

CURRICULUM VITAE

ROBERT FREEDMAN, M.D.

Born: June 8, 1946, St. Louis, Missouri

Citizenship: U.S.A.

Family: Married, three children.

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EDUCATION:

1968 B.A., Harvard College, Cambridge, Massachusetts.
1972 M.D., Harvard Medical School, Boston, Massachusetts.

BRIEF CHRONOLOGY OF EMPLOYMENT:

1972-1973 Intern, Harvard Medical Service, Boston City Hospital, Boston, MA.

1973-1975 Research Associate, NIMH, Laboratory of Neuropharmacology, St. Elizabeths Hospital, Washington, D.C.

1975-1978 Resident Physician and Research Fellow, Dept. of Psychiatry, Univ. of Chicago Hospital and Clinics, Chicago, Illinois.

1978-1981 Assistant Professor of Psychiatry and Pharmacology, Univ. of Colorado Health Sciences Center, Denver, Colorado

1978-present Staff Psychiatrist, Veterans Administration Hospital, Denver, Colorado.

1981-1985 Director and Ward Chief, Biological Consultation Service and Psychiatric Assessment Unit, Boulder Psychiatric Institute, Boulder, Colorado. Established a new clinical service at a proprietary hospital, increasing patient census from 0 to 24 patients. Established clinical and fiscal value of using research methods in a tertiary care setting.

1981-1986 Associate Professor of Psychiatry and Pharmacology, Univ. of Colorado Health Sciences Center, Denver, CO.

- 1986-present Professor, Department of Psychiatry and Pharmacology, Univ. of Colorado Health Sciences Center, Denver, CO.
- 1986-2000 Vice Chairman and Director of Research, Department of Psychiatry, Univ. of Colorado Health Sciences Center, Denver, CO. Responsible for establishing two clinical-basic collaborative research centers.
- 1987-present Senior Fellow, Eleanor Roosevelt Institute for Cancer Research, Denver, CO
- 1990-1991 Visiting Scientist, Department of Histology and Neurobiology, Karolinska Institute, Stockholm, Sweden.
- 2000-present Chairman, Department of Psychiatry, and Superintendent, Colorado Psychiatric Hospital, University of Colorado Health Sciences Center, Denver, CO

MILITARY SERVICE:

1973-1975 Surgeon, United States Public Health Service.

CERTIFICATION:

Diplomate, National Board of Medical Examiners; 1973
Licensed Physician, State of Illinois; 1976
Licensed Physician, State of Colorado; 1978
Diplomate, American Board of Psychiatry and Neurology; 1980

EDITORIAL BOARDS:

New England Journal of Medicine, 2001-present
Schizophrenia Research, 1992-present
Neuropsychopharmacology, 1995-present
Biological Psychiatry, 1997-present
Experimental Neurology, 2000-present
Field Editor, Journal of Pharmacology and Experimental Therapeutics, 1994-1995

ADVISORY/PEER REVIEW COMMITTEES:

VA Merit Review Board, Neurobiology, 1986-1989.
VA Merit Review Board, Mental Health and Behavioral Sciences, 1989-1991.
NIDA Initial Review Group, 1996-1999.
Chairman, VA Medical Research Advisory Group for Mental Health, 1997-2000
National Institute of Drug Abuse, Board of Scientific Councilors, 1999-present.
National Institute of Mental Health, National Advisory Council, 1999-present
Institute of Medicine, 2004-present
National Association for Research in Schizophrenia and Affective Disorders, 2001-present

PROFESSIONAL SOCIETY MEMBERSHIPS:

Society of Biological Psychiatry – Editorial Board
American Psychiatric Association – Distinguished Fellow; (Chairman, Task Force on Quantitative EEG)
American College of Neuropharmacology – Editorial Board, Program Committee, Publications Committee, Ethics Committee (chair 2004)
American College of Psychiatry – distinguished fellow
Society for Neuroscience
American Society of Human Genetics

COMMUNITY SERVICE

President, Mothers and Children’s Project, 1984-1999
Service Award, National Alliance for the Mentally Ill, 1984
President, Institute for Children’s Mental Disorders, 1999-present
Board Member, Mental Health Association of Colorado, 1998-2001

AWARDS:

Phi Beta Kappa Society, 1968
A.E. Bennett Research Award of the Society of Biological Psychiatry, 1976
Falk Fellow, American Psychiatry Association, 1976
Colorado Alliance for the Mentally Ill Recognition Award, 1984
Edward Sacher Award of Columbia University, 1997
Eli Lilly Award for Social Service, 1998
William K. Warren Award for Schizophrenia Research of the International Congress of Schizophrenia Research, 1999
Dean Award for Research of the American College of Psychiatrists, 2000
NARSAD Distinguished Investigator Award, 1999
Mysell Lectureship, Harvard Medical School, 2004

TEACHING AWARDS:

Psychiatric Residents' Teaching Award, 1985, 1993, 1995
Medical Students' Teaching Award, 1993, 1995, 1996 (Pharmacology), 1997, 2000
(Pharmacology and Psychiatry)
UCHSC Graduate Student Mentoring Award, 2002

RESEARCH INTERESTS:

Central nervous system physiology and pharmacology and its application to clinical psychiatry.

CURRENT GRANT SUPPORT:

NIMH R01 MH38321. "Electrophysiology of Sensory Gating in Schizophrenia." Principal Investigator. 1984-2005. Designated as Merit Award for extended funding.

NIMH R01 MH61412. "Nicotinic Agonists in Schizophrenia." Principal Investigator. 2001-2005.

NIMH R01 MH59565 "Molecular Genetics of Schizophrenia." Principal Investigator, Colorado Site. Member of the Executive Committee for 9 Center Co-operative Project. 1999-2007.

NIMH P50 MH068582 "Molecular Neurobiology of Schizophrenia." Principal Investigator. 2004-2009.

Veterans Administration Medical Research Service Merit Review Award, "Neuronal Physiology of Schizophrenia", Principal Investigator. 1988-2008.

Veterans Administration Medical Research Service National Schizophrenia Research Center, "Molecular Biology of Neuronal Abnormalities in Schizophrenia". Medical Director. 1989-2005.

US Navy for Executive Office of the President, Drug Abuse Task Force. University of Colorado Brain Imaging Center for Drug Abuse, Principal Investigator, 2001-2005.

Department of Veterans Affairs Mental Illness Research Education and Clinical Center, VISN 19 MIRECC, Suicide and Suicidality in Combat Veterans, Research Director, 2004-2009.

PUBLICATIONS:

1. Corey, E.J., Seebach, D. and Freedman, R. Alpha-silyl ketones via 1,3-dithianes. *J. Amer. Chem. Soc.*, 316: 788-792, 1968.
2. Hobson, J.A., McCarley, R.W., Pivik, R.T. and Freedman, R. Selective firing by cat pontine brain stem neurons in desynchronized sleep. *J. Neurophysiology*, 37: 497- 511, 1974.
3. Hobson, J.A., McCarley, R.W., Freedman, R. and Pivik, R.T. Time course of discharge rate changes by cat pontine brain stem neurons during sleep cycle. *J. Neurophysiology*, 37: 1297-1309, 1974.
4. Foote, S.L., Freedman, R. and Oliver, A.P. Effects of putative neurotransmitters on neuronal activity in monkey auditory cortex. *Brain Research*, 86: 229-242, 1975.
5. Freedman, R. and Hoffer, B.J. Phenothiazine antagonism of the noradrenergic inhibition of cerebellar Purkinje neurons. *J. Neurobiology*, 6: 277-288, 1975.
6. Freedman, R., Hoffer, B.J. and Woodward, D.J. A quantitative microiontophoretic analysis of the responses of central neurons to noradrenaline: Interactions with cobalt, manganese, verapamil, and dichloroisoprenaline. *British J. of Pharmacology*, 54: 529-538, 1975.
7. Freedman, R., Foote, S.L. and Bloom, F.E. Histochemical characterization of a neocortical projection of the nucleus locus coeruleus in the squirrel monkey. *J. of Comparative Neurology*, 164: 209-232, 1975.
8. Skolnick, P., Daly, J.W., Freedman, R. and Hoffer, B.J. Interrelationship between catecholamine-stimulated formation of cyclic AMP in cerebellar slices and inhibitory effects on cerebellar Purkinje cells: Antagonism by neuroleptic compounds. *J. of Pharmacology and Experimental Therapeutics*, 197: 280-292, 1976.
9. Hoffer, B.J., Freedman, R., Woodward, D.J., Daly, J.W. and Skolnick, P. Adrenergic receptors in cerebellum: Pharmacological heterogeneity confirmed by destruction of interneurons. *Exper. Neurol.*, 51: 653-677, 1976.
10. Nathanson, J.A., Freedman, R. and Hoffer, B.J. Lanthanum: Calcium-independent blockade of noradrenergic depression of Purkinje cell discharge. *Nature*, 261: 330-332, 1976.
11. Olson, L., Freedman, R., Seiger, A. and Hoffer, B.J. Electrophysiology and cytology of hippocampal formation transplants in the anterior chamber of the eye. I. Intrinsic organization. *Brain Research*, 119: 87-106, 1977.
12. Hoffer, B.J., Seiger, A., Freedman, R. and Olson, L. Electrophysiology and cytology of hippocampal formation transplants in the anterior chamber of the eye. II. Cholinergic mechanisms. *Brain Research*, 119: 107-132, 1977.

13. Freedman, R., Hoffer, B.J., Puro, D. and Woodward, D.J. Effects of noradrenaline on the responses of the cerebellar Purkinje cell to afferent synaptic activity. *British J. of Pharmacology*, 57: 603-605, 1976.
14. Freedman, R. Interactions of antipsychotic drugs with Cerebellar neuronal circuitry: Implications for the psychobiology of psychosis. *Biological Psychiatry*, 12: 181-196, 1977. A.E. Bennett Research Award.
15. Freedman, R. and Schwab, P.J. Paranoid symptoms in patients admitted to a general hospital psychiatric unit. *Archives of General Psychiatry*, 35:387-391, 1978.
16. Hoffer, B.J., Freedman, R., Seiger, A. and Olson, L. Seizures and related epileptiform activity in hippocampal formation transplants in the anterior chamber of the eye. *Experimental Neurology*, 54: 233-250, 1977.
17. Freedman, R., Hoffer, B.J., Woodward, D.J. and Puro, D. Interaction of norepinephrine with cerebellar activity evoked by mossy and climbing fibers. *Experimental Neurology*, 55: 269-288, 1977.
18. Taylor, D., Seiger, A., Freedman, R., Olson, L. and Hoffer, B.J. Electrophysiological analysis of reinnervation of transplants in the anterior chamber of the eye by the autonomic ground plexus of the iris. *Proc. of the National Academy of Science*, 75: 1009-1112, 1978.
19. Offenkrantz, W., Tobin, A., and Freedman, R. A psychodynamic hypothesis about heroin addiction, prostitution, and suicide: An acting-out of conflicts about parenting. *International J. of Psychoanalytic Psychotherapy*, 7:602-608, 1978.
20. Freedman, R. Symposium on isolated neuronal systems: Intraocular transplantation. Eighth Annual Winter Conference on Brain Research. *Brain Information Service Report No. 41*, 13-17, 1975.
21. Freedman, R. Symposium on information processing in the brain: Effects of norepinephrine on cerebellar neuronal circuitry. Ninth Annual Winter Conference on Brain Research. *Brain Information Service*, 79-89, 1976.
22. Hoffer, B.J., Freedman, R., Woodward, D., Puro, D. and Moises, H. A functional role for the adrenergic input to the cerebellar cortex: Interaction of norepinephrine with mossy and climbing fiber excitation and GABA-mediated inhibition. *Interactions Among Putative Neurotransmitters in the Brain* (S. Garattini, et al., ed.), 231-243, 1978.
23. Offenkrantz, W., Tobin, A. and Freedman, R. Comments on an aspect of "The Survey of Psychoanalytic Practice": The third party parameter in psychoanalysis. Report of the Panel, S.E. Pulver, reporter. *J. Amer. Psychoanalytic Assoc.*, 26: 626-630, 1978.
24. Schwab, P. and Freedman, R. Self-diagnosis of paranoid schizophrenia. *J. Amer. Medical Assoc.*, 239: 1283, 1978.

25. Freedman, R. and Hoffer, B.J. Interactions between antipsychotic drugs and central noradrenergic pathways. In Usdin, E. (ed.), *Catecholamines: Basic and Clinical Frontiers*, 1979, pp. 628-630.
26. Olson, L., Seiger, A., Alund, M., Freedman, R., Taylor, D. and Hoffer, B. Grafts of locus coeruleus and substantia nigra in oculo: Regulation of CA fiber growth into peripheral and central target tissues and establishment of functional connections between double brain grafts. *Ibid.*
27. Hoffer, B., Taylor, D., Freedman, R., Seiger, A. and Olson, L. Functional autonomic inputs to transplants in the anterior chamber of the eye. *Ibid.*
28. Woodward, D.J., Moises, H.C., Waterhouse, B.D., Hoffer, B.J. and Freedman, R. Modulatory actions of norepinephrine in the central nervous system. *Fed. Proc.*, 38: 2109-2116, 1979.
29. Freedman, R., Silverman, M. and Schwab, P. Patients' awareness of extrapyramidal reactions to neuroleptic drugs: Possible evidence for the role of catecholamines in perception. *J. Psychiatry Research*, 1: 31-38, 1979.
30. Freedman, R. and Marwaha, J. Effects of acute and chronic amphetamine treatment on Purkinje neuron discharge in rat cerebellum. *J. Pharm. Exp. Ther.*, 212: 390-396, 1980.
31. Freedman, R., Taylor, D., Seiger, A., Olson, L. and Hoffer, B.J. Seizures and related epileptiform activity in hippocampus transplanted to the anterior chamber of the eye. II. Modulation by cholinergic and adrenergic input. *Annals Neurol.*, 6 (4): 281-295, 1979.
32. Woodward, D.J., Moises, H.C., Hoffer, B.J. and Freedman, R. Norepinephrine modulation of Purkinje cell responses evoked by afferent stimulation and by microiontophoresis of amino acid neurotransmitters. In: Ryall, R. and Kelly, J. (eds.), *Iontophoresis and Transmitter Mechanisms in the Mammalian Central Nervous System*, Elsevier/North Holland Biomedical Press, New York, 441-443, 1978.
33. Moises, H., Woodward, D., Hoffer, B. and Freedman, R. Interactions of norepinephrine with Purkinje cell responses to putative amino acid neurotransmitters applied by microiontophoresis. *Exp. Neurol.*, 64: 493-515, 1979.
34. Olson, L., Seiger, A., Taylor, D., Freedman, R. and Hoffer, B. Conditions for adrenergic hyperinnervation in hippocampus. I. Histochemical evidence from intraocular double brain grafts. *Exp. Brain Res.* 39: 277-288, 1980.
35. Taylor, D., Freedman, R., Seiger, A., Olson, L. and Hoffer, B. Conditions for adrenergic hyperinnervation in hippocampus. II. Electrophysiological evidence from intraocular double brain grafts. *Exp. Brain Res.* 39: 289-299, 1980.
36. APA Committee on Confidentiality. Model Law on Confidentiality of Health and Social Service Records. *Amer. J. Psychiatry*, 136: 137-144, 1979.

37. Freedman, R. and Carter, D.B. Neuroendocrine strategies in psychiatric research. In Timiras, P.S. and Vernadakis, A. (eds.), *Hormones in Development and Aging*, 1982, pp. 619-636.
38. Freedman, R. Neurochemical and psychopharmacological factors in mental illness. In Simons, R. and Pardes, H., *Understanding Human Behavior in Health and Illness* (2nd edition), 1981, pp. 513-523.
39. Marwaha, J., Palmer, M., Hoffer, B. and Freedman, R. Phencyclidine- induced depressions of cerebellar Purkinje neurons. *Life Sciences*, 26: 1509-1515, 1980.
40. Freedman, R. Electrophysiology is not sufficient to determine modulatory influence. *Behavioral and Brain Sciences*, 2: 425-426, 1979.
41. Freedman, R., Bell, J. and Kirch, D. Clonidine therapy for co- existing psychosis and tardive dyskinesia. *Amer. J. Psychiatry*, 137: 629-630, 1980.
42. Olson, L., Seiger, A., Mathias, A., Freedman, R., Hoffer, B., Taylor, D. and Woodward, D. Intraocular brain grafts: A method for differentiating between intrinsic and extrinsic determinants of structural and functional development in the central nervous system. In: *Neural Growth and Differentiation*, E. Meisami and M.A.B. Brazier (eds.), Raven Press, New York, 1979, pp. 223-235.
43. Marwaha, J., Hoffer, B. and Freedman, R. Age-related electrophysiological changes in rat cerebellum. *Brain Research*, 201: 85-97, 1980.
44. Marwaha, J., Hoffer, B. and Freedman, R. Electrophysiological actions of neurotensin in rat cerebellum. *Regulatory Peptides*, 1: 115-125, 1980.
45. Olson, L., Seiger, A., Freedman, R. and Hoffer, B. Chromaffine cells can innervate brain tissue: Evidence from intraocular double grafts. *Exp. Neurol.*, 70: 414-426, 1980.
46. Marwaha, J., Palmer, M., Hoffer, B. and Freedman, R. Phencyclidine inhibition of central neurons. 42nd Meeting of Committee on Problems of Drug Dependence, Hyannis, Massachusetts. *NIDA Research Monograph* 34: 187-192, 1980.
47. Marwaha, J., Hoffer, B.J. and Freedman, R. Electrophysiological changes at a central noradrenergic synapse during thallium toxicosis. *Toxicol. and Appl. Pharm.*, 56: 345-352, 1980.
48. Marwaha, J., Palmer, M.R., Woodward, D.J., Hoffer, B.J. and Freedman, R. Electrophysiological evidence for presynaptic actions of phencyclidine on noradrenergic transmission in rat cerebellum. *J. Pharmacol. and Exp. Ther.* 215: 606-613, 1980.
- 48a. Sorensen, S., Carter, D., Marwaha, J., Baker, R., and Freedman, R. Disinhibition of rat cerebellar purkinje neurons from noradrenergic inhibition during rising blood ethanol. *J. Study of Alcohol*, 908-917, 1980.

49. Marwaha, J., Palmer, M., Hoffer, B., Rice, K.C., Paul, S., Freedman, R. and Skolnick, P. Differential electrophysiological and behavioral responses to optically active derivatives of phencyclidine. *Naunyn-Schmiedeberg's Arch. of Pharmacology*, 315: 203-209, 1981.
50. Adler, L.E., Bell, J., Kirch, D., Friedrich, E. and Freedman, R. Psychosis associated with clonidine withdrawal. *Amer. J. Psychiatry* 139: 110-112, 1982.
51. Sorensen, S., Carter, D., Marwaha, J., Baker, R. and Freedman, R. Disinhibition of cerebellar Purkinje neurons from noradrenergic inhibition during the rising phase of blood ethanol. *J. of Studies on Alcohol* 42: 908-917, 1981.
52. Freedman, R., Kirch, D., Bell, J., Adler, L., Pecevich, M., Pachtman, E. and Denver, P. Clonidine treatment of schizophrenia: Double-blind comparison to placebo and neuroleptic drugs. *Acta Psychiatrica Scand.* 65: 35-45, 1982.
53. Olson, L., Bjorklund, H., Hoffer, B., Freedman, R., Marwaha, J., Palmer, M. and Seiger, A. Silent Purkinje cells: An effect of early chronic lead treatment on cerebellar grafts. In: *Symposium on Chemical Indices and Mechanisms of Organ Directed Toxicity*, S. Brown and D. Davies, (eds.), Pergamon Press, New York, 1981, pp. 243-245.
54. Palmer, M., Bjorklund, H., Freedman, R., Taylor, D., Marwaha, J., Olson, L., Seiger, A. and Hoffer, B. Permanent impairment of spontaneous Purkinje cell discharge in cerebellar grafts caused by chronic lead exposure. *Toxicol. Appl. Pharm.*, 60: 431-440, 1981.
55. Marwaha, J., Hoffer, B. and Freedman, R. Electrophysiologic evidence for histamine receptors in rat cerebellum. *Exp. Neurol.*, 74: 285-292, 1981.
56. Bickford, P., Palmer, M., Rice, K., Hoffer, B. and Freedman, R. Electrophysiological effects of phencyclidine on rat hippocampal pyramidal neurons. *Neuropharmacology*, 20: 733-742, 1981.
57. Adler, L.E., Pachtman, E., Franks, R. and Freedman, R. Neurophysiologic evidence for a defect in neuronal mechanisms involved in sensory gating in schizophrenia. *Biol. Psych.* 17: 639-654, 1982.
58. Marwaha, J., Hoffer, B.J., Geller, H.M. and Freedman, R. Electrophysiological interactions of antipsychotic drugs with central noradrenergic pathways. *Psychopharmacology*, 73: 126-133, 1981.
59. Bickford, P., Palmer, M.R., Hoffer, B.J. and Freedman, R. Interactions of phencyclidine with cholinergic excitations of hippocampal pyramidal neurons. *Neuropharmacol.*, 21: 729-732, 1982.
60. Leder, R., Kirch, D., Murphy, R., Clay, K. and Freedman, R. Partial resolution of tardive dyskinesia with treatment of co-existing thyrotoxicosis. *Canadian J. Psychiatry*, 28: 134-136, 1983.

61. Marwaha, J., Hoffer, B.J. and Freedman, R. Changes in noradrenergic neurotransmission in rat cerebellum during aging. *Neurobiology of Aging*, 2: 95-98, 1981.
62. Sorensen, S., Dunwiddie, T., McClearn, G., Freedman, R. and Hoffer, B. Ethanol-induced depressions in cerebellar and hippocampal neurons of mice selectively bred for differences in ethanol sensitivity: An electrophysiological study. *Pharm. Biochem. Behav.* 14: 227-234, 1981.
63. Palmer, M.R., Freedman, R. and Dunwiddie, T.V. Interactions of a neuroleptic drug (fluphenazine) with catecholamines in hippocampus. *Psychopharmacology*, 76: 122-129, 1982.
64. Sorensen, S., Johnson, S. and Freedman, R. Persistent effects of amphetamine on cerebellar Purkinje neurons following chronic administration. *Brain Res.*, 247: 365-371, 1982.
65. Palmer, M.R., Sorensen, S., Freedman, R., Olson, L. and Hoffer, B. Differential ethanol sensitivity of intraocular cerebellar grafts in long and short-sleep mice. *J. Pharmacol. Exp. Therap.* 222: 480-487, 1982.
66. Freedman, R., Adler, L.E., Waldo, M.C., Pachtman, E. and Franks, R.D. Neurophysiological evidence for a defect in inhibitory pathways in schizophrenia: Comparison of medicated and drug-free patients. *Biol. Psychiat.* 18: 537-551, 1983.
67. Olson, L., Bjorklund, H., Freedman, R., Goldowitz, D., Hoffer, B., Palmer, M., Seiger, A., Taylor, D. and Woodward, D. Intrinsic and extrinsic determinants of brain development as evidenced by grafting of fetal brain tissue. In: *Developing and Regenerating Vertebrate Nervous Systems*, Proc. 4th Tarbox Parkinson's Disease Symposium, Lubbock, TX, 1982. P. Coates, R. Markwald, A. Kenny, (eds.), Alan R. Liss, New York, 1983, pp. 121-150.
68. Franks, R., Adler, L.E., Waldo, M., Alpert, J. and Freedman, R. Neurophysiological studies of sensory gating in mania: Comparison with schizophrenia. *Biol. Psychiatry*, 18: 989-1005, 1983.
69. Lubman, A., Emrick, C., Mosimann, W.F. and Freedman, R. Altered mood and norepinephrine metabolism following withdrawal from alcohol. *Drug and Alcohol Dependence*, 12: 3-13, 1983.
70. Johnson, S.W., Palmer, M.R. and Freedman, R. Effects of dopamine on spontaneous and evoked activities of caudate neurons. *Neuropharmacology*, 22: 843-851, 1983.
71. Palmer, M.R., Bickford, P., Hoffer, B. and Freedman, R. Electrophysiological evidence for presynaptic actions of phencyclidine on noradrenergic transmission in rat cerebellum and hippocampus. In: *Phencyclidine and Related Arylcyclohexylamines: Present and Future Applications*, ed. by J.M. Kamenka, E.F. Domino and P. Geneste, NPP Books, Ann Arbor, MI, 1983, pp. 443-469.
72. Siegel, C., Waldo, M., Mizner, G., Adler, L.E. and Freedman, R. Deficits in sensory gating in schizophrenic patients and their relatives. *Arch. Gen. Psychiat.*, 41: 607-612, 1984.

73. Kirch, D., Hattox, S., Bell, J., Murphy, R. and Freedman, R. Plasma homovanillic acid and tardive dyskinesia during neuroleptic maintenance and withdrawal. *Psychiat. Res.*, 9: 217-223, 1983.
74. Sorensen, S. and Freedman, R. Effects of Alprazolam on the activity of rat cerebellar Purkinje neurons: Evidence for mediation by norepinephrine. *Drug Development Research* 3: 555-560, 1983.
75. Johnson, S.W., Freedman, R. and Sorensen, S. Effects of d- amphetamine withdrawal in rats and man. (Letter to the Editor), *Amer. J. Psychiat.* 140: 953-954, 1983.
76. Olson, H.E., Biddinger, J.E., Freedman, R. and Marquardt, J.E. Interminability in healthy appearing patients. *Hospital and Community Psychiatry*, 35: 710-714, 1984.
77. Johnson, S.W., Haroldsen, P.E., Hoffer, B.J. and Freedman, R. Presynaptic dopaminergic activity of phencyclidine in rat caudate. *J. Pharmacol. Exp. Therap.*, 229: 322-332, 1984.
78. Freedman, R. Biopharmacological assessment and treatment of addiction disorders. In *The Addictions: An Interdisciplinary Synthesis of Concepts and Treatments*, H. Milkman and H. Shaffer, eds., Proceedings of The Addictions Conference, Chapter 3, pp. 21-27, 1985.
79. Bickford, P.C., Mosimann, W.F., Hoffer, B.J. and Freedman, R. Effects of the selective noradrenergic neurotoxin DSP4 on cerebellar Purkinje neuron electrophysiology. *Life Sciences*, 34: 731-741, 1984.
80. Rose, G., Pang, K., Palmer, M. and Freedman, R. Differential effects of phencyclidine upon hippocampal complex-spike and theta neurons. *Neurosci. Letters*, 45: 141-146, 1984.
81. Johnson, S.W., Hoffer, B.J. and Freedman, R. Correlation of Purkinje neuron depression and hypnotic effects of ethanol in inbred strains of rats. *Alcoholism: Clin. Exp. Res.*, 9: 56, 1985.
82. Johnson, S.W., Hoffer, B.J. and Freedman, R. Investigation of the failure of parenterally administered haloperidol to antagonize dopamine released from micropipettes in the caudate. *J. Neuroscience*, 6: 572- 580, 1986.
83. Pang, K., Johnson, S.W., Maayani, S. and Freedman, R. Structure- activity relationships of phencyclidine derivatives in rat cerebellum. *Pharmacol. Biochem. Behav.*, 24: 127-134, 1986.
84. Freedman, R., Waldo, M., Adler, L., Baker, N., Levin, D. and Deitrich, R. Electrophysiological effects of low dose alcohol on human subjects at high altitude. *Alcohol and Drug Research*, 6: 289-297, 1986.
85. Freedman, R. Book Review: *Neurophysiological Correlates of Normal Cognition and Psychopathology*, Adv. in Biol. Psychiatry, Vol. 13; Perris, Kemali and Koukkou-Lehmann, Eds. (Basel, S. Karger AG, 1983). *Amer. J. Psychiatry*, 1986.

86. Freedman, R. Book Review: EEG and Evoked Potentials in Psychiatry and Behavioral Neurology; J.R. Hughes and W.P. Wilson (Boston, Butterworths,1983). Amer. J. Psychiatry, 142: 381, 1985.
87. Freedman, R. Book Review: Childhood Psychosis in the First Four Years of Life; H. Massie and J. Rosenthal (New York, McGraw-Hill, 1984). Amer. J. Psychiatry, 143:242, 1986.
88. Kirch, D., Palmer, M., Egan, M. and Freedman, R. Electrophysiological interactions of haloperidol and reduced haloperidol with dopamine, norepinephrine and phencyclidine in rat brain. Neuropharm. 24: 375, 1985.
89. Kim, M., Pang, K., Freedman, R. and Palmer, M. Electrophysiological effects of cyclazocine on rat cerebellar Purkinje neurons. Alcohol and Drug Research, 6: 23-26, 1985.
90. Wang, Y., Palmer, M., Freedman, R., Hoffer, B.J., Mattson, M.V., Lessor, R.A., Rice, K.C. and Jacobson, A.E. Antagonism of PCP action by metaphit in rat cerebellar Purkinje neurons: An electrophysiological study. PNAS, 83: 2724-2727, 1986.
91. Adler, L., Waldo, M. and Freedman, R. Neurophysiologic studies of sensory gating in schizophrenia: Comparison of auditory and visual responses. Biol. Psychiatry, 20: 1284-1296, 1985.
92. Olson, L., Vanderhaeghen, J., Freedman, R., Henschen, A., Hoffer, B. and Seiger, A. Combined grafts of the ventral tegmental area and nucleus accumbens in oculo. Exp. Brain Res., 59: 325-337, 1985.
93. Sorensen, S., Hattox, S., Johnson, S.W., Bickford, P., Murphy, R. and Freedman, R. Norepinephrine-dependent and independent mechanisms of persistent effects of amphetamine in rat cerebellum. Life Sciences, 36: 2383-2389, 1985.
94. Bickford, P.C., Hoffer, B.J. and Freedman, R. Interaction of norepinephrine with Purkinje cell responses to cerebellar afferent inputs in aged rats. Neurobiology of Aging, 6: 89-94, 1985.
95. Jonsson, G., Sundstrom, E., Mefford, I., Olson, L., Johnson, S., Freedman, R. and Hoffer, B.J. Electrophysiological and neurochemical correlates of the neurotoxic effect of MPTP on central catecholamine neurons in the mouse. Naunyn-Schmiedeberg's Arch. Pharmacol., 331: 1-6, 1985.
96. Freedman, R. Neurochemical, neuroendocrine and psychopharmacological factors in mental illness. Chapter 52.B. in: Understanding Human Behavior in Health and Illness, 3rd edition, ed. by R. Simons, Williams & Wilkins, 1985, pp. 553-564.
97. Palmer, M.R., Wang, Y., Hoffer, B.J. and Freedman, R. Mechanisms of PCP action in the central nervous system. Chapter in VIIIth International Brezelius Symposium on Brain Reward Systems and Abuse, Raven Press, 1987, pp. 89-98.

98. Hoffer, B., Freedman, R. and Olson, L. Electrophysiological pharmacology using CNS transplants in oculo. Chapter in: H. Geller (ed.), *Electrophysiological Techniques for Neuropharmacology, Modern Methods in Pharmacol*, Vol. 3. Alan R. Liss Inc., New York, 1986, pp. 51-64.
99. Adler, L.E., Rose, G.M. and Freedman, R. Neurophysiologic studies of sensory gating in rats: Effects of amphetamine, phencyclidine and haloperidol. *Biol. Psychiatry*, 21: 787-798, 1986.
100. Bickford, P.C., Fredholm, B., Dunwiddie, T. and Freedman, R. Inhibition of Purkinje cell firing by systemic administration of phenylisopropyl adenosine. *Life Sciences*, 37: 239-292, 1985.
101. Waldo, M.C., Graze, K., de Graff Bender, S., Adler, L.E. and Freedman, R. Premenstrual mood changes and gating of the auditory evoked potential. *Psychoneuroendocrinol*, 12: 35-40, 1987.
102. Waldo, M.C. and Freedman, R. Gating of auditory evoked responses in normal college students. *Psychiatry Research*, 19: 233-239, 1986.
103. Bickford, P., Parfitt, K., Hoffer, B. and Freedman, R. Desipramine and noradrenergic neurotransmission in aging: Failure to restore function in aged laboratory animals. *Neuropharmacology*, 26: 597-605, 1987.
104. Contreras, P.C., Johnson, S., Freedman, R., Hoffer, B., Olsen, K., Rafferty, M.F., Lessor, R.A., Rice, K.C., Jacobson, A.E., and O'Donohue, T.L. Metaphit, an acylating ligand for phencyclidine receptors: Characterization of in vivo actions in the rat. *J. Pharmacol. Exp. Therap.*, 238: 1101-1107, 1986.
105. Gerhardt, G.A., Drebing, C.J. and Freedman, R. Simultaneous determination of free homovanillic acid (HVA), 3-methoxy-4- hydroxyphenylethylene glycol (MHPG), and vanilmandelic acid (VMA) in human plasma by HPLC coupled with dual-electrode coulometric electrochemical detection. *Analyt. Chemistry*, Vol. 58: 2879-2883, 1986.
106. Bickford, P.C., Hoffer, B.J. and Freedman, R. Diminished interaction of norepinephrine with climbing fiber inputs to cerebellar Purkinje neurons in aged Fischer 344 rats. *Brain Res.*, 385: 405-410, 1986.
107. de la Garza, R., Bickford-Wimer, P., Hoffer, B.J. and Freedman, R. Heterogeneity of nicotine actions in the rat cerebellum: An in vivo electrophysiologic study. *J. Pharm. Exp. Therap.* 240: 689-695, 1987.
108. Baker, N., Adler, L.E., Franks, R.D., Waldo, M., Berry, S., Nagamoto, H., Muckle, A., and Freedman, R. Neurophysiological assessment of sensory gating in psychiatric inpatients: Comparison between schizophrenia and other diagnoses. *Biol. Psychiatry*, 22: 603-617, 1987.

109. Gratton, A., Hoffer, B. and Freedman, R. Electrophysiological effects of phencyclidine in the medial prefrontal cortex of the rat. *Neuropharm.*, 26: 1275-1283, 1987.
110. de la Garza, R., McGuire, T.J., Freedman, R. and Hoffer, B.J. The electrophysiological effects of nicotine in the rat cerebellum: evidence for direct postsynaptic actions. *Neurosci. Letters*, 80: 303-308, 1987.
111. Lindvall, O., Backlund, E.-O., Farde, L., Sedvall, G., Freedman, R., Hoffer, B., Nobin, A., Seiger, A. and Olson, L. Transplantation in Parkinson's disease: Two cases of adrenal medullary grafts to putamen. *Annals of Neurology*, 22: 455-468, 1987.
112. Freedman, R., Waldo, M., Waldo, C.I. and Wilson, J. Genetic influences on the effects of alcohol on auditory evoked potentials. *Alcohol*, 4: 249-253, 1987.
113. Freedman, R., Adler, L., Baker, N., Waldo, M. and Mizner, G. A candidate for an inherited neurobiological dysfunction in schizophrenia. *Somatic Cell & Molecul. Genetics*, 13: 479-484, 1987.
114. Freedman, R. Book Review: American Psychiatric Association Annual Review, Vol. 5, A.J. Frances and R.E. Hales (eds.), Amer. Psychiat. Press, 1986. *Amer. J. Psychiat.*, 144:515, 1987.
115. Freedman, R. and Nagamoto, H. Brain evoked potentials as predictors of risk. In: *Recent Developments in Alcoholism*, 6:323-331, 1981.
116. Baker, N., Adler, L., Waldo, M., Gerhardt, G., Drebing, C., Cox, B., Berry, S., Phillips, W. and Freedman, R. Reproducibility of the measurement of plasma noradrenergic and dopaminergic metabolites in normal subjects. *Psychiat. Res.*, 23: 119-130, 1988.
117. Kirch, D., Gerhardt, G., Shelton, R., Freedman, R. and Wyatt, R. The effect of chronic nicotine administration on monoamine and monoamine metabolite concentrations in rat brain. *Clin. Neuropharmacol.*, 4: 376-383, 1987.
118. Hoffer, B., Rose, G., Parfitt, K., Freedman, R. and Bickford-Wimer, P. Age-related changes in cerebellar noradrenergic function. *Annals of N.Y. Acad. Sci.*, 515: 269-286, 1988.
119. Freedman, R., Adler, L.E. and Waldo, M. Gating of the auditory evoked potential in children and adults. *Psychophysiol.*, 24: 223-227, 1987.
120. Freedman, R. Book Review: Sleep cycle generation: Testing the new hypothesis; *The Behavioral and Brain Sciences*, 1986.
121. Gerhardt, G.A., Drebing, C.J. and Freedman, R. Direct determination of unconjugated HVA in human plasma filtrates by HPLC coupled with dual-electrode coulometric electrochemical detection. *Biomed. Chromatography*, 3(3):105-109, 1989.

122. Freedman, R., Adler, L.E., Gerhardt, G.A., Waldo, M., Baker, N., Rose, G.M., Drebing, C., Nagamoto, H., Bickford-Wimer, P. and Franks, R. Neurobiological studies of sensory gating in schizophrenia. *Schizophrenia Bulletin*, 13: 669-678, 1987.
123. Freedman, R. Book Review: *Some Simple Concepts and Models, Psychophysiology*; Walter S. Surwillo (Charles C. Thomas, Publisher, 1986). *Amer. J. Psychiatry*, 145:371, 1988.
124. Waldo, M.C., Adler, L.E. and Freedman, R. Defects in auditory sensory gating and their apparent compensation in relatives of schizophrenics. *Schizophr. Res.*, 1: 19-24, 1988.
125. Olson, L., Stromberg, I., Bygdeman, M., Granholm, A-Ch., Hoffer, B., Freedman, R. and Seiger, A. Human fetal tissues grafted to rodent hosts: Structural and functional observations of brain, adrenal and heart tissue in oculo. *Exp. Brain Res.*, 67: 163-178, 1987.
126. Wang, Y., Palmer, M., Freedman, R., Rice, K., Lessor, R., Jacobson, A., and Hoffer, B. Electrophysiological interactions of isomers of cyclazocine with the phencyclidine antagonist metaphit in rat cerebellar Purkinje neurons. *J. Neuroscience*, 6: 3189-3196, 1986.
127. Waldo, M.C., Roath, M., Levine, W., and Freedman, R. A model program to teach parenting skills to schizophrenic mothers. *Hospital and Community Psychiatry*, 38: 1110-1112, 1987.
128. Palmer, M., Wang, Y., Kim, M., Moore, E., Hoffer, B., Rice, K., Jacobson, A. and Freedman, R. Pharmacological specificity of the electrophysiological effects of PCP and benzomorphans on cerebellar Purkinje neurons. In: *Sigma and Phencyclidine- Like Compounds as Molecular Probes*, E.F. Domino and J.M. Kamenka (eds.), NPP Books, Ann Arbor, Michigan, 1988, pp. 555-575.
129. de la Garza, R., McGuire, T.J., Freedman, R., Hoffer, B.J. Selective antagonism of nicotine actions in the rat cerebellum with alpha-bungarotoxin. *Neuroscience*, 23: 887-891, 1987.
130. Freedman, R. and Mirsky, A.F. Event-Related Potentials: Exogenous components. Chapter III, in: *The Handbook of Schizophrenia*, Vol. 5: *Neurophysiology and Information Processing*. S.R. Steinhauser, J.H. Gruzelier and J. Zubin, (eds.) Elsevier Science Publishers, B.V., The Netherlands, 1991, pp. 71-90.
131. Bell, J., Bickford-Wimer, P.C., de la Garza, R., Egan, M. and Freedman, R. Increased central noradrenergic activity during benzodiazepine withdrawal: An electrophysiological study. *Neuropharmacology*, 27: 1187-1190, 1988.
132. Parfitt, K., Freedman, R. and Bickford-Wimer, P.C. Electrophysiological effects of locally applied noradrenergic agents at cerebellar Purkinje neurons: Receptor specificity. *Brain Res.*, 462: 242-251, 1988.
133. de la Garza, R., Freedman, R. and Hoffer, B.J. Nicotine-induced inhibitions of cerebellar Purkinje neurons: Specific actions of nicotine and selective blockade by mecamylamine. *Neuropharmacology*, 28: 495-501, 1989.

134. de la Garza, R., Freedman, R. and Hoffer, B.J. Kappa-bungarotoxin blockade of nicotine electrophysiological actions in cerebellar Purkinje neurons. *Neuroscience Lett.*, 99: 95-100, 1989.
135. de la Garza, R., Freedman, R. and Hoffer, B.J. Heterogeneity of nicotine actions in the rat cerebellum. *NATO ASI Series, Vol. H25: Nicotinic Acetylcholine Receptors in the Nervous System* (F. Clementi, et al., eds.), Springer-Verlag, Berlin, 1988, pp. 137-141.
136. Lindvall, O., Gustavii, B., Astedt, B., Lindholm, T., Leenders, K.L., Frackowiak, R., Johnels, B., Freedman, R., Hoffer, B. et al. Fetal dopamine-rich mesencephalic grafts in Parkinson's disease. *The Lancet*, Dec. 24/31: 1483-1484, 1988.
137. Nagamoto, H.T., Adler, L.E., Waldo, M.C. and Freedman, R. Sensory gating in schizophrenics and normal controls: Effects of changing stimulation interval. *Biol. Psychiatry*, 25: 549-561, 1989.
138. Lindvall, O., Rehncrona, S., Brundin, , Gustavii, B., Astedt, B., Widner, H., Lindholm, T., Bjorklund, A., Leenders, K.L., Rothwell, J.C., Frackowiak, R., Marsden, C.D., Johnels, B., Steg, G., Freedman, R., Hoffer, B.J., Seiger, A., Bygdeman, M., Stromberg, I., and Olson, L. Human fetal dopamine neurons grafted into the striatum in two patients with severe Parkinson's disease: a detailed account of methodology and a 6 months follow-up. *Arch. Neurology*, 46: 615-631, 1989.
139. Granholm, A.-C., Eriksdotter-Nilsson, M., Stromberg, I., Stieg, P., Seiger, A., Olson, L., Bygdeman, M., Geffard, M., Oertel, W., Dahl, D., Hoffer, B., and Freedman, R. Morphological and electrophysiological studies of human hippocampal transplants in the anterior eye chamber of athymic nude rats. *Exp. Neurol.*, 104: 162- 171, 1989.
140. Freedman, R., Olson, L., and Hoffer, B.J. Toxic effects of lead on neuronal development and function. *Environ. Health Perspectives*, 89:27-35, 1990.
141. Adler, L.E., Gerhardt, G.A., Franks, R., Baker, N., Nagamoto, H., Drebing, C. and Freedman, R. Sensory physiology and catecholamines in schizophrenia and mania. *Psychiat. Res.*, 31:297-309, 1989.
142. Boyajian, C.L., Bickford-Wimer, P., Kim, M.B., Freedman, R., and Cooper, D.M.F. Pertussis toxin lesioning of the nucleus caudate- putamen attenuates adenylyate cyclase inhibition and alters neuronal electrophysiological activity. *Brain Res.*, 495:66-74, 1989.
143. Bickford-Wimer, P.C., Nagamoto, H., Johnson, R., Adler, L.E., Egan, M., Rose, G.M., and Freedman, R. Auditory sensory gating in hippocampal neurons: A model system in the rat. *Biol. Psychiat.*, 27:183-192, 1990.
144. Freedman, R., Waldo, M., Bickford-Wimer, P., and Nagamoto, H. Elementary neuronal dysfunctions in schizophrenia. *Schizophrenia Res.*, 4:233-243, 1991.

145. Adler, L.E., Waldo, M.C., Tatcher, A., Cawthra, E., Baker, N., and Freedman, R. Lack of relationship of auditory gating defects to negative symptoms in schizophrenia. *Schizophrenia Res.*, 3:131-138, 1990.
146. Baker, N.J., Staunton, M., Adler, L.E., Gerhardt, G.A., Drebing, C., Waldo, M., Nagamoto, H., and Freedman, R. Sensory gating deficits in psychiatric inpatients: Relation to catecholamine metabolites in different diagnostic groups. *Biol. Psychiat.*, 27:519- 528, 1990.
147. Nagamoto, H.T., Adler, L.E., Waldo, M.C., Griffith, J., and Freedman, R. Gating of auditory response in schizophrenics and normal controls: effects of recording site and stimulation interval on the P50 wave. *Schizophrenia Res.*, 4:31-40, 1991.
148. Bickford-Wimer, P., Kim, M., Boyajian, C., Cooper, D.M.F., and Freedman, R. Effects of pertussis toxin on caudate neuron electrophysiology: studies with dopamine D1 and D2 agonist. *Brain Res.*, 533:263-267, 1990.
149. Freedman, R. Overview: A VA National Research Symposium on Schizophrenia. *Schizophrenia Res.*, 4:67-69, 1991.
150. Olson, L., Backlund, E.-O., Ebendal, T., Freedman, R., Hamberger, B., Hansson, P., Hoffer, B., Lindblom, U., Meyerson, B., Stromberg, I., Sydow, O., and Seiger, A. Intraputaminial infusion of nerve growth factor to support adrenal medullary autografts in Parkinson's disease: One-year follow-up of first clinical trial. *Arch. Neurology*, 48:373-381, 1991.
151. Drebing, C.J., Freedman, R., Waldo, M., and Gerhardt, G.A. Unconjugated methoxylated catecholamine metabolites in human saliva. Quantitation methodology and comparison with plasma levels. *Biomed. Chromatography*, 3:217-220, 1989.
152. Baker, N.J., Kirch, D.G., Waldo, M., Bell, J., Adler, L.E., Hattox, S., Murphy, R., and Freedman, R. Plasma homovanillic acid and prognosis in schizophrenia. *Biol. Psychiat.*, 29:192-196, 1991.
153. Leonard, S., Logel, J., Luthman, D., Kirch, D., Casanova, M., and Freedman, R. Biological stability of mRNA isolated from human postmortem brain collections. *Biol. Psychiat.*, 33:456-466, 1993.
154. Freedman, R., Waldo, M., Adler, L.E., Nagamoto, H., Cawthra, E., Madison, A., Hoffer, L., and Bickford-Wimer, P. *Schizotaxia and Sensory Gating*. R.L. Cromwell & Rick Snyder, eds. Oxford University Press, Nov. 1990.
155. Freedman, R., Hoffer, B.J., Gerhardt, G., Stromberg, I., Rehncrona, S., Brundin, P., Widner, H., Bjorklund, A., Lindvall, O., Seiger, A., and Olson, L. Assessment of function and survival of intracerebral transplants. *Intracerebral Transplantation in Movement Disorders*. O. Lindvall, A. Bjorklund, and H. Widner, eds. 1991, Elsevier Science Publishers.
156. Freedman, R. Evoked response to repeated auditory stimuli. *Biol. Psychiat.*, 28:1065-1067, 1990.

157. Nagel, K., Adler, L.E., Nagamoto, H.T., and Freedman, R. Lithium carbonate and mood disorder in recently detoxified alcoholics. A double-blind, placebo-controlled pilot study. *Alcoholism*, 15:978-981, 1991.
158. Waldo, M., Carey, G., Myles-Worsley, M., Cawthra, E., Adler, L.E., Nagamoto, H.T., Wender, P., Byerley, W., Plaetke, R., and Freedman, R. Co-distribution of sensory gating deficit and schizophrenia in multi-affected families. *Psychiatry Res.*, 39:257-268, 1991.
159. Miller, C.L., Bickford, P.C., Luntz-Leybman, V., Adler, L.E., Gerhardt, G.A., and Freedman, R. Phencyclidine and auditory sensory gating in the hippocampus of the rat. *Neuropharmacol.*, 31:1041-1048, 1992.
160. Jensen, S., Plaetke, R., Holik, J., Hoff, M., Myles-Worsley, M., Leppert, M., Coon, H., Vest, K., Freedman, R., Waldo, M., Zhou, Q-Y., Litt, M., Civelli, O., and Byerley, M. Linkage analysis of schizophrenia, the D1 dopamine receptor gene, and several flanking DNA regions. *Human Heredity*, 43:58-62, 1993.
161. Adler, L.E., Hoffer, L.J., Griffith, J., Waldo, M., and Freedman, R. Normalization by nicotine of deficient auditory sensory gating in the relatives of schizophrenics. *Biol. Psychiat.*, 32:607-616, 1992.
162. Myles-Worsley, M., Byerley, W., Dale, P.W., Polloi, A., Freedman, R., Levy, D., and Holzman, P. Eye tracking abnormalities in two Micronesia families with schizophrenia. *Psychiatric Genetics*, 2:209-212, 1991.
163. Waldo, Gerhardt, G., Baker, N., Drebing, C., Cawthra, E., and Freedman, R. Auditory sensory gating and catecholamine metabolism in schizophrenic and normal subjects. *Psychiatry Res.*, 44:21-32, 1992.
164. Byerley, W., Plaetke, R., Hoff, M., Jensen, S., Leppert, M., Holik, J., Reimherr, F., Wender, P., Waldo, M., Myles-Worsley, M., Freedman, R., and O'Connell, P. Tyrosine hydroxylase not linked to schizophrenia in nine pedigrees. *Psychiatric Genetics*, 42:259-263, 1992.
165. Luntz-Leybman, V., Bickford, P.C., and Freedman, R. Cholinergic gating of response to auditory stimuli in rat hippocampus. *Brain Res.*, 587:130-136, 1992.
166. Freedman, R., Stromberg, I., Seiger, A., Olson, L., Nordstrom, A-L., Wiesel, F-A., Bygdeman, M., Wetmore, C., Palmer, M.R., and Hoffer, B.J. Initial studies of embryonic transplants of human hippocampus and cerebral cortex derived from schizophrenic women. *Biol. Psychiat.*, 32:1148-1163, 1992.
167. Hoffer, B.J., Leenders, K.L., Young, D., Gerhardt, G., Zerbe, G.O., Bygdeman, M., Seiger, A., Olson, L., Stromberg, I., and Freedman, R. Eighteen month course of two patients with grafts of fetal dopamine neurons for severe Parkinson's disease. *Exp. Neurol.*, 118:243-252, 1992.

168. Drebing, C.J., Sikela, J.M., Hopkins, J.A., Byerley, W., Khan, A.S., Leonard, S., and Freedman, R. Method to detect mutations in the beta-nerve growth factor gene in schizophrenics and normals by fluorescent sequencing. *Psychiatric Genetics*, 3:21-27, 1993.
169. Freedman, R., Wetmore, C., Stromberg, I., Leonard, S., and Olson, L. α -Bungarotoxin binding to hippocampal interneurons: Immunocytochemical characterization and effects on growth factor expression. *J. Neurosci.*, 13(5):1965-1975, 1993.
170. Hall, M., Zerbe, L., Leonard, S., and Freedman, R. Characterization of [3H]cytisine binding to human brain membrane preparations. *Brain Res.*, 600:127-133, 1993.
171. Cullum, C.M., Harris, J.G., Waldo, M.C., Smernoff, E., Madison, A., Nagamoto, H.T., Griffith, J., Adler, L.E., and Freedman, R. Neurophysiological and neuropsychological evidence for attentional dysfunction in schizophrenia. *Schizophrenia Res.*, 10:131-141, 1993.
172. Bickford, P.C., Luntz-Leybman, V., and Freedman, R. Auditory sensory gating in the rat hippocampus: modulation by brainstem activity. *Brain Res.*, 607:33-38, 1993.
173. Coon, H., Plaetke, R., Holik, J., Hoff, M., Myles-Worsley, M., Freedman, R., and Byerley, W. Use of a neurophysiological trait in linkage analysis of schizophrenia. *Biol. Psychiat.*, 34:277-289, 1993.
174. Browning, M.D., Dudek, E.M., Rapier, J.L., Leonard, S., and Freedman, R. The specific activity of synapsin but not synaptophysin is greatly reduced in the brains of some schizophrenics. *Biol. Psychiat.*, 34:529-535, 1993.
175. Adler, L.E., Hoffer, L.D., Wiser, A., and Freedman, R. Normalization of auditory physiology by cigarette smoking in schizophrenic patients. *Am. J. Psychiat.*, 150:1856-1861, 1993.
176. Leonard, S., Luthman, D., Logel, J., Luthamn, J., Antle, C., Freedman, R., and Hoffer, B. Acidic and basic fibroblast growth factor mRNAs are increased in striatum following MPTP-induced dopamine neurofiber lesion: assay by quantitative PCR. *Molecular Brain Res.*, 18:275-284, 1993.
177. Waldo, M.C., Cawthra, E., Adler, L.E., Dubester, S., Staunton, M., Nagamoto, H., Baker, N., Madison, A., Simon, J., Scherzinger, A., Drebing, C., Gerhardt, G., and Freedman, R. Auditory sensory gating, hippocampal volume, and catecholamine metabolism in schizophrenics and their siblings. *Schizophrenia Res.*, 12:93-106, 1994.
178. Miller, C.L. and Freedman, R. Medial septal neuron activity in relation to an auditory sensory gating paradigm. *Neurosci.*, 55:373-380, 1993.
179. Myles-Worsley, M., Dale, P., Polloi, A., Levy, D., Freedman, R., and Byerley, W. Eye tracking abnormalities in two Micronesian families with schizophrenia. *Psychiatric Genetics*, 2:209-212, 1991.

180. Griffith, J.M., Waldo, M., Adler, L.E., and Freedman, R. Normalization of auditory sensory gating in schizophrenic patients after a brief period for sleep. *Psychiatry Res.*, 49:29-39, 1993.
181. Coon, H., Byerley, W., Holik, J., Hoff, M., Myles-Worsley, M., Lannfelt, L., Sokoloff, P., Schwartz, J.-C., Waldo, M., Freedman, R., and Plaetke, R. Linkage analysis of schizophrenia with five dopamine receptor genes in nine pedigrees. *Am. J. Hum. Genet.*, 52:327-334, 1993.
182. Coon, H., Hoff, M., Holik, J., Delisi, L.E., Crowe, T., Freedman, R., Shields, G., Boccio, A.M., Lerman, M., and Gershon, E.S. C to T nucleotide substitution in codon 713 of amyloid precursor protein gene not found in 86 unrelated schizophrenics from multiplex families. *Am. J. Med. Genet.*, 48:36-39, 1993.
183. Leonard, S., Logel, J., Luthman, D., Casanova, M., Kirch, D., and Freedman, R. Biological stability of mRNA isolated from human postmortem brain collections. *Biol. Psychiat.*, 33:456-466, 1993.
184. Byerley, W., Coon, H., Hoff, M., Holik, J., Waldo, M., Freedman, R., Caron, M.G., and Giros, B. Human dopamine transporter gene not linked to schizophrenia in multigenerational pedigrees. *Hum. Hered.*, 43:319-322, 1993.
185. Jensen, S., Plaetke, R., Holik, J., Hoff, M., Myles-Worsley, M., Leppert, M., Coon, H., Vest, K., Freedman, R., and Waldo, M. Linkage analysis of schizophrenia: the D1 dopamine receptor gene and several flanking DNA markers. *Hum. Hered.*, 43:58-62, 1993.
186. Coon, H., Jensen, S., Holik, J., Hoff, M., Myles-Worsley, M., Reimherr, F., Wender, P., Waldo, M., Freedman, R., Leppert, M., and Byerley, W. Genomic scan for genes predisposing to schizophrenia. *Am. J. Med. Genet.*, 54:59-71, 1994.
187. Griffith, J.M. and Freedman, R. Normalization of schizophrenics' auditory P50 gating deficit after NREM, but not REM sleep. *Psychiat. Res.*, 56:271-278, 1995.
188. Griffith, J.M., Adler, L.E. and Freedman, R. Fine motor performance in schizophrenia. *Neuropsychobiol.*, 29:179-184, 1994.
189. Freedman, R., Stromberg, I., Nordstrom, A.-L., Seiger, A., Olson, L., Bygdeman, M., Wiesel, F.-A., Granholm, A.-C., and Hoffer, B.J. Neuronal development in embryonic brain tissue derived from schizophrenic women and grafted to animal hosts. *Schizophrenia Res.*, 13:259-270, 1994.
190. Freedman, R., Adler, L.E., Bickford, P., Byerley, W., Coon, H., Cullum, M.C., Griffith, J.M., Harris, J.G., Leonard, S., Miller, C., Myles-Worsley, M., Nagamoto, H.T., Rose, G.M., Waldo, M. Schizophrenia and Nicotinic Receptors. *Harvard Rev. Psychiatry*, 2(4):179-192, 1994.
191. Freedman, R., Leonard, S., Adler, L., Bickford, P., Byerley, W., Coon, H., Miller, C., Luntz-Leybman, V., Myles-Worsley, M., Nagamoto, H., Rose, G., Stevens, K., and Waldo, M.

- Nicotinic receptors and the pathophysiology of schizophrenia. In: *Advances in Pharmacological Sciences: Effects of Nicotine on Biological Systems II*. P.B.S. Clarke, M. Quik, F. Adlkofer, and K. Thureau, eds, Birkhauser Verlag Basel, 1995, pp. 307-312.
192. Hershman, K.M., Freedman, R., and Bickford, P.C. GABA-B antagonists diminish the inhibitory gating of auditory response in the rat hippocampus. *Neurosci. Lett.*, 190:133-136, 1995.
 193. Freedman, R., Hall, M., Adler, L.E., and Leonard, S. Evidence in postmortem brain tissue for decreased numbers of hippocampal nicotinic receptors in schizophrenia. *Biol. Psychiat.*, 38:22-33, 1995.
 194. Breese, C.R., Freedman, R., and Leonard, S. Glutamate receptor subtype expression in human postmortem brain tissue from schizophrenics and alcohol abusers. *Brain Res.*, 674:82-90, 1995.
 195. Griffith, J., Hoffer, L.D., Adler, L.E., Zerbe, G.O., and Freedman, R. Effects of sound intensity on a midlatency evoked response to repeated auditory stimuli in schizophrenic and normal subjects. *Psychophysiol.*, 32:460-466, 1995.
 196. Pariseau, C., Gregor, P., Myles-Worsley, M., Holik, J., Hoff, M., Waldo, M., Freedman, R., Coon, H., and Byerley, W. Schizophrenia and glutamate receptor genes. *Psychiat. Gen.*, 4(3):161-165, 1994.
 197. Olson, L., Backman, L., Ebendal, T., Eriksdotter-Jonhagen, M., Hoffer, B., Humpel, C., Freedman, R., Giacobini, M., Meyerson, B., Nordberg, A., et al. Role of growth factors in degeneration and regeneration in the central nervous system; clinical experiences with NGF in Parkinson's and Alzheimer's diseases. *J. Neurol.*, 242:S12-15, 1994.
 198. Issa, F., Gerhardt, G.A., Bartko, J.J., Suddath, R.L., Lynch, M., Gamache, P.H., Freedman, R., Wyatt, R.J., and Kirch, D.G. A multidimensional approach to analysis of cerebrospinal fluid biogenic amines in schizophrenia: I. Comparisons with healthy control subjects and neuroleptic-treated/unmedicated pairs analyses. *Psychiat. Res.*, 52(3):237-249, 1994.
 199. Issa, F., Kirch, D.G., Gerhardt, G.A., Bartko, J.J., Suddath, R.L., Freedman, R., and Wyatt, R.J. A multidimensional approach to analysis of cerebrospinal fluid biogenic amines in schizophrenia: II. Correlations with psychopathology. *Psychiatry Res.*, 52:251-258, 1994.
 200. Coon, H., Holik, J., Hoff, M., Reimherr, F., Wender, P., Myles-Worsley, M., Waldo, M., Freedman, R., and Byerley, W. Analysis of chromosome 22 markers in nine schizophrenia pedigrees. *Am. J. Med. Gen.*, 54(1):72-79, 1994.
 201. Khan, A.S., Freedman, R., Byerley, W., and Leonard, S. Temperature gradient gel electrophoresis analysis of the beta-NGF gene in schizophrenia. *J. Psychiat. & Neurosci.*, 20(3):199-209, 1995.

202. Byerley, W., Hoff, M., Holik, J., Myles-Worsley, M., Waldo, M., Freedman, R., and Coon, H. Linkage analysis between schizophrenia and index simple-sequence repeat loci for chromosome 21. *Human Heredity*, 45(1):49-52, 1995.
203. Sydow, O., Hansson, P., Young, D., Meyerson, B., Backlund, E.-O., Ebendal, T., Farnebo, L.O., Freedman, R., Hamberger, B., Hoffer, B., Seiger, A., Stromberg, I., and Olson, L. Long-term beneficial effects of adrenal medullary autografts supported by nerve growth factor in Parkinson's disease. *European J. Neurol.*, 2:445-454, 1995.
204. Byerley, W., Bailey, M.E.S., Hicks, A.A., Riley, B.P., Darlison, M.G., Holik, J., Hoff, M., Umar, F., Reimherr, F., Wender, P., Myles-Worsley, M., Waldo, M., Freedman, R., Johnson, K.J., and Coon, H. Schizophrenia and GABA-A receptor subunit genes. *Psychiatric Genet.*, 5:23-29, 1995.
205. Miller, C.C. and Freedman, R. The activity of hippocampal interneurons and pyramidal cells during the response of the hippocampus to repeated auditory stimuli. *Neurosci.*, 69:371-381, 1995.
206. Fang, N., Coon, H., Hoff, M., Holik, J., Hadley, D., Reimherr, F., Wender, P., Myles-Worsley, M., Freedman, R., and Byerley, W. Search for a schizophrenia susceptibility gene on chromosome 18. *Psych. Genet.*, 5:31-35, 1995.
207. Waldo, M., Myles-Worsley, M., Madison, A., Byerley, W., and Freedman, R. Sensory gating deficits in parents of schizophrenics. *Am. J. Med. Genetics*, 60:506-511, 1995.
208. Adams, C.E., DeMaster, B.K., and Freedman, R. Regional zinc staining in postmortem hippocampus from schizophrenic patients. *Schiz. Res.*, 18:71-77, 1995.
209. Young, D.A., Waldo, M., Rutledge, J.H., and Freedman, R. Heritability of inhibitory gating of the P50 auditory evoked potential in monozygotic and dizygotic twins. *Neuropsychobiol.* 33:113-117, 1996.
210. Stevens, K.E., Freedman, R., Collins, A.C., Hall, M., Leonard, S., Marks, M.J., and Rose, G.M. Genetic correlation of inhibitory gating of hippocampal auditory evoked response and alpha-bungarotoxin-binding nicotinic cholinergic receptors in inbred mouse strains. *Neuropsychopharm.* 15:152-162, 1996.
211. Nagamoto, H.T., Adler, L.E., Hea, R.A., Griffith, J.M., McRae, K.A., and Freedman, R. Gating of auditory P50 in schizophrenics: unique effects of clozapine. *Biol. Psychiat.* 40:181-188, 1996.
212. Myles-Worsley, M., Coon, H., Byerley, W., Waldo, M., Young, D., and Freedman, R. Developmental and genetic influences on the P50 sensory gating phenotype. *Biol. Psychiat.* 39:289-295, 1996.
213. Freedman, R., Adler, L.E., Waldo, M., Myles-Worsley, M., Nagamoto, H.T., Miller, C., Kisley, McRae, K., and Cawthra, E. Inhibitory gating of an evoked response to repeated

- auditory stimuli in schizophrenic and normal subjects: Human recordings, computer simulation, and an animal model. *Arch. Gen. Psychiat.*, 53:1114-1121, 1996.
214. Leonard, S., Adams, C., Breese, C.R., Adler, L.E., Bickford, P., Byerley, W., Coon, H., Griffith, J.M., Miller, C., Myles-Worsley, M., Nagamoto, H.T., Rollins, Y., Stevens, K.E., Waldo, M., and Freedman, R. Nicotine receptor function in schizophrenia. *Schizophrenia Bull.*, 22:431-445, 1996.
 215. Ross, R.G., Hommer, D.W., Radant, A.D., Roath, M., and Freedman, R. Early expression of smooth pursuit eye movement abnormalities in children of schizophrenic parents. *J. Child Adolescent Psychiatry*, 35(7): 941-949, 1996.
 216. McCarley, R.W., Hsiao, J.K., Freedman, R., Pfefferbaum, A., and Donchin, E. NIMH Activities: Neuroimaging and the cognitive neuroscience of schizophrenia. *Schiz. Bull.*, 22(4):703-725, 1996.
 217. Yaw, J., Myles-Worsley, M., Hoff, M., Holik, J., Freedman, R., Byerley, W., and Coon, H. Anticipation in multiplex schizophrenia pedigrees. *Psych. Genet.*, 6(1):7-11, 1996.
 218. Harris, J.G., Adler, L.E., Young, D.A., Cullum, C.M., Rilling, L.M., Cicerello, A., Intemann, P.M., and Freedman, R. Neuropsychological dysfunction in parents of schizophrenics. *Schiz. Res.*, 20:253-260, 1996.
 219. Freedman, R., Coon, H., Myles-Worsley, M., Orr-Urtreger, A., Olincy, A., Davis, A., Polymeropoulos, M., Holik, J., Hopkins, J., Hoff, M., Rosenthal, J., Waldo, M.C., Reimherr, F., Wender, P., Yaw, J., Young, D.A., Breese, C.R., Adams, C., Patterson, D., Adler, L.E., Kruglyak, L., Leonard, S., and Byerley, W. Linkage of a neurophysiological deficit in schizophrenia to a chromosome 15 locus. *Proc. Natl. Acad. Sci.*, 94:587-592, 1997.
 220. Frazier, C.J., Rollins, Y.D., Breese, C.R., Leonard, S., Freedman, R., and Dunwiddie, T.V. Acetylcholine activates an α -bungarotoxin sensitive nicotinic current in rat hippocampal interneurons, but not pyramidal cells. *J. Neuroscience*, 18:1187-1195, 1997.
 221. Freedman, R., Ross, R.G., and Adler, L.E. Physiological indicators of the schizophrenia phenotype. For: *Psychopharmacology: Fourth Generation of Progress*---CD-ROM. 1997.
 222. Olincy, A., Young, D.A., and Freedman, R. Increased levels of nicotine metabolite cotinine in schizophrenic smokers compared to other smokers. *Biol. Psychiatry*, 42:1-5, 1997.
 223. Adams, C.E., and Freedman, R. Nicotinic antagonist α -bungarotoxin binding to rat hippocampal neurons containing nitric oxide synthase (NOS). *Brain Research*, 776:111-116, 1997.
 224. Breese, C.R., Adams, C., Logel, J., Drebing, C., Rollins, Y., Barnhart, M., Sullivan, B., DeMasters, B.K., Freedman, R., and Leonard, S. Comparison of the Regional Expression

- of Nicotinic Acetylcholine Receptor $\alpha 7$ mRNA and [125 I]- α -bungarotoxin binding in human postmortem brain. *The Journal of Comparative Neurology*, 387:385-398, 1997.
225. Olincy, A., Ross, R.G., Young D.A., and Freedman, R. Age diminishes performance on an antisaccade eye movement task. *Neurobiology of Aging*, (18) 5:483-489, 1997.
 226. Stevens, K.E., Kem, W.R., Mahnir, V.M., and Freedman, R. Selective $\alpha 7$ -nicotinic agonists normalize inhibition of auditory response in DBA mice. *Psychopharmacology*, 126:320-327, 1998.
 227. Griffith, J., O'Neill, J.E., Petty, F., Garver, D., Young, D., and Freedman, R. Nicotinic receptor desensitization and sensory gating deficits in schizophrenia. *Biological Psychiatry*, 44: 98-106, 1998.
 228. Ross, R.G., Harris, J.G., Olincy, A., Radant, A., Adler, L.E., and Freedman, R. Familial transmission of two independent saccadic abnormalities in schizophrenia. *Schizophrenia Research*, 30:59-70. 1998.
 229. Ross, R.G., Harris, J.G., Olincy, A., Radant, A., Adler, L.E., and Freedman, R. Anticipatory saccades during smooth pursuit eye movements and familial transmission of schizophrenia. *Biological Psychiatry* 44: 690-697,1998.
 230. Olincy, A., Ross, R.G., Young, D.A., Roath, M., and Freedman, R. Improvement in smooth pursuit eye movements after cigarette smoking in schizophrenic patients. *Neuropsychopharmacology*, 18:175-185, 1998.
 231. Leonard, S., Gault, J., Moore, T., Hopkins, J., Robinson, M., Olincy, A., Adler, L.E., Cloninger, R., Kaufmann, C.A., Tsuang, M.T., Faraone, S.V., Malaspina, D., Svrakic, D.M., and Freedman, R. Further Investigation of a chromosome 15 Locus in schizophrenia: Analysis of Affected Sibpairs from the NIMH Genetics Initiative. *Neuropsychiatric Genetics*, 81:308-312, 1998.
 232. Adler, L.E., Olincy, A., Waldo, M., Harris, J., Griffith, J., Stevens, K., Flach, K., Nagamoto, H., Bickford, P., Leonard, S., and Freedman, R. Schizophrenia, sensory gating, and nicotinic receptors. *Schiz. Bulletin*, 24(2): 189-202, 1998.
 233. Gault, J., Robinson, M., Berger, R., Drebing, C., Logel, J., Hopkins, J., Moore, T., Jacobs, S., Merriwether, J., Choi, M.J., Kim E. J., Walton, K., Buiting, K., Davis, A., Breese, C., Freedman, R., and Leonard, S. Genomic organization and partial duplication of the human $\alpha 7$ neuronal nicotinic acetylcholine receptor gene. *Genomics*, 52:173-185. 1998.
 234. Jensen J., Coon H., Hoff M., Rosenthal J., Reimherr F., Wender, P., Myles-Worsley M., Freedman R. Byerley W. Search for a schizophrenia susceptibility gene on chromosome 13. *Psychiatric Genetics*. 8(4): 239-43, 1998.
 235. Freedman R. Biological phenotypes in the genetics of schizophrenia. *Biological Psychiatry*. 44(10): 939-40, 1998.

236. Freedman, R., Adler, LE, Nagamoto, HT, and Waldo, M. Selection of digital filtering parameters and P50 amplitude. *Biological Psychiatry*, 43:921-922,1998.
237. Frazier CJ. Rollins YD. Breese CR. Leonard S. Freedman R. Dunwiddie TV. Acetylcholine activates an alpha-bungarotoxin-sensitive nicotinic current in rat hippocampal interneurons, but not pyramidal cells. *Journal of Neuroscience*. 18(4): 1187-95, 1998
238. Leonard, S., Adler, L.E., Olincy, A., Breese, C.R., Gault, J., Ross, R.G., Lee, M., Cawthra, E., Nagamoto, H., Freedman, R. The role of nicotine and nicotine receptors in psychopathology. *Neuronal Nicotinic Receptors: Pharmacology and Therapeutic Opportunities*. 307-322,1998.
239. Leonard, S., Gault, J., Adams, C., Breese, C.R., Rollins, Y., Adler, L.E., Olincy, A., and Freedman, R. Nicotinic Receptors, Smoking and Schizophrenia. *Restorative Neurology and Neuroscience*, 12: 195-201, 1998.
240. Stevens, K.E., Kem, W., and Freedman, R. Selective $\alpha 7$ nicotinic receptor stimulation normalizes chronic cocaine-induced loss of hippocampal sensory inhibition in C3H mice. *Biological Psychiatry*, 46:143-1450, 1999.
241. Ross, R.G., Olincy, A., Harris, J.G., Radant, A., Adler, L.E., Compagnon, N., and Robert Freedman. The effects of age on a smooth pursuit tracking task in adults with schizophrenia and normals. *Biological Psychiatry* 46 (3): 383-391, 1999.
242. Freedman, R., Adler, L.E., Leonard, S., Alternative Phenotypes for the Complex Genetics of Schizophrenia. *Biological Psychiatry* 45:551-558,1999.
243. Adler, L.E, Freedman, R., Ross, R., Olincy, A., Waldo, M. Elementary Phenotypes in the Neurobiological and Genetic Study of Schizophrenia. *Biological Psychiatry* 46:8-18, 1999.
244. Olincy, A., Leonard, S., Young, D.A., Sullivan, B., and Freedman, R. Decreased bombesin peptide response in schizophrenia. *Neuropsychopharmacology*, 20:52-59, 1999.
245. Ross, R.G., Olincy, A., Harris, J.G., Radiant, A., Hawkins, M., Adler, L.E., and Freedman, R. Evidence for bilineal inheritance of physiological indicators of risk in childhood-onset schizophrenia *American Journal of Medical Genetics: Neuropsychiatric Genetics*, 88, 188-199, 1999.
246. Myles-Worsley M. Coon H. McDowell J. Brenner C. Hoff M. Lind P. Bennett P. Freedman R. Clementz B. Byerley W. Linkage of a composite inhibitory phenotype to a chromosome 22q locus in eight Utah families. *American Journal of Medical Genetics*. 88(5): 544-550, 1999.
247. Freedman R. Schizophrenia as a neuronal illness. *Biological Psychiatry*. 46(5): 587-588, 1999.

248. Waldo, M.C., Freedman, R.F. Neurobiological abnormalities in the relatives of schizophrenics. *Journal of Psychiatric Research*, 33:491-491, 1999.
249. Olincy, A, Ross, R.G. Harris, J.G., Young, D.A., McAndrews, M.A., Cawthra, E., McRae, K.A., Sullivan, B., Adler, L.E., Freedman R.F. The P50 Auditory Event-Related Potential in Adult Attention-Deficit Disorder: Comparison with Schizophrenia. *Biol. Psych.* 47:969-977, 2000.
250. Leonard S.S., Breese C., Adams, C.A., Benhammou K., Gault J., Stevens K.E., Lee M., Adler L.A., Olincy, A., Ross R.G., Freedman, R. Smoking and schizophrenia: Abnormal nicotinic expression. *European Journal of Pharmacology*, 393:237-242, 2000.
251. Adams, C.E., Stevens, K.E., Kem. W.R., Freedman, R. Inhibition of nitric oxide synthase prevents $\alpha 7$ nicotinic receptor-mediated restoration of inhibitory auditory gating in rat hippocampus. *Brain Research*, 877:235-244, 2000.
252. Freedman, R., Adams, C., Adler, L.E., Bickford, P.C., Gault, J., Harris, J., Olincy, A., Ross, R.G., Stevens, K., Waldo, M., Leonard, S. Inhibitory Neurophysiological Deficit as Phenotype for Genetic Investigation of Schizophrenia. *J. Med Genet. (Semin., Med. Genet.)* 97:58-64, 2000.
253. Waldo, M.C., Adler, L.E., Leonard, S., Olincy, A., Ross, R.G., Harris, J.G., Freedman, R. Familial Transmission of Risk Factors in the First-Degree Relatives of Schizophrenic People. *Biol. Psychiatry* 47:231-239, 2000.
254. Freedman R, Adams C, Leonard S. The $\alpha 7$ -nicotinic acetylcholine receptor and the pathology of hippocampal interneurons in schizophrenia. *J. Chem. Neuroanatomy* 20:295-306, 2000.
255. Buervenich, S., Carmine, A., Arvidsson, M., Xiang, F., Zhang, Z., Sydow, O., Jönsson, E.G., Sedvall, G.C., Leonard, S., Ross, R.G., Freedman, R., Chowdari, K.V., Nimgaonkar, V.L., Perlmann, T., Anvret, M., and Olson, L. *NURR1* mutations in cases of schizophrenia and manic depressive disorder. *Am. J. Med. Gen., Neuropsych. Gen.* 96:808-813, 2000.
256. Simosky, J.K., Stevens, K.E., Kem, W.R., Freedman, R. Intragastric DMXB-A, an $\alpha 7$ nicotinic agonist, improves deficient sensory inhibition in DB/2 mice. *Biol. Psychiatry* 50(7): 493-500, 2001.
257. Kisley, M.A., Olincy, A., Freedman, R. The effect of state on sensory gating: comparison of waking, REM and non-REM sleep. *Clinical Neurophysiology* 112:1154-1165, 2001.
258. Freedman R, Leonard S, Gault J, Hopkins J, Cloninger CR, Kaufmann CA, Tsuang M, Farone S, Malaspina D, Svrakic D, Sanders A, Gejman P. Linkage disequilibrium for schizophrenia at the chromosome 15q13-14 locus of the $\alpha 7$ -nicotinic acetylcholine receptor subunit gene (CHRNA7). *Am J Med Genetics*, 105:20-22, 2001.

259. Adler LE, Olincy A, Cawthra E, Hoffer M, Nagamoto HT, Amass L, Freedman R. Reversal of diminished inhibitory sensory gating in cocaine addicts by a nicotinic cholinergic mechanism. *Neuropsychopharmacology*, 24(6): 671-679, 2001.
260. Freedman R and Leonard S. Genetic linkage to schizophrenia at chromosome 15q14. *Am. J. Med. Gen., Neuropsych. Gen.*, 105:655-657,2001.
261. Braff, D.L., Freedman, R. Endophenotypes in studies of the genetics of schizophrenia. *Neuropsychopharmacology: The Fifth Generation of Progress.* (Davis KL, Charney D, Coyle JT, Nemeroff C, eds.) Lippincott Williams & Wilkins, 2002, pp. 703-716.
262. Adams CE, Stitzel JA, Collins AC, Freedman R. alpha7-Nicotinic receptor expression and the anatomical organization of hippocampal interneurons. *Brain Res.* 2001 Dec 20;922(2):180-190.
263. Freedman R, Leonard S, Olincy A, Kaufmann, CA, Malaspina D, Cloninger CR, Svrakic D, Farone SV, and Tsuang M. Evidence for the multigenic inheritance of schizophrenia. *American J of Medical Genetics* 105:794-800, 2001.
264. Leonard, S, Adler, L.E., Benhammou, K., Berger, R., Breese, C.R., Drebing, C., Gault, J., Lee, M.J., Logel, J., Olincy, A., Ross, R.G., Stevens, K., Sullivan, B., Vianzon, R., Virnich, D.E., Waldo, M., Walton, K., Freedman, R. Smoking and mental illness. *Pharmacology, Biochemistry and Behavior* 70:561-570, 2001.
265. Freedman, R. Electrophysiological Phenotypes. *Psychiatric Genetics*, Humana Press. 9:211-221, 2002.
266. Tanabe, J., Miller, D., Tregellas, J., Freedman, R., and Meyer, F.G.. Comparison of Detrending Methods for Optimal fMRI Preprocessing. *Neuroimage*. 15, 902-907, 2002.
267. Simosky JK, Stevens KE, Freedman R. Nicotinic Agonists in Psychosis. *Current Drug Targets: CNS and Neurological Disorders*, 1 (2): 149-162, 2002.
267. Ross RG, Olincy A, Mikulich SK, Radant AD, Harris JG, Waldo M, Compagnon N, Heinlein S, Leonard S, Zerbe GO, Adler L, Freedman R. Admixture analysis of smooth pursuit eye movements in schizophrenic probands and their relatives suggests gain and leading saccades are potential endophenotypes. *Psychophysiology* 39:809-819, 2002.
268. Adams CE, Broide RS, Chen Y, Winzer-Serhan UH, Henderson TA, Leslie FM, Freedman R. Development of the alpha7 nicotinic cholinergic receptor in rat hippocampal formation. *Developmental Brain Research*. 139(2):175-87, 2002
269. Leonard S, Gault J, Hopkins J, Logel J, Vianzon R, Short M, Drebing C, Berger R, Benn D, Sirota P, Zerbe G, Olincy A, Ross RG, Adler LE, Freedman R. Association of promoter variants in the alpha7 nicotinic acetylcholine receptor subunit gene with an

- inhibitory deficit found in schizophrenia. *Archives of General Psychiatry*. 59(12):1085-96, 2002.
270. Adams CE, Broide RS, Chen Y, Winzer-Serhan UH, Henderson TA, Leslie FM, Freedman R. Development of the alpha7 nicotinic cholinergic receptor in rat hippocampal formation. *Developmental Brain Research*. 139(2):175-87, 2002
271. Tregellas JR, Tanabe JL, Miller DE, Freedman R. Monitoring eye movements during fMRI tasks with echo planar images. *Human Brain Mapping*. 17(4):237-43, 2002.
272. Freedman R. Long-term effects of early genetic influences on behavior. *New England Journal of Medicine*. 347(3):213-5, 2002.
273. Harris JG, Young DA, Rojas DC, Cajade-Law A, Nawroz S, Adler LE, Cullum CM, Simon J, Freedman R. Increased hippocampal volume in schizophrenic's parents with ancestral history of schizophrenia. *Schizophrenia Research*. 55(1-2):11-7, 2002.
274. Freedman R, Adler LE, Olincy A, Waldo MC, Ross RG, Stevens KE, Leonard S. Input dysfunction, schizotypy, and genetic models of schizophrenia. *Schizophrenia Research*. 54(1-2):25-32, 2002.
275. Freedman R. Electrophysiological phenotypes. *Methods in Molecular Medicine*. 77:215-25, 2003.
276. Simosky JK, Stevens KE, Adler LE, Freedman R. Clozapine improves deficient inhibitory auditory processing in DBA/2 mice, via a nicotinic cholinergic mechanism. *Psychopharmacology*. 165(4):386-96, 2003.
277. Kisley MA. Olincy A. Robbins E. Polk SD. Adler LE. Waldo MC. Freedman R. Sensory gating impairment associated with schizophrenia persists into REM sleep. *Psychophysiology*. 40:29-38, 2003.
278. Kisley MA. Polk SD. Ross RG. Levisohn PM. Freedman R. Early postnatal development of sensory gating. *Neuroreport*. 14:693-7, 2003.
279. Leonard S. Freedman R. Recombination in a schizophrenic proband fails to exclude CHRNA7 at chromosome 15q14.[comment]. *Molecular Psychiatry*. 8:145-6, 2003.
280. Freedman, R. Drug Therapy: Schizophrenia. *New England Journal of Medicine* 349: 1738-1749, 2003.
281. Myles-Worsley M. Ord L. Blailes F. Ngiralmu H. Freedman R. P50 sensory gating in adolescents from a Pacific island isolate with elevated risk for schizophrenia. *Biological Psychiatry*. 55(7):663-7, 2004.
282. Tregellas JR. Tanabe JL. Miller DE. Ross RG. Olincy A. Freedman R. Neurobiology of smooth pursuit eye movement deficits in schizophrenia: an fMRI study. *American Journal of Psychiatry*. 161(2):315-21, 2004.

283. Adler LE, Olincy A, Cawthra, E, McRae K, Harris J, Nagamoto H, Waldo MC, Hall M, Ross R, Freedman R: The varied effects of atypical medications on P50 auditory gating in schizophrenic patients. *American Journal Psychiatry* 161:1822-1828, 2004
284. Harris, J.G., Kongs, S., Allensworth, D.A., Sullivan, B., Zerbe, G., Freedman, R. Effects of nicotine on cognitive deficits in schizophrenia. *Neuropsychopharmacology* 29:1378-1385, 2004.
285. Martin LF, Kem WR, Freedman R. Alpha-7 nicotinic receptor agonists: potential new candidates for the treatment of schizophrenia. *Psychopharmacology*. 174:54-64, 2004.
286. Tregellas J, Tanabe JL, Martin LF and Freedman. fMRI of response to nicotine during a smooth pursuit eye movement task in schizophrenia. *American Journal of Psychiatry*, 2005, in press.
287. Freedman R, Leonard S, Waldo M, Gault J, Olincy A, Adler LE. Characterization of allelic variants at chromosome 15q14 in schizophrenia. *Genes to Behavior*, 2005 in press.
288. Koike K, Hashimoto K, Takai N, Komatsu N, Watanabe H, Nakazoto M, Okamura N, Stevens KE, Freedman R, Iyo M. Tropisetron improves deficits in auditory sensory P50 suppression in schizophrenic patients. *Schizophrenia Research*, in press.