, R Stein and GV Ripka. Combined administration of agonist-antagonist as a method of regulating receptor activation. In: Annals of the New York Academy of Sciences, Vol 757, Functional Diversity of Interacting Receptors, A. Lajtha and L. Abood (eds.), The New York Academy of Sciences, New York, pp 218-221, 1995.
104. Beckham JC, AA Roodman, RH Shipley, MA Hertzberg, GH Cunha, HS Kudler, ED Levin, JE Rose and JA Fairbank. Smoking in Vietnam veterans with posttraumatic stress disorder. Journal of Traumatic Stress, 8:461-472, 1995.
105. Levin ED, NC Christopher MB Abou-Donia. Triphenyl phosphite-induced impairment of spatial alternation. Journal of Toxicology and Environmental Health, 44:461-467, 1995.
106. Levin ED, JE Rose and L Abood. Effects of nicotinic dimethylaminoethyl esters on working memory performance of rats in the radial-arm maze. Pharmacology, Biochemistry and Behavior, 51:369-373, 1995.
107. Bushnell PJ, ED Levin and DH Overstreet. Spatial working and reference memory in rats bred for autonomic sensitivity to cholinergic stimulation: Acquisition, accuracy, speed and effects of cholinergic drugs. Neurobiology of Learning and Memory, 63:116-132, 1995.
108. Westman EC, ED Levin and JE Rose. Nicotine as a therapeutic drug. North Carolina Medical Journal, 56:48-51, 1995.
109. McEvoy JP, O Freudenreich, M McGee, C VanderZwaag, ED Levin and JE Rose. Clozapine decreases smoking in patients with chronic schizophrenia. Biological Psychiatry, 37:550-552, 1995.
110. McEvoy JP, O Freudenreich, ED Levin and JE Rose. Haloperidol increases smoking in patients with schizophrenia. Psychopharmacology, 119:124-126, 1995.
111. Levin ED. Pergolide interactions with nicotine and pilocarpine in rats on the radial-arm maze. Pharmacology, Biochemistry and Behavior, 52:837-840, 1995.
112. Levin ED, CK Connors, E Sparrow, S Hinton, W Meck, JE Rose, D Ernhardt and J March. Nicotine effects on adults with Attention-Deficit/Hyperactivity Disorder. Psychopharmacology, 123:55-63, 1996.
113. Levin, ED and D Torry. Acute and chronic nicotine effects on working memory in aged rats. Psychopharmacology, 123:88-97, 1996.
114. Connors CK, ED Levin, E Sparrow, S Hinton, D Ernhardt, WH Meck, JE Rose, and J March. Nicotine and attention in adult ADHD. Psychopharmacology Bulletin, 32:67-73, 1996.
115. Levin ED, W Wilson, JE Rose and J McEvoy. Nicotine-haloperidol interactions and cognitive performance in schizophrenics. Neuropsychopharmacology, 15:429-436, 1996.
116. Kim JS and ED Levin. Nicotinic, muscarinic and dopaminergic actions in the ventral hippocampus and the nucleus accumbens: Effects on spatial working memory in rats. Brain Research, 725:231-240, 1996.

117. Brucato FH, ED Levin, DD Mott, DV Lewis, WA Wilson and HS Swartzwelder. Hippocampal LTP and spatial learning are attenuated by GABA_B receptor blockade in the rat. Neuroscience, 74:331-339, 1996.
118. Levin ED, P. Kim and R. Meray. Chronic nicotine working and reference memory effects in the 16-arm radial maze: Interactions with D₁ agonist and antagonist drugs. Psychopharmacology, 127:25-30, 1996.
119. Levin ED, K Toll, G Chang, NC Christopher and SJ Briggs. Epibatidine, a potent nicotinic agonist: effects on learning and memory in the radial-arm maze. Medicinal Chemistry Research, 6:543-554, 1996.
120. Cutler AR, AE Wilkerson, JL Gingras and ED Levin. Prenatal cocaine and/or nicotine exposure in rats: Preliminary findings on long term cognitive outcome and genital development at birth. Neurotoxicology and Teratology, 18:635-643, 1996.
121. Chambers RA, J Moore, JP McEvoy and ED Levin. Cognitive effects of neonatal hippocampal lesions in a rat model of schizophrenia. Neuropsychopharmacology, 15:587-594, 1996.
122. Levin ED. Nicotinic agonist and antagonist effects on memory. Drug Development Research, 38:188-195, 1996.
123. Levin ED, A Wilkerson, JP Jones, NC Christopher and SJ Briggs. Prenatal nicotine effects on memory in rats: pharmacological and behavioral challenges. Developmental Brain Research, 97:207-215, 1996.
124. Levin ED, NC Christopher, SJ Briggs and JT Auman Chronic nicotine-induced improvement of spatial working memory and D₂ dopamine effects in rats. Drug Development Research, 39:29-35, 1996.
125. Levin ED, NC Christopher and SJ Briggs. Chronic nicotinic agonist and antagonist effects on T-maze alternation. Physiology and Behavior, 61:863-866, 1997.
126. Levin ED, D Torry, NC Christopher, X Yu, G Einstein and R Schwartz-Bloom. Is binding to nicotinic acetylcholine and dopamine receptors related to working memory in rats?. Brain Research Bulletin, 43:295-304, 1997.
127. Newhouse PA, A Potter and ED Levin. Nicotinic systems and Alzheimer's and Parkinson's diseases: Implications for therapeutics. Drugs and Aging, 11:206-228, 1997.
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Neuroscience Abstracts, Number 744.2, 2001.

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143. Rezvani AH, PJ Bushnell and ED Levin. Effects of nicotine and mecamylamine on choice accuracy in an operant visual signal detection task in rats. Savannah, GA, Society for Research on Nicotine and Tobacco, Feb. 20-23, 2002
144. Qiao D, FJ Seidler, ED Levin and S Padilla and TA Slotkin. Developmental neurotoxicity of chlorpyrifos: Defining the vulnerable period. Federation of Associated Societies for Experimental Biology, Annual Meeting, 2002.
145. McEvoy J, T Allen, R Keefe, E Levin and W Wilson. The effects of galanthamine in patients with refractory schizophrenia receiving risperidone, XIth International Symposium on Cholinergic Mechanisms - Function and Dysfunction, St. Moritz, Switzerland, 5-9 May 2002.
146. Levin ED, AH Rezvani, HB Glasgow Jr., NJ Deamer-Melia, JM Burkholder, PR Moeller and JS Ramsdell. *Pfiesteria piscicida* causes learning impairment in a rat model. Tenth International Conference on Harmful Algae, St. Petersburg, FL, October, 21-25, 2002.
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148. Levin ED, D Sledge, A Baruah and NA Addy. Ventral hippocampal NMDA blockade and nicotinic effects on memory. Society for Neuroscience Abstracts, 2002.
149. Rezvani AH and ED Levin. Nicotine-dizocilpine interactions and attentional performance on an operant visual signal detection task in rats. Society for Neuroscience Abstracts, 2002.
150. White HK and ED Levin, Chronic transdermal nicotine patch treatment effects on cognitive performance in age-associated memory impairment. American College of Neuropsychopharmacology, Annual meeting, San Juan, PR, Dec. 8-12, 2002.
151. Levin ED. Limbic system components of alpha7 and alpha4beta2 nicotinic receptor roles in memory function. Society for Research on Nicotine and Tobacco Annual Meeting, New Orleans, LA, Feb 19-22, 2003.
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23, 2003.

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156. Levin ED. The potential of nicotinic therapy for Alzheimer's disease and aging-related cognitive impairment. American Society for Pharmacology and Experimental Therapeutics, Annual Meeting, San Diego, CA, April 10-15, 2003.
157. Newhouse PA, DJ Bucci, ED Levin, MJ Mentis, M Sarter. Controversies regarding cholinergic function in cognition: Intersection of animal models and human studies. Society of Biological Psychiatry, San Francisco, CA, May 2003.
158. Levin ED. Animal models of developmental nicotine exposure: Possible mechanisms of childhood obesity. Teratology Society, Annual Meeting, Philadelphia, PA, June 21-25, 2003.
159. Levin ED. And F Scalzo. Developing zebrafish models for neurobehavioral toxicology. Behavioral Toxicology Society/Neurobehavioral Teratology Society, Annual Meeting, Philadelphia, PA, June 23-26, 2003.
160. Levin ED, WP Blackwelder, HB Glasgow, JM Burkholder, PR Moeller and JS Ramsdell. *Pfiesteria*-induced learning deficits: Biobehavioral mechanisms in a rat model. Behavioral Toxicology Society/Neurobehavioral Teratology Society, Annual Meeting, Philadelphia, PA, June 21-25, 2003.
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163. Icenogle L, NC Christopher, WP Blackwelder, DP Caldwell, D Qiao, FJ Seidler TA Slotkin and ED Levin. Early prenatal chlorpyrifos exposure causes persistent behavioral alterations in rats. Society for Neuroscience, Annual Meeting, New Orleans, LA, Nov. 9-13, 2003.
164. Pocivavsek A, J Song and ED Levin Nicotinic interactions with clozapine and risperidone-induced memory impairment: the role of hippocampal alpha7 nicotinic receptors. Society for Neuroscience, Annual Meeting, New Orleans, LA, Nov. 9-13, 2003.
165. Rezvani AH and ED Levin Nicotinic-antipsychotic drug interactions and attentional performance in female rats. Society for Neuroscience, Annual Meeting, New Orleans, LA, Nov. 9-13, 2003.
166. Levin ED, A Petro and DP Caldwell. Nicotinic and interactions with dizocilpine and clozapine in rats: effects on pre-pulse inhibition. Society for Neuroscience, Annual Meeting, New Orleans, LA, Nov. 9-13, 2003.
167. Levin ED, AH Rezvani, D Montoya, JE Rose and HS Swartzwelder. Adolescent vs. adult onset nicotine self-administration in female rats Society for Research on Nicotine and Tobacco

Annual Meeting, Scottsdale, AZ, Feb 18-21, 2004.

168. Levin ED. Neural Mechanisms of auditory and tactile startle response and its inhibition: nicotinic, glutamatergic and GABAergic interactions. The Neurobiology of Sensory Processing Disorders Conference, Boulder, CO, February 6-8, 2003
169. Levin ED. Fetal nicotinic impacts on weight gain later in life. Twenty-first International Neurotoxicology Conference, Honolulu, HI, February 10-14, 2004.
170. Levin ED, K Sato, J Freedman, JHP Skene and GJ Harry. Developmental lead exposure impacts on spatial learning and memory: Cholinergic and glutamatergic involvement. Society of Toxicology, Annual Meeting, Baltimore, MD, March 21-25, 2004.
171. Levin ED, Obesity as a target of behavioral toxicology. Behavioral Toxicology Society, Research Triangle Park, NC, April 28-30, 2004, 2004
172. Levin ED and AH Rezvani. Adolescent rats show differential effects of nicotine and alcohol relative to adults. Neurobehavioral Teratology Society and Research Society on Alcoholism Annual Meetings, Vancouver, BC June 26-30, 2004
173. Rezvani AH, DH Overstreet, ED Levin, D Rosenthal, CP Kordik, AB Reitz and AH Vaidya. The atypical anxiolytic JNJ-5234801 reduces alcohol intake in alcohol-preferring rats. Research Society on Alcoholism Annual Meeting, Vancouver, BC June 26-30, 2004.
174. Levin ED, RH Ali, S Donerly, L Upchurch and E Linney. Morpholino modeling of chlorpyrifos-induced learning deficits in zebrafish. Neurobehavioral Teratology Society Annual Meeting, Vancouver, BC June 26-30, 2004
175. Icenogle L, NC Christopher, J Crapo and ED Levin. Extracellular superoxide dismutase and aging-induced cognitive impairment. Society for Neuroscience, Annual Meeting, San Diego, CA, Oct. 23-27, 2004.
176. Pocivavsek A, L Icenogle, J Song and ED Levin. Risperidone interactions with hippocampal nicotinic receptors with regard to memory function. Society for Neuroscience, Annual Meeting, San Diego, CA, Oct. 23-27, 2004.
177. Rezvani AH, DP Caldwell and ED Levin. Nicotinic-serotonergic interactions and attentional performance in rats. Society for Neuroscience, Annual Meeting, San Diego, CA, Oct. 23-27, 2004.
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179. Eddins D, A Petro and ED. Levin. Habenular lesion effects on motor function and nicotinic response. Society for Neuroscience, Annual Meeting, San Diego, CA, Oct. 23-27, 2004.
180. Levin ED, WP Blackwelder, E Lau and J Brotherton. Nicotinic alpha4-beta2 and alpha7 nicotinic antagonist effects in the mediodorsal thalamic nucleus and frontal cortex on memory function. Society for Neuroscience, Annual Meeting, San Diego, CA, Oct. 23-27, 2004.
181. Jirtle R, HK Evans, JR Weidman, K Kucera, N Pollard, R Schwartz-Bloom and ED Levin. Spatial learning and memory in mice: Role of M6P/IGF2R expression. Society for Neuroscience, Annual Meeting, San Diego, CA, Oct. 23-27, 2004.

182. Timme-Laragy, AR, Levin, ED, Di Giulio, RT. The developmental and behavioral effects of embryonic exposure to DE-71 in *Fundulus heteroclitus*. Society of Environmental Toxicology and Chemistry (SETAC), Nov. 14-18, 2004
183. Aldridge JE, ED Levin, FJ Seidler, and TA Slotkin. Developmental chlorpyrifos exposure targets serotonergic function and related behaviors. Society of Toxicology, Annual Meeting, New Orleans, LA, March 6-10, 2005.
184. Kreider ML, ED Levin, FJ Seidler, TA Slotkin Prenatal or neonatal glucocorticoid treatment at doses commensurate with pharmacotherapy in preterm infants disrupts brain development and evokes lasting behavioral abnormalities. Society of Toxicology, Annual Meeting, New Orleans, LA, March 6-10, 2005.
185. Levin ED, K Pizarro, J Harrison, WG Pang, JS Ramsdell, Persisting behavioral consequences of prenatal domoic acid exposure in rats. Society of Toxicology, Annual Meeting, New Orleans, LA, March 6-10, 2005.
186. Levin ED, AH Rezvani, S Laurence and JE Rose Potentiated nicotine self-administration with adolescence as the age of onset: a rat model. Society for Research on Nicotine and Tobacco, Annual Meeting, Prague, Czech Republic, March 21-23, 2005.
187. Levin ED, L Icenogle and A Farzad Nicotine-induced working memory improvement attenuated by the 5-HT_{2A} antagonist ketanserin. Society for Research on Nicotine and Tobacco, Annual Meeting, Prague, Czech Republic, March 21-23, 2005.
188. Levin ED, D Eddins, A Petro, N Pollard, C. Perraut and JH Freedman. Metallothionein expression and developmental exposure to mercury: Effects on learning in mice. Neurobehavioral Teratology Society, Annual Meeting, St. Pete's Beach, FL, June 25-28, 2005.
189. Scalzo FM and ED Levin. Zebrafish models of neurobehavioral toxicity. Neurobehavioral Teratology Society, Annual Meeting, St. Pete's Beach, FL, June 25-28, 2005.
190. Levin ED. Zebrafish choice behavior: Sensitivity to pharmacological and toxicological challenge. Neurobehavioral Teratology Society, Annual Meeting, St. Pete's Beach, FL, June 25-28, 2005.
191. Crofton KM, JA Foss, U Hass, K Jensen, ED Levin and SL Parker. Undertaking positive control studies as part of developmental neurotoxicity testing. Neurobehavioral Teratology Society, Annual Meeting, St. Pete's Beach, FL, June 25-28, 2005.
192. Ramsdell JS, J Tiedeken and ED Levin. *In utero* exposure to domoic acid leads to subtle behavioral deficits manifest later in life. United States Harmful Algal Bloom Symposium, Monterey CA, November, 2005.
193. Lawrence S, A Petro, AH Rezvani, JE Rose and ED Levin. Sex differences in a rat model of adolescent-onset nicotine self-administration. Society for Neuroscience, Annual Meeting, Washington, DC, November 12-16, 2005.
194. Eddins D, ED Levin, R Klein and J Yakel. Apolipoprotein E4 peptide induced cognitive impairment. Society for Neuroscience, Annual Meeting, Washington, DC, November 12-16, 2005.
195. Petro A, D Eddins, N Pollard, JH Freedman, R Schwartz-Bloom and ED Levin. Cognitive

- impairment caused by developmental mercury exposure in metallothionein knockout mice. Society for Neuroscience, Annual Meeting, Washington, DC, November 12-16, 2005.
196. Peterson M, J Harrison, J Limpuangthip, T Rachakonda, E Linney and ED Levin. Rapid assessment of learning in zebrafish for screening and assessment of toxicological and therapeutic effects. Society for Neuroscience, Annual Meeting, Washington, DC, November 12-16, 2005.
 197. Levin ED, AH Rezvani, Y Tizabi, B Getachew and SR Hauser. Nicotinic and NMDA receptor regulation and attentional function in rats. Society for Neuroscience, Annual Meeting, Washington, DC, November 12-16, 2005.
 198. Kholdebarin E, DP Caldwell, WP Blackwelder, M Kao, NC Christopher and ED Levin. Radial-arm maze repeated acquisition learning and working memory performance: Nicotinic effects and histaminergic interactions. Society for Neuroscience, Annual Meeting, Washington, DC, November 12-16, 2005.
 199. Rezvani AH and DS Hampton and ED Levin. Neonatal frontal 6-OHDA lesions in the rat: Effects on locomotor activity, learning and nicotine reinforcement. Society for Neuroscience, Annual Meeting, Washington, DC, November 12-16, 2005.
 200. Rosenthal D, AH Rezvani, DH Overstreet, ED Levin, CP Kordik, AB Reitz and AH Vaidya. The Effects of atypical anxiolytic n-phenyl-2-[1-[3-(2-pyridinylethynyl)benzoyl]-4-piperidine] acetamide (JNJ-5234801) on alcohol intake in alcohol-preferring p rats: comparison with naltrexone. Society for Neuroscience, Annual Meeting, Washington, DC, November 12-16, 2005.
 201. Levin ED. Neurobehavioral consequences of neurodevelopmental toxicity zebrafish. Twenty-Second International Neurotoxicology Conference, Environment and Neurodevelopmental Disorders. September 11-14, 2005, Research Triangle Park, NC.
 202. Levin ED. Cholinergic involvement in neurocognitive function: from zebrafish to humans, Twenty-Second International Neurotoxicology Conference, Environment and Neurodevelopmental Disorders. September 11-14, 2005, Research Triangle Park, NC.
 203. Levin ED. Clozapine effects on memory function are reversed by hippocampal damage. The American College of Neuropsychopharmacology Annual Meeting, Hilton Waikoloa Village, HI, December 11-15, 2005.
 204. McClernon FJ, FB Hiott, EC Westman, JE Rose and ED Levin. Transdermal nicotine attenuates depression symptoms in non-smokers: a preliminary placebo controlled trial. Society for Research on Nicotine and Tobacco, Annual Meeting, Orlando, FL, February 15-18, 2006.
 205. Levin ED, AH Rezvani, N Pollard and A Petro. Oral nicotine self-administration is less in nicotinic alpha-7 receptor knockout mice than wildtype controls. Society for Research on Nicotine and Tobacco, Annual Meeting, Orlando, FL, February 15-18, 2006.
 206. Levin ED, S Lawrence, A Petro, K Horton, FJ Seidler and TA Slotkin. Prenatal nicotine exposure affects adolescent nicotine self-administration. Society for Research on Nicotine and Tobacco, Annual Meeting, Orlando, FL, February 15-18, 2006.

207. Levin ED, Z Bencan and DT Cerutti. Anxiolytic effects of nicotine in zebrafish. Society for Research on Nicotine and Tobacco, Annual Meeting, Orlando, FL, February 15-18, 2006.
208. Levin ED. Obesity induced by fetal nicotinic over-stimulation. Society of Toxicology, Annual Meeting, San Diego, CA, March 5-9, 2006.
209. Roegge C, X Hao, C Perraut and ED Levin. Histaminergic H1 blockade as a potential source of therapeutic or adverse effects of the antipsychotic drug clozapine: Studies with the H1 antagonist ptyrilamine. Society of Toxicology, Annual Meeting, San Diego, CA, March 5-9, 2006.
210. Seidler FJ, ED Levin and TA Slotkin. Comparative developmental neurotoxicity of organophosphates *in vitro* and *in vivo*. Society of Toxicology, Annual Meeting, San Diego, CA, March 5-9, 2006.
211. Levin ED. Development of complementary animal models to the classic rodent assays for determining neurotoxic effects and mechanisms during development. Test Smart DNT Developmental Neurotoxicity, Reston, VA, March 13-15, 2006.
212. Rezvani AH, S Lawrence, A Petro, JE Rose and ED Levin Sex differences in a rat model of adolescent-onset nicotine self-administration. Association for Behavior Analysis, Annual Meeting, Atlanta, GA, May 26-30, 2006.
213. Rezvani AH and ED Levin. Nicotine-antipsychotic drugs interaction and sustained attention in rats. Collegium Internationale Neuro-Psychopharmacologicum (CINP) 25th Biennial Congress, Chicago, IL, July 9-13, 2006.
214. Levin ED. Developing nicotinic therapy for cognitive impairment of schizophrenia and aging-related dementia. Collegium Internationale Neuro-Psychopharmacologicum (CINP) 25th Biennial Congress, Chicago, IL, July 9-13, 2006.
215. Ramsdell JS, J Tiedeken and ED Levin. Early life exposure to domoic acid leads to “silent” neurologic manifestations in juveniles and adults. 12th International Conference on Harmful Algae, Copenhagen, Denmark, Sept. 4-8, 2006.
216. Levin ED. Nicotinic Treatment for both symptomatic relief and attenuation of cognitive decline with aging and Alzheimer’s dementia. Twenty-Third International Neurotoxicology Conference, Little Rock, AR, September 17-21, 2006.
217. Levin ED, C Roegge, O Timofeeva, FJ Seidler and TA Slotkin. Low dose early postnatal diazinon exposure causes impaired working memory on the radial-arm maze in rats during adulthood. Twenty-Third International Neurotoxicology Conference, Little Rock, AR, September 17-21, 2006.
218. Roegge C, O Timofeeva, FJ Seidler, TA Slotkin and ED Levin. Persisting effects of early postnatal diazinon exposure on emotional reactivity in rats. Behavioral Toxicology Society, Annual Meeting, Little Rock, AR, September 16-17, 2006.
219. Levin ED, Z Bencan and DT Cerutti. Assessing stress in zebrafish: Anxiolytic effects of nicotine. Behavioral Toxicology Society, Annual Meeting, Little Rock, AR, September 16-17, 2006.
220. Dawson E, E Kholdebarin, A Petro, AH Rezvani and ED Levin Nicotine and clozapine effects

- on attentional performance impaired by the NMDA antagonist dizocilpine in rats. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
221. Hampton D, SI Dworkin, JE Rose, and ED Levin Nicotine IV self-administration in rats using a consummatory operant licking response. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 222. Rezvani AH, E Kholdebarin, F Brucato, P Callahan and ED Levin. The alpha7 nicotinic agonist MEM-3454 improves sustained attention in rats. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 223. Peterson M, AH Rezvani, JS Ramsdell, MY Bottein, CJ Gordon, O Timofeeva and ED Levin. Neurobehavioral effects of ciguatera toxin in rodents. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 224. Cerutti DT, Z Bencan, L Upchurch, S Donerly, E Linney and ED Levin Zebrafish models for neurobehavioral pharmacology and toxicity of cholinergic systems. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 225. Roegge C, O Timofeeva, FJ Seidler, TA Slotkin and ED Levin. Developmental diazinon neurotoxicity: Lasting effects of low postnatal exposure on behavioral function in rats. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 226. Hao X, C Perraut, BT Harris, J Harrison, R Schwartz-Bloom and ED Levin Pharmacological dissection of clozapine-induced reversal of the impairment of tactile prepulse inhibition caused by NMDA blockade with dizocilpine. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 227. Schmajuk NA, JA Larrauri and ED Levin. Testing computer models of PPI. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 228. Lawrence S, K Horton, A Petro, AH Rezvani and ED Levin. Horizon of adulthood with regard to onset of nicotine self-administration in rats. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 229. Kholdebarin E, R Lawner and ED Levin Clozapine-nicotine interactions concerning the learning impairment caused by NMDA blockade with dizocilpine. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 230. Levin ED, T Brotherton, M Qazi, P Williams and CG Berez, WP Blackwelder and NC Christopher. Frontal cortical nicotinic alpha4beta2 and alpha7 blockade and the amnestic effect of clozapine. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 231. Eddins D, A Petro, N Pollard, JS Friedman and ED Levin. Metallothionein effects on frontal cortical monoamines and reaction to developmental mercury exposure. Society for Neuroscience, Annual Meeting, Atlanta, GA, October 14-18, 2006.
 232. Timofeeva O, C Roegge, FJ Seidler, TA Slotkin and ED Levin. Developmental diazinon neurotoxicity: Lasting effects of low postnatal exposure on behavioral function in rats. Superfund Basic Research Program, Annual Meeting, San Diego, CA, December 11-12, 2006.

233. Levin ED. Obesity induced by fetal nicotinic overload. American Association for the Advancement of Science, Annual Meeting, San Francisco, CA, Feb 17, 2007
234. Levin ED, S Lawrence, K Horton, P Williams, A Petro and AH Rezvani. Identification of a particularly vulnerable adolescent period for increased nicotine self-administration in female rats. Society for Research on Nicotine and Tobacco, Annual Meeting, Austin, TX, February 21-24, 2007.
235. Levin ED, S Lawrence, A Petro, K Horton, P Williams and JE Rose. Ketanserin, a serotonin type-2 receptor antagonist, decreases nicotine self-administration. Society for Research on Nicotine and Tobacco, Annual Meeting, Austin, TX, February 21-24, 2007.
236. Timofeeva O, C Roegge, FJ Seidler, TA Slotkin, and ED Levin. Drug challenges to test the functional integrity of neural systems involved with memory after early diazinon exposure in rats. Society of Toxicology, Annual Meeting, Charlotte, NC, March 25-29, 2007.
237. Cerutti DT, Z Bencan, E Linney and ED Levin, Using zebrafish to screen for neurobehavioral toxicity. Society of Toxicology, Annual Meeting, Charlotte, NC, March 25-29, 2007.
238. Slikker W, AZ Xu, ED Levin and TA Slotkin. Disruption of brain cell replication and neurotransmitter systems during development leading to cognitive dysfunction: Developmental neurotoxicity of nicotine. Society of Toxicology, Annual Meeting, Charlotte, NC, March 25-29, 2007.
239. Levin ED. Non-monotonic dose-toxicity effects and behavioral function: Low-dose impairments from developmental pesticide exposure. Third Annual International Hormesis Society Meeting, Amherst, MA, May 1-2, 2007.
240. Cerutti DT, Z Bencan, J Jozefowicz and ED Levin. Habituation of tap-elicited swimming in the zebrafish, *Danio rerio*. Society for the Quantitative Analysis of Behavior, Annual Meeting, San Diego, CA, May 24-26, 2007.
241. Levin ED, D Eddins, A Petro, N Pollard, C Perraut and J Freedman. The role of metallothionein in neural systems underlying learning and the susceptibility to cognitive impairment caused by developmental mercury exposure. International Neurotoxicology Association, Annual Meeting, Pacific Grove, CA, June 10-15, 2007.
242. Levin ED, E Linney and TA Slotkin. Complementary zebrafish and rat models of developmental neurobehavioral toxicity: The case of organophosphate pesticide exposure. Neurobehavioral Teratology Society, Annual Meeting, Pittsburgh, PA, June 23-27, 2007.
243. Levin ED. Nicotine and Neural Underpinnings of Obesity. International Congress of Toxicology, Montreal, July 16, 2007.
244. Bottein MY, AH Rezvani, CJ Gordon, ED Levin, and JS Ramsdell. Evaluation of short and long lasting neurological response to single and repeated ciguatoxin exposure in mice. US HAB Symposium, Woods Hole, MA, Oct 29-Nov 1, 2007.
245. Levin ED, D Hampton, Y Xiao and KJ Kellar. Sazetidine-A, a nicotinic desensitizing agent, decreases nicotine self-administration in rats. Nicotinic Acetylcholine Receptors as Therapeutic Targets Conference, San Diego, CA, Oct 31-Nov 2, 2007.
246. Levin ED and AH Rezvani. Nicotinic interactions with antipsychotic drugs, models of

schizophrenia and impacts on cognitive function. Nicotinic Acetylcholine Receptors as Therapeutic Targets Conference, San Diego, CA, Oct 31-Nov 2, 2007.

247. Cauley MC, AH Rezvani, E Kholdebarin, E Dawson, ED Levin. Methylphenidate interactions with scopolamine, dizocilpine and mecamylamine induced deficits in sustained attention in rats. Society for Neuroscience, Annual Meeting, San Diego, CA, November 3-7, 2007.
248. Kholdebarin E and ED Levin Ketanserin and nicotine effects on the learning impairment caused by NMDA glutamatergic blockade with dizocilpine. Society for Neuroscience, Annual Meeting, San Diego, CA, November 3-7, 2007.
249. Levin ED, S Slade, M Johnson, K Horton, P Williams, A Petro and AH Rezvani. Sex differences in the developmental sequence of nicotine self-administration in rats during adolescence. Society for Neuroscience, Annual Meeting, San Diego, CA, November 3-7, 2007.
250. Eddins D, A Petro, DT Cerutti, N Schmajuk and ED Levin. Nicotinic effects on cognitive function and effects on dopamine and serotonin in zebrafish. Society for Neuroscience, Annual Meeting, San Diego, CA, November 3-7, 2007.
251. Rezvani AH, S Lawrence, D Eddins, A Petro, K Horton, DS Hampton and ED Levin. Neonatal 6-OHDA lesions of the frontal cortex: Persisting effects on locomotion, learning and nicotine self-administration in rats. Society for Neuroscience, Annual Meeting, San Diego, CA, November 3-7, 2007.
252. Larrauri JA, G De La Casa, ED Levin, NA Schmajuk. Attenuation of auditory pre-pulse inhibition by changes in ambient light: Role of dopamine. Society for Neuroscience, Annual Meeting, San Diego, CA, November 3-7, 2007.
253. Slade S, A Petro, K Horton, P Williams, M Johnson, AH Rezvani and ED Levin. Acute and chronic administration of a 5HT₂ antagonist ketanserin decreases nicotine self-administration in rats. Society for Neuroscience, Annual Meeting, San Diego, CA, November 3-7, 2007.
254. Petro A, N Pollard, NC Christopher, R Schwartz-Bloom, AH Rezvani and ED Levin. Nicotinic $\alpha 7$ and $\beta 2$ knockout effects on spatial learning and nicotine self-administration. Society for Neuroscience, Annual Meeting, San Diego, CA, November 3-7, 2007.
255. Timofeeva OA and ED Levin. Idazoxan reverses the memory-improving effect of nicotine and increases seizure susceptibility in rats treated with NMDA receptor antagonist dizocilpine. Society for Neuroscience, Annual Meeting, San Diego, CA, November 3-7, 2007.
256. Levin ED. The zebrafish model for development and behavioral assessment. American College of Toxicology, Charlotte, NC, November 11-14, 2007.
257. Timofeeva OA, S Agoos, C Perraut, FJ Seidler, TA Slotkin and ED Levin. Long-term neurobehavioral impairments after low-level neonatal parathion exposure in rats. Superfund Basic Research Centers, Annual Meeting, Durham, NC, Dec 3-5, 2007.
258. Eddins D, A Petro, D Cerutti, P Williams, E Linney and ED Levin. Zebrafish models of neurobehavioral impairment after early developmental chlorpyrifos exposure. Superfund Basic Research Centers, Annual Meeting, Durham, NC, Dec 3-5, 2007.
259. Lassiter TL, ED Levin, S Brimijoin, FJ Seidler and TA Slotkin. Is early-life pesticide exposure making us fat? Organophosphate administration to developing rats increases body weight and

- alters the adult response to dietary fat intake. Superfund Basic Research Centers, Annual Meeting, Durham, NC, Dec 3-5, 2007.
260. Levin ED. Nicotinic interactions with clozapine and cognitive function. American College of Neuropsychopharmacology. Annual Meeting, Boca Raton, FL, December 9-13, 2007.
 261. Levin ED, S Slade, P Williams, A Petro and AH Rezvani. The importance of sex differences in adolescent-onset nicotine self-administration in rats Society for Research on Nicotine and Tobacco, Annual Meeting, Portland, OR, February 27-March 1, 2008.
 262. Levin ED, D Hampton, C Perraut, Y Xiao and KJ Kellar. A promising new treatment avenue for smoking cessation, nicotinic receptor desensitization: Decreased nicotine self-administration in rats with sazetidine-A, Society for Research on Nicotine and Tobacco, Annual Meeting, Portland, OR, February 27-March 1, 2008.
 263. Levin ED. Early Developmental nicotine and pesticide exposure and later risk for excessive weight gain. The 5th Annual Pediatric Healthy Weight Summit, East Carolina University, Greenville, NC March 6, 2008.
 264. Timofeeva OA, S Agoos, C Perraut, FJ Seidler, TA Slotkin and ED Levin. Long-term neurobehavioral consequences of low-level neonatal parathion exposure in rats. Society of Toxicology, Annual Meeting, Seattle, WA, March 16-20, 2008.
 265. Levin ED, D Cerutti, P Williams and E Linney. Enhanced startle response in adult zebrafish after early developmental chlorpyrifos exposure: Sensitivity of a rapid automated neurobehavioral test. Society of Toxicology, Annual Meeting, Seattle, WA, March 16-20, 2008.
 266. Schramm-Sapyta NL, MC Cauley, A Stepp, ED Levin and CM Kuhn. Adolescence affects cocaine self-administration, but not compulsive lever pressing in rats. The College on Problems of Drug Dependence, Annual Meeting, San Juan, PR, June 14-19, 2008.
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