

Curriculum Vitae
Michael J. Zigmond
BIOGRAPHICAL

Name:	Michael Jonathan Zigmond	Birth Date: 9/1/41
Home Address:	6735 Forest Glen Road Pittsburgh, PA 15217	Birth Place: Waterbury, CT
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EDUCATION and TRAINING

UNDERGRADUATE:

1959-63	Carnegie Institute of Technology Pittsburgh, Pennsylvania	B.S. 1963	Chemical Engineering
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GRADUATE:

1963-68	University of Chicago Chicago, Illinois	Ph.D. 1968	Biopsychology John A. Harvey - Advisor
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POST-GRADUATE:

1967-70	Massachusetts Institute of Technology Cambridge, MA	Neuropharmacology Richard J. Wurtman - Advisor
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APPOINTMENTS and POSITIONS

ACADEMIC:

2006	Program in Cellular and Molecular Pathology Faculty University of Pittsburgh	Graduate
2003 -	National Laboratory of Medical Neurobiology Fudan University, Shanghai Medical College	Professor
1999-	Department of Neurobiology University of Pittsburgh	Professor
1998- (primary)	Department of Neurology University of Pittsburgh	Professor
1998- faculty	Program in Molecular Pharmacology University of Pittsburgh	Graduate
1998-	Program in Neuroscience University of Pittsburgh	Professor
1997-	National Parkinson Foundation Center of Excellence, Univ. of Pittsburgh	Co-Director
1996-	Department of Instruction & Learning, School of Education	Professor
1996-	Program in Survival Skills and Ethics University of Pittsburgh	Co-Director
1983- faculty	Center for Neuroscience at the University of Pittsburgh	Training
1983-	Department of Psychiatry University of Pittsburgh	Professor
1998-99 Research Associate	Division of Neuroscience Children's Hospital Boston, MA	Visiting
1991-95	Minority Fellowship Program Marine Bio. Lab., Woods Hole, MA	Faculty
1990-91 Scientist	Department of Neuropharmacology Research Institute of Scripps Clinic La Jolla, California	Visiting Staff
1986-98	Department of Neuroscience University of Pittsburgh	Professor
1983-89 Training	Center for Neuroscience University of Pittsburgh	Director of

1982-89	Molecular Pharmacology Unit National Institute for Medical Research Scientist Mill Hill, U.K.	Visiting Staff
1981-86	Biological Sciences and Psychology University of Pittsburgh	Professor
1977-90 Director	Clinical Research Center for Affective Disorders University of Pittsburgh Research	Associate for Basic
1976-1981 Professor	Dept. of Biological Sciences & Psychology University of Pittsburgh	Associate
1970-75 Professor	Departments of Biology and Psychology University of Pittsburgh	Assistant
1969-70	Massachusetts Institute of Technology	Instructor
1967-69 Associate	Massachusetts Institute of Technology	Research
1965-67 Predoc	University of Chicago	USPHS Fellow

MEMBERSHIPS IN PROFESSIONAL AND SCIENTIFIC SOCIETIES

American Association for the Advancement of Science

American Chemical Society
American Society for Pharmacology and Experimental Therapeutics

International Basal Ganglia Society

International Brain Research Organization
New York Academy of Science

Sigma Xi

Society for Neuroscience

PROFESSIONAL ACTIVITIES

Editorial Board Appointments

Progress in Neurobiology
 Co-editor-in-chief, 1998 – 99
 Editor-in-chief, 2000 –
Neuroscience Bulletin, 2006 -
JUNE (Journal of Undergraduate Research Education), 2005 –
Biology Image Library, Neuroscience section, 2005 -
Behavioral and Brain Functions, 2005 –
Parkinsonism and Related Disorders, 1998 – 2005
Stress, 1995-
Engineering & Science Ethics, 1994-
Journal of Neural Transmission, 1992-
Biological Signals, 1991-
Advances in Neuroscience, 1989-
Biogenic Amines, 1988-
Neurobiology of Disease, 1996-2009
Amino Acids (Editor of Section on Neurobiology), 1998- 2001
Journal of Pharmacology and Experimental Therapeutics, 1995-1999
Synapse, 1991- 2004
Physiological Psychology, 1981-85
Journal of Neuroscience, 1980-89

Scientific Advisory Boards

NIH Study Section services (selected list)
 NIH BPNS Scientific Review Group, ZRG1 F0-1W (June 22-23, 2009)
 NIH Challenge Grant Panel 11, BDCN-T, ZRG1 (June, 2009)
 NINDS Diversity Research Education Grants in Neuroscience, August 12, 2008
 NINDS NSD-C Review Committee (ad hoc, June 2008)
 Fogarty International Committee ZRG1 ICP2-B (chair, ad hoc, Oct 2007)
 NINDS NSD-B Review Committee (ad hoc, Feb 2007)
 NINDS T32 NRSA Review Committee (ad hoc, Sept 2004)
 NINDS ZNS1 SRB-M (Nov 2003)
 NINDS ZNS1 SRB-K Review Committee (Chair, ad hoc, Sept 2001)
 NINDS Training Grant and Career Development Review Committee (NST), 1997-2001
 NIMH Neuropsychology Research Review Committee, NIMH, 1974-1978
 UCLA Brain Research Institute Five-Year Review Committee, 2009
 Texas Higher Education Coordinating Board, Consultant, 2008
 Mentoring Committee, Clinical Science Translation Institute, University of Pittsburgh, 2006-7
 Scholarly Project Mentor, University of Pittsburgh, School of Medicine, 2005 -
 Scientific Laboratory Management Course Planning Committee, University of Pittsburgh Schools of Health Sciences 2005 - 2006

Educational Advisory Board, ICOHRTA-Virtual Collaboration Project, 2005 –6
 K-12 Multidisciplinary Advisory Committee (MAC), University of Pittsburgh
 Schools of Health Sciences, 2004-
 Consultant NIH Predoctoral Training Grant in Neuroscience at University of
 Texas, San Antonio (David Morilak, Program Director), 2004-
 Chair, Scientific Advisory Board, UCLA Center of Excellence in Parkinson's
 Disease Research (Marie-Francoise Chesselet, PI), 2003-
 Chair, Scientific Advisory Board, UCLA Center for Gene-Environment
 Studies in Parkinson Disease (Marie-Francoise Chesselet, PI), 2003 - 2008
 Advisory Committee, Maryland Psychiatric Research Center Fellowship
 Program (Brian Kirkpatrick), 2003-
 Scientific Advisory Board, The Michael J. Fox Foundation for Parkinson's
 Research, 2001-
 Co-director of "Fast Track" grants program, 2003 - 2005
 Advisory Committee, Portland Parkinson's Disease Research, Education and
 Clinical Center (PADRECC), (John G. Nutt, PI), 2002 - 2007
 Board of Scientific Counselors, Pittsburgh Development Center, 2001 - 2005
 Advisory Board, Advisory Board, Student National Medical Association,
 1999-2001
 Columbia University Udall Center Research Program on Parkinson's disease:
 pathogenesis of dopamine neuron death (Robert Burke, PI), 1999-
 Internal Advisory Committee, Alzheimer Disease Research Center, Univ.
 Pittsburgh, 1999-
 UCLA research program on neurophysiological modulation by dopamine in the
 neostriatum (Michael Levine, PI), Consultant, 1998 – 2003
 Washington University research program on mechanisms of protective and
 symptomatic treatments of PD (Joel Perlmutter, PI), 1998 - 2003
 Parkinson Institute Program on L-DOPA therapy in MPTP treated primates (Wm.
 Langston, PI), 1997-
 Association for Women in Science Project, Women Scientists in Academe, 1994 -
 1998
 Tourette's Syndrome Association, 1993-2001
 International Advisory Committee to the Society of Neuroscientists of Africa,
 1993-; chair, 1999-2002
 Dystonia Medical Research Foundation, 1992-1996
 Biological & Neuroscience Subcommittee, Mental Health Research Education
 Review Committee, 1986-1987

Professional Societies: Committee Memberships and Offices

American Association for the Advancement of Science
 Neuroscience Section, Secretary, 2005 – 2008
 National Conference of Lawyers and Scientists (NCLS) member, 2005 - 2008
 Association of Neuroscience Departments and Programs
 Information and Survey Committee, 1984 – 1986

Executive Committee, 1988 – 1992
 President, 1990 - 1991

Center for Neuroscience, University of Pittsburgh
 Executive Committee, 1983 – 1998
 Director of Training program, 1984-91

Gordon Research Conference on Catecholamines
 Chair, 1993
 Program committee member, 1995, 1997

Institute of Medicine Committee on Assessing Integrity in Research
 Environments, 2001-2002

International Basal Ganglia Society, treasurer, 1998 – 2002; program committee

National Academy of Sciences
 Editorial Committee for “On Being A Scientist,” 2007-8

Society for Neuroscience
 Young Investigator Award Selection Committee, 2001 – 2002
 Social Issues Committee, chair, 1999-2002; committee member, 1996 - 1999
 Minority Education, Training, & Professional Advancement Committee, 1997
 - 2001
 Ad Hoc Committee on Responsible Conduct in Publishing, chair, 1995 - 98
 Secretary of the Society for Neuroscience, 1994 – 1996
 Committee on Survey of Neuroscientists, 1993 – 1997, chair 1993 -1994
 Membership Committee 1990 – 1993
 Education Committee, 1989 – 1992
 Organizing Committee, Neurobiology of Disease Workshops, 1980 - 1984

Winter Conference on Brain Research
 Conference Chair, 1996-1998
 Board of Directors, 1992 – 2000

HONORS

Research Scientist Career Development Awardee (NIMH) 1985	1975 -
Research Scientist Awardee (NIMH) 2001	1986 -
MERIT Award (NIMH) 2002	1993 –
Grass Lecturer, Society for Neuroscience 1995, 97, 05	
Educational Award, Association of Neuroscience Departments and Programs 1999	
Order of Lion, Senegal	1999
Inaugural Keynote Speaker, Brain-Behavior Initiative, University of Cape Town, South Africa	2006
Commencement Speaker, University of Texas, Houston	2009

Teaching

For many years (1971 – 1997), I taught an annual course on the *biological basis of psychoactive drug action* (“Drugs and Behavior”) to undergraduates. The course size varied from 50 to more than 250. During that period, I also often taught courses or gave lectures on *chemical transmission* at the graduate level. More recently, I have taught in the neuroscience course for first and second year medical students, focusing on lectures related to the *basal ganglia*, *neurodegenerative disease*, *cell death*, and *psychopharmacology*. I also lectured for several years on *neurodegenerative disease* to first year graduate students in the Interdisciplinary Biomedical Graduate Program, and I currently direct a 1-term course on the *neurobiology of disease* for graduate students, postdoctoral fellows, and faculty

In addition, for the last 20 years I have provided instruction in *professional skills* and *research ethics* to summer high school students, undergraduates, graduate students, medical students, postdoctoral fellows, and faculty. The topics covered have included written and oral communication, applying for research and training funding, career choices and applying for jobs, and responsible conduct in research, as well as “trainer-of-trainers” instruction to faculty and administrators interested in establishing such programs at their home institutions or within their professional societies.

Major Research Interests

1. Cellular and molecular processes underlying cell death, protection, and repair in neurodegenerative disease, with emphasis on role of intracellular signaling cascades, including the MAP kinases and Akt. Studies involve the use of animal and cellular models of oxidative stress with reference to Parkinson’s disease.
2. Impact of exercise, trophic factors, hormones, and Parkinson-related gene products on survival of dopaminergic neurons in brain.
3. Impact of stress on the viability of catecholaminergic neurons in brain, and their vulnerability to oxidative stress and other challenges.
4. The mechanism by which preconditioning can serve to protect dopamine neurons from subsequent insult.

PUBLICATIONS

Refereed Research Articles

1. Wurtman RJ, Shoemaker WJ, Larin F, **Zigmond MJ**. Failure of brain norepinephrine depletion to extinguish the daily rhythm in hepatic tyrosine transaminase activity. *Nature* **219**: 1049-1050, 1968.
2. Pohorecky LA, **Zigmond MJ**, Karten H, Wurtman RJ. Enzymatic conversion of norepinephrine to epinephrine by the brain. *J Pharmacol Exp Ther* **165**: 190-195, 1969.

3. **Zigmond MJ**, Shoemaker WJ, Larin F, Wurtman RJ. Hepatic tyrosine transaminase rhythm: Interaction of environmental lighting, food consumption, and dietary protein content. *J Nutr* **98**: 71-75, 1969.
4. Pohorecky LA, **Zigmond MJ**, Heimer L, Wurtman RJ. Olfactory bulb removal: Effects on brain norepinephrine. *Proc Nat Acad Sci*. **62**: 1052-1055, 1969.
5. **Zigmond MJ**, Harvey JA. Resistance to central norepinephrine depletion and decreased mortality in rats chronically exposed to electric foot shock. *J Neurosci Relations* **31**: 373-381, 1970.
6. **Zigmond MJ**, Wurtman RJ. Daily rhythm in the accumulation of brain catecholamines synthesized from circulating H³-tyrosine. *J Pharmacol Exp Ther* **172**: 416-422, 1970.
7. **Zigmond MJ**, Chalmers JP, Simpson JR, Wurtman RJ. Effect of lateral hypothalamic lesions on uptake of norepinephrine by brain homogenates. *J Pharmacol Exp Ther* **179**: 20-28, 1971.
8. **Zigmond MJ**, Stricker EM. Deficits in feeding behavior after intraventricular injection of 6-hydroxydopamine in rats. *Science* **177**: 1211-1214, 1972.
9. Caggiula AR, Antelman SM, **Zigmond MJ**. Disruption of copulation in male rats after hypothalamic lesions: A behavioral, anatomical and neurochemical analysis. *Brain Res* **59**: 273-287, 1973.
10. **Zigmond MJ**, Stricker EM. Recovery of feeding and drinking by rats after intraventricular 6-hydroxydopamine or lateral hypothalamic lesions. *Science* **182**: 717-720, 1973.
11. **Zigmond MJ**, Wilson SP. Studies on the interaction between catecholamines and tyrosine aminotransferase in brain. *Biochem Pharmacol* **22**: 2151-2163, 1973.
12. Caggiula AR, Antelman SM, **Zigmond MJ**. Ineffectiveness of sexually arousing stimulation after hypothalamic lesions in the male rat. *Physiol Behav* **12**: 313-316, 1974.
13. Heffner TG, Drawbaugh RB, **Zigmond MJ**. Amphetamine and operant behavior in rats: relationship between drug effect and control response rate. *J Comp Physiol Psychol* **86**: 1031-1043, 1974.
14. Stricker EM, **Zigmond MJ**. Effects on homeostasis of intraventricular injections of 6-hydroxydopamine in rats. *J Comp Physiol Psychol* **86**: 973-994, 1974.
15. Stricker EM, Friedman MI, **Zigmond MJ**. Glucoregulatory feeding by rats after intraventricular 6-hydroxydopamine or lateral hypothalamic lesions. *Science* **189**: 895-897, 1975.
16. Stricker EM, Rowland N, **Zigmond MJ**. Trigeminal lemniscal lesions and the lateral hypothalamic syndrome. *Science*. **190**: 694-6, 1975.
17. Heffner TG, **Zigmond MJ**, Stricker EM. Effects of dopaminergic agonists and antagonists on feeding in intact and 6-hydroxydopamine-treated rats. *J Pharmacol Exp Ther* **201**: 386-399, 1977.
18. Saller CF, **Zigmond MJ**. A radioenzymatic assay for catecholamines and dihydroxyphenylacetic acid. *Life Sci*. **23**: 1117-1130, 1978.
19. Sherman KA, Hanin I, **Zigmond MJ**. The effect of neuroleptics on acetylcholine concentration and choline uptake in striatum: Implications for regulation of acetylcholine metabolism. *J Pharmacol Exp Ther* **621**: 677-686, 1978.

20. Sherman KA, **Zigmond MJ**, Hanin I. High affinity choline uptake in striatum and hippocampus: Differential effects of treatments which release acetylcholine. *Life Sci* **23**: 1863-1870, 1978.
21. Stricker EM, Swerdloff AF, **Zigmond MJ**. Intrahypothalamic injections of kainic acid produce feeding and drinking deficits in rats. *Brain Res* **158**: 470-473, 1978.
22. Kapatos G, **Zigmond MJ**. Effect of haloperidol on dopamine synthesis and tyrosine hydroxylase in striatal synaptosomes. *J Pharmacol Exp Ther* **208**: 468-475, 1979.
23. Kennedy LA, **Zigmond MJ**. The behavioral effects of d-amphetamine are correlated with its effects on cAMP in different brain regions. *Brain Res* **168**: 408-413, 1979.
24. Stricker EM, Cooper PH, Marshall JF, **Zigmond MJ**. Acute homeostatic imbalances reinstate sensorimotor dysfunctions in rats with lateral hypothalamic lesions. *J Comp Physiol Psychol.* **93**: 512-21, 1979.
25. Acheson AL, **Zigmond MJ**, Stricker EM. Compensatory increase in tyrosine hydroxylase activity in rat brain after intraventricular injection of 6-hydroxydopamine. *Science* **207**: 537-540, 1980.
26. **Zigmond MJ**, Stricker EM. Supersensitivity after intraventricular 6-hydroxydopamine: Relation to lesion dopamine depletion. *Experientia* **36**: 436-438, 1980.
27. Acheson AL, Kapatos G, **Zigmond MJ**. The effects of phosphorylating conditions on tyrosine hydroxylase activity are influenced by assay conditions and brain region. *Life Sci.* **28**: 1407-1420, 1981.
28. Acheson AL, **Zigmond MJ**. Short and long term changes in tyrosine hydroxylase activity in rat brain after subtotal destruction of central noradrenergic neurons. *J Neurosci.* **1**: 493-504, 1981.
29. Sherman KA, **Zigmond MJ**, Hanin I. Fluphenazine-induced decline in striatal acetylcholine content is not abolished by exogenous choline. *Neuropharmacol.* **20**: 921-924, 1981.
30. Kapatos G, **Zigmond MJ**. Influence of calcium on dopamine synthesis and tyrosine hydroxylase activity in rat striatum. *J Neurochem.* **39**: 327-335, 1982.
31. Birdsall NJM, Burgen ASV, Hulme EC, Stockton JM, **Zigmond MJ**. The effect of McN-A-343 on muscarinic receptors in the cerebral cortex and heart. *Br. J. Pharmacol.* **78**: 257-259, 1983.
32. Chiodo LA, Acheson AL, **Zigmond MJ**, Stricker EM. Subtotal destruction of central noradrenergic projections increases the firing rate of locus coeruleus cells. *Brain Res.* **264**: 123-126, 1983.
33. Keller RW Jr., Stricker EM, **Zigmond MJ**. Environmental stimuli but not homeostatic challenges produce apparent increases in dopaminergic activity in the striatum: An analysis by in vivo voltammetry. *Brain Res.* **279**: 159-170, 1983.
34. Mantione CR, **Zigmond MJ**, Fisher A, Hanin I. Selective presynaptic cholinergic neurotoxicity following intrahippocampal AF64A injection in rats. *J Neurochem.* **41**: 251-255, 1983.
35. Fluharty SJ, Snyder GL, Stricker EM, **Zigmond MJ**. Short-and long-term changes in adrenal tyrosine hydroxylase activity during insulin-induced hypoglycemia and cold stress. *Brain Res.* **267**: 384-387, 1983.

36. Fluharty SJ, Stricker EM, **Zigmond MJ**. Partial damage to the noradrenergic bundle increases tyrosine hydroxylase activity in nor-adrenergic terminals of hippocampus but not cerebellum. *Brain Res.* **324**: 390-393, 1984.
37. MacKenzie RG, **Zigmond MJ**. High- and low-affinity states of striatal D2 receptors are not affected by 6-hydroxydopamine or chronic haloperidol treatment. *J Neurochem.* **43**: 1310-1318, 1984.
38. Stachowiak MK, Bruno JP, Snyder AM, Stricker EM, **Zigmond MJ**. Apparent sprouting of striatal serotonergic terminals after dopamine-depleting brain lesions in neonatal rats. *Brain Res.* **291**: 164-167, 1984.
39. Roffler-Tarlov S, Landis SC, **Zigmond MJ**. Effects of Purkinje cell degeneration on the noradrenergic projection to mouse cerebellar cortex. *Brain Res.* **298**: 303-311, 1984.
40. **Zigmond MJ**, Acheson AL, Stachowiak MK, Stricker EM. Neurochemical compensation after nigrostriatal bundle injury in an animal model of preclinical Parkinsonism. *Arch Neurol.* **41**: 856-861, 1984.
41. Berger TW, Kaul S, Stricker EM, **Zigmond MJ**. Hyperinnervation of the striatum by dorsal raphe afferents after dopamine-depleting brain lesions in neonatal rats. *Brain Res.* **366**: 354-358, 1985.
42. Bruno JP, Stricker EM, **Zigmond MJ**. Rats given dopamine-depleting brain lesions as neonates are subsensitive to dopaminergic antagonists as adults. *Behav Neurosci.* **99**: 771-775, 1985.
43. Fluharty SJ, Snyder GL, **Zigmond MJ**, Stricker EM. Tyrosine hydroxylase activity and catecholamine biosynthesis in the adrenal medulla of rats during stress. *J Pharmacol Exp Ther.* **233**: 32-38, 1985.
44. Granneman JG, MacKenzie RG, Fluharty SJ, **Zigmond MJ**, Stricker EM. Neural control of adenylate cyclase responsiveness in brown adipose tissue. *J Pharmacol Exp Ther.* **233**: 163-167, 1985.
45. MacKenzie RG, **Zigmond MJ**. Chronic neuroleptic treatment increases D-2 but not D-1 receptors in rat striatum. *Eur J Pharmacol.* **113**: 159-165, 1985.
46. Snyder AM, Stricker EM, **Zigmond MJ**. Stress-induced neurological impairments in an animal model of Parkinsonism. *Ann Neurol.* **18**: 544-551, 1985.
47. Fluharty SJ, Rabow LE, **Zigmond MJ**, Stricker EM. Tyrosine hydroxylase activity in the sympathoadrenal system under basal and stressful conditions: Effect of 6-hydroxydopamine. *J Pharmacol Exp Ther.* **235**: 354-360, 1985.
48. Stachowiak M, Sebbane R, Stricker EM, **Zigmond MJ**, Kaplan BB. Effect of chronic cold exposure on tyrosine hydroxylase mRNA in rat adrenal gland. *Brain Res.* **359**: 356-359, 1985.
49. Bruno JP, **Zigmond MJ**, Stricker EM. Rats given dopamine-depleting brain lesions as neonates do not respond to acute homeostatic imbalances as adults. *Behav Neurosci.* **100**: 125-128, 1986.
50. Stachowiak MK, Stricker EM, Jacoby JH, **Zigmond MJ**. Increased tryptophan hydroxylase activity in serotonergic nerve terminals spared by 5,7-dihydroxytryptamine. *Biochem Pharmacol* **35**: 1241-1248, 1986.
51. Snyder AM, **Zigmond MJ**, Lund RD. Sprouting of serotonergic afferents into striatum after dopamine depleting lesions in infant rats: A retrograde transport and immunocytochemical study. *J Comp Neurol.* **245**: 274-281, 1986.

52. Onn S-P, Berger TW, Stricker EM, **Zigmond MJ**. Effects of intraventricular 6-hydroxydopamine on the dopaminergic innervation of striatum: Histochemical and neurochemical analysis. *Brain Res.* **376**: 8-19, 1986.
53. Orr WB, Gardiner TW, Stricker EM, **Zigmond MJ**, Berger TW. Short-term effects of dopamine-depleting brain lesions on spontaneous activity of striatal neurons: Relation to local dopamine concentration and behavior. *Brain Res.* **376**: 20-28, 1986.
54. Stachowiak MK, Fluharty SJ, Stricker EM, **Zigmond MJ**, Kaplan BB. Molecular adaptations in catecholamine biosynthesis induced by cold, stress and sympathectomy. *J Neurosci Res.* **16**: 13-24, 1986.
55. Nisenbaum ES, Stricker EM, **Zigmond MJ**, Berger TW. Long-term effects of dopamine-depleting brain lesions on spontaneous activity of Type II striatal neurons: Relation to behavioral recovery. *Brain Res.* **398**: 221-230, 1986.
56. Stachowiak MK, Keller RW Jr., Stricker EM, **Zigmond MJ**. Increased dopamine efflux from striatal slices during development and after nigrostriatal bundle damage. *J Neurosci.* **7**: 1648-1654, 1987.
57. Orr WB, Stricker EM, **Zigmond MJ**, Berger TW. Effects of dopamine depletion on the spontaneous activity of Type I striatal neurons: Relation to local dopamine concentration and motor behavior. *Synapse* **1**: 461-469, 1987.
58. Bruno JP, Jackson D, **Zigmond MJ**, Stricker EM. Effect of dopamine-depleting brain lesions in rat pups: Role of striatal serotonergic neurons in behavior. *Behav Neurosci.* **101**: 806-811, 1987.
59. Fluharty SJ, Vollmer RR, Meyers SA, McCann MJ, **Zigmond MJ**, Stricker EM. Recovery of chronotropic responsiveness after systemic 6-hydroxydopamine treatment: Studies in the pithed rat. *J Pharmacol Exp Ther.* **243**: 415-423, 1987.
60. Jackson D, Stachowiak MK, Bruno JP, **Zigmond MJ**. Inhibition of striatal acetylcholine release by endogenous serotonin. *Brain Res.* **457**: 259-266, 1988.
61. Jackson D, Bruno JP, Stachowiak MJ, **Zigmond MJ**. Inhibition of striatal acetylcholine release by serotonin and dopamine after the intracerebral administration of 6-hydroxydopamine to neonatal rats. *Brain Res.* **457**: 267-273, 1988.
62. Keller RW Jr., Kuhr WG, Wightman RM, **Zigmond MJ**. The effect of L-dopa on in vivo dopamine release from nigrostriatal bundle neurons. *Brain Res.* **447**: 191-194, 1988.
63. Stachowiak MK, Stricker EM, **Zigmond MJ**, Kaplan BB. A cholinergic antagonist blocks cold stress-induced alterations in rat adrenal tyrosine hydroxylase mRNA. *Molecular Brain Res.* **3**: 193-196, 1988.
64. Bernath S and **Zigmond MJ**. Characterization of [³-H] GABA release from striatal slices: Evidence for a calcium-independent process via the GABA uptake system. *Neurosci.* **27**: 563-570, 1988.
65. Abercrombie ED, Keller RW Jr., **Zigmond MJ**. Characterization of hippocampal norepinephrine release as measured by microdialysis perfusion: Pharmacological and behavioral Studies. *Neurosci.* **27**: 897-904, 1988.
66. Nisenbaum ES, Stricker EM, **Zigmond MJ**. and Berger, T W. Spontaneous activity of Type II but not Type I striatal neurons is correlated with recovery of behavioral function after dopamine-depleting brain lesions. *Brain Res.* **473**: 389-393, 1988.

67. Abercrombie ED, Keefe KA, DiFrischia DS, **Zigmond MJ**. Differential effect of stress on in vivo dopamine release in striatum, nucleus accumbens, and medial frontal cortex. *J Neurochem.* **52**: 1655-1658, 1989.
68. Salamone JD, Keller RW Jr., **Zigmond MJ**, Stricker EM. Behavioral activation in rats increases striatal dopamine metabolism measured by dialysis perfusion. *Brain Res.* **487**: 215-224, 1989.
69. Bernath S, Keller RW Jr., **Zigmond MJ**. Release of endogenous GABA can occur through Ca^{2+} -dependent and Ca^{2+} -independent processes. *Neurochem Int.* **14**: 439-445, 1989.
70. Carder RK, Jackson D, Morris HJ, Lund RD, **Zigmond MJ**. Dopamine released from mesencephalic transplants restores modulation of striatal acetylcholine release after neonatal 6-hydroxydopamine: An in vitro analysis. *Exp Neurol.* **105**: 251-259, 1989.
71. Abercrombie ED, **Zigmond MJ**. Partial injury to central noradrenergic neurons: reduction of tissue norepinephrine content is greater than reduction of extracellular norepinephrine measured by microdialysis. *J Neurosci.* **9**: 4062-4067, 1989.
72. Wolf ME, **Zigmond MJ**, Kapatos G. Tyrosine hydroxylase content of residual striatal dopamine nerve terminals following 6-hydroxydopamine administration: A flow cytometric study. *J Neurochem.* **53**: 879-885, 1989.
73. MacKenzie RG, Stachowiak M, **Zigmond MJ**. Dopaminergic inhibition of striatal acetylcholine release after 6-hydroxydopamine. *Eur J Pharmacol.* **168**: 43-52, 1989.
74. Keefe KA, Salamone JD, **Zigmond MJ**, Stricker EM. Paradoxical kinesia in Parkinsonism is not caused by dopamine release: Studies in an animal model. *Arch Neurol.* **46**: 1070-1075, 1989.
75. Weisberg EP, Baruchin A, Stachowiak MK, Stricker EM, **Zigmond MJ**, Kaplan BB. Isolation of a rat adrenal cDNA clone encoding phenylethanolamine N-methyltransferase and cold-induced alterations in rat adrenal PNMT mRNA and protein. *Mol Brain Res* , **6**: 159-166, 1989.
76. Bernath S, **Zigmond MJ**. Dopamine may influence striatal GABA release via three separate mechanisms. *Brain Res.* **476**: 373-376, 1989.
77. Baruchin A, Weisberg EP, Miner LL, Ennis D, Nisenbaum L, Naylor E, Stricker EM, **Zigmond MJ**, Kaplan BB. Effects of cold exposure on rat adrenal tyrosine hydroxylase: An analysis of RNA, protein, enzyme activity and cofactor levels. *J Neurochem.* **54**: 1769-1775, 1990.
78. Snyder GL, Keller RW Jr., **Zigmond MJ**. Dopamine efflux from striatal slices after intracerebral 6-hydroxydopamine: Evidence for compensatory hyperactivity of residual terminals. *J Pharm Exp Ther.* **253**: 867-876, 1990.
79. Snyder GL, **Zigmond MJ**. The effects of L-DOPA on in vitro dopamine release from striatum. *Brain Res.* **508**: 181-187, 1990.
80. Abercrombie ED, Bonatz AE, **Zigmond MJ**. Effects of L-DOPA on extracellular dopamine in striatum of normal and 6-hydroxydopamine-treated rats. *Brain Res.* **525**: 36-44, 1990.
81. Bernath S, **Zigmond MJ**. Calcium-independent GABA release from striatal slices: The role of calcium channels. *Neurosci.* **36**: 677-682, 1990.

82. Bernath S, **Zigmond MJ**. Dopamine enhances striatal GABA release from rat striatal slices via an influence on the GABA uptake system. *Biogenic Amines* **7**: 465-473, 1990.
83. Onn SP, Balzer JF, Sidney JP, Stricker EM, **Zigmond MJ**, Berger TW. Lesions of the dopaminergic nigrostriatal system in neonatal rats: Effects on the electrophysiological activity of striatal neurons recorded during adulthood. *Brain Res.* **518**: 274-278, 1990.
84. Lewis RM, Levari I, Ihrig B, **Zigmond MJ**. In vivo stimulation of D1 receptors increases the phosphorylation of proteins in the striatum. *J Neurochem.* **55**: 1071-1074, 1990.
85. Salamone JD, **Zigmond MJ**, Stricker EM. Characterization of the impaired feeding behavior in rats given haloperidol or dopamine-depleting brain lesions. *Neurosci.* **39**: 17-24, 1990.
86. Keefe KA, Stricker EM, **Zigmond MJ**, Abercrombie ED. Environmental stress increases extracellular dopamine in striatum of 6-hydroxydopamine-treated rats: In vivo microdialysis studies. *Brain Res.* **527**: 350-353, 1990.
87. Lonart G, **Zigmond MJ**. Incubation of tissue slices in the absence of Ca^{2+} and Mg^{2+} can cause nonspecific damage. *J Neurochem.* **56**: 1445-1448, 1991.
88. Lonart G, **Zigmond MJ**. High glutamate concentrations evoke Ca^{++} -independent dopamine release from striatal slices: a possible role of reverse dopamine transport. *J Pharm Exp Ther.* **256**: 1132-1138, 1991.
89. Nisenbaum LK, **Zigmond MJ**, Sved AF, Abercrombie ED. Prior exposure to chronic stress results in enhanced synthesis and release of hippocampal norepinephrine in response to a novel stressor. *J Neurosci* **11**: 1478-1484, 1991.
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**CONTRIBUTIONS ON TOPICS IN
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