

## **Steven Arnold, MD**

Cellular & Molecular Neuropathology  
Associate Professor  
Director, Laboratory for Cellular and Molecular Neuropathology  
Center for Neurobiology and Behavior

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Department of Psychiatry  
415 Curie Boulevard  
142 Clinical Research Building  
Philadelphia, PA 19104

### **Education**

1976-83 B.A.

Boston University (Medical Science, Philosophy, Summa cum laude)

1978-83 M.D.

Boston University School of Medicine

### **Postgraduate Training and Fellowship Appointments**

1983-84

Intern in Internal Medicine  
St. Luke's - Roosevelt Hospital Center  
New York, NY

1984-87

Resident in Psychiatry  
New York State Psychiatric Institute / Columbia - Presbyterian Medical Center  
New York, NY

1987-90

Resident in Neurology  
University of Iowa Hospitals and Clinics  
Iowa City, IA

1987-90

Postgraduate Associate  
Neuroanatomy  
University of Iowa College of Medicine

Iowa City, IA (with Gary W. Van Hoesen, Ph.D.)

1989-90

Fellowship

Behavioral Neurology and Cognitive Neuroscience

University of Iowa Hospitals and Clinics

Iowa City, IA (with Antonio. R. Damasio, M.D., Ph.D.)

### **Faculty Appointments**

1990-99

Assistant Professor

Departments of Psychiatry and Neurology

University of Pennsylvania School of Medicine

Philadelphia, PA

1999-

Associate Professor (with tenure)

Departments of Psychiatry and Neurology

University of Pennsylvania School of Medicine

Philadelphia, PA

### **Hospital and Administrative Appointments**

1986-87

Chief Resident in Psychiatry

New York State Psychiatric Institute / Columbia - Presbyterian Medical Center

New York, NY

1990-94

Director

Brain and Behavior Clinic

Hospital of the University of Pennsylvania

Philadelphia, PA

1991-97

Consultant in Neuropsychiatry

Bryn Mawr Rehabilitation Hospital

Malvern, PA

1994-95

Memory Disorders Clinic

Department of Neurology

The Graduate Hospital

Philadelphia, PA

1994-  
Division of Geriatric Psychiatry  
Ralston-Penn Medical Group  
University of Pennsylvania  
Philadelphia, PA

1994-  
Senior Fellow  
Institute on Aging  
University of Pennsylvania  
Philadelphia, PA

1993-  
Director  
Laboratory for Cellular and Molecular Neuropathology  
Center for Neurobiology and Behavior  
Department of Psychiatry  
University of Pennsylvania  
Philadelphia, PA

1997-  
Clinician-Investigator  
Alzheimer's Disease Center - Memory Disorders Clinic  
Hospital of the University of Pennsylvania  
Philadelphia, PA

2001-  
Associate Director  
Mahoney Institute of Neurological Sciences  
University of Pennsylvania School of Medicine  
Philadelphia, PA

### **Specialty Certification**

1988  
Psychiatry  
American Board of Psychiatry and Neurology

1991  
Neurology  
American Board of Psychiatry and Neurology

### **Licensure**

Pennsylvania, New York (inactive), and Iowa (inactive)

## **Awards, Honors and Membership in Honorary Societies**

1987 Sandoz Award for Excellence in Clinical Administration

1988 Iowa Midwest Neurology Assoc. Residents' Day Research Award

1989 Iowa Midwest Neurology Assoc. Residents' Day Research Award

1990 Iowa Midwest Neurology Assoc. Residents' Day Research Award

1991 Hartford Foundation Fellow for Research on Aging

1992 National Alliance for Research on Schizophrenia and Depression (NARSAD) Young Investigator Award

1994 Fellow, Institute on Aging, University of Pennsylvania

1996 Gerald Klerman Award (Honorable Mention), National Alliance for Research on Schizophrenia and Depression (NARSAD)

1996 Theodore & Vada Stanley Foundation Research Award

1996 New York State Psychiatric Institute Centennial Award -- Alumnus of the Decade 1980-1989

1998 Philadelphia Magazine, June 1998 -- "Top Doctor," Caring for the Aging, Neurology (Specialty: Neuropsychiatry)

2000 National Alliance for Research on Schizophrenia and Depression (NARSAD) Independent Investigator Award

2001 Essel Investigator, NARSAD Research Partners Program

## **Memberships in Professional and Scientific Societies**

American Association of Geriatric Psychiatry

American Academy of Neurology (member)

American Association of Neuropathology (member)

American Neuropsychiatric Association (member)

American Psychiatric Association (member)

Society for Neuroscience (member)

## **National Scientific Committees**

National Institute of Mental Health, Mental Disorders of Aging Study Section (MDA), Regular Member 7/97 - 6/99

National Institutes of Health, Neurological Sciences Study Section,  
Subcommittee 1 (NLS-1), Ad Hoc Reviewer

National Institute of Mental Health, Neuroscience Review Branch, Special  
Emphasis Panel (NRB-E), Reviewer

### **Scientific Advisory Boards**

Family Diversity Projects, Inc., “The Family Face of Mental Illness”  
Swarthmore Senior Citizens Association, Health Committee

### **Editorial Positions**

Board Member – American Journal of Geriatric Psychiatry  
Board Member – Journal of Gerontology

### **Academic Committees at the University of Pennsylvania and Affiliated Hospitals**

University of Pennsylvania Faculty Grievance Commission Hearings Panel  
Faculty Advisory Committee for Institute on Aging  
Co-Chair, Basic Research Committee for Strategic Planning, Department of  
Psychiatry

### **Major Teaching and Clinical Responsibilities at the University of Pennsylvania**

1. Lecturer in Integrative Neuroscience course (ID110), School of Medicine
2. Section coordinator in Neuropsychopharmacology course (Pharm 550),  
Graduate School
3. Lecturer in Biological Basis of Behavior course (BBB), School of Arts and  
Sciences
4. Independent study undergraduate advisor, Biological Basis of Behavior  
(BBB 399/499), School of Arts and Sciences
5. Lecturer in Biological/Behavioral Correlates in Mental Health and Illness  
(NURS 622), School of Nursing
6. Attending physician, Psychiatry inpatient unit at HUP
7. Staff physician for geriatric neuropsychiatry and neurology, Foederer  
Clinic, Ralston-Penn Center, HUP

8. Neuropsychiatry inpatient consultation, HUP
9. Supervision of residents, medical students and graduate students
10. Director, Clinical Neuroscience Track

### **Lectures by Invitation (past 5 years)**

January 12, 1996

"Development or Degeneration? Insights from Neuropathological Investigations of Schizophrenia" -- Grand Rounds, Department of Psychiatry, College of Physicians and Surgeons of Columbia University, New York, NY

May 2, 1996

"The Dementia of Schizophrenia: Antemortem and Postmortem Studies" -- Society of Biological Psychiatry 50th Annual Meeting, New York, NY

July 22, 1996

"Clinical Neuroscience" Evening Workshop -- 1996 American Association of Geriatric Psychiatry-National Institute of Mental Health-Janssen Summer Research Institute, Philadelphia, PA

April 2, 1997

"Neuropathology and Cognition in Schizophrenia" -- Dr. Paul Janssen Medical Institute - Symposium 1997: Schizophrenia: Clinical Signs and Cognitive Dysfunction, Copenhagen, DENMARK

April 12, 1997

"Schizophrenia and Frontotemporal Degenerative Dementias: Neuropathological Similarities and Differences" -- 1997 Mt. Sinai Conference on Schizophrenia and Cognition, New York, NY

July 8, 1997

"Cellular and Molecular Neuropathology of the Olfactory Epithelium and Central Olfactory Pathways in Neuropsychiatric Disorders in Late Life" -- International Symposium on Olfaction and Taste XII, San Diego, CA

August 16, 1997

Eighth Congress of the International Psychogeriatric Association, Jerusalem, ISRAEL (declined)

November 24, 1997

"A Neuropathological Perspective on Neurodevelopment and Neurodegeneration in Schizophrenia" -- Grand Rounds, Department of Psychiatry, University of Chicago, Chicago, IL

December 8, 1997

"Is There a Distinct 'Vascular Depression' in Late-Life" -- Annual Meeting Study Group Panelist, 36th Annual Meeting of the American College of Neuropsychopharmacology, Kamuela, HA

March 10, 1998

"Neuropathological Investigations of Schizophrenia in Late Life" -- AAGP Symposium on Elderly Schizophrenics, 11th Annual Meeting of the American Association for Geriatric Psychiatry, San Diego, CA

March 23, 1998

"Towards a Neuropathology of Schizophrenia" -- Grand Rounds, Department of Pathology and Laboratory Medicine, University of Pennsylvania, Philadelphia, PA

May 21, 1998

Visiting Professorship -- "Development of a Program for Clinico-Pathological Studies of Psychiatric Disorders in Late Life" -- The New York Hospital - Cornell Medical Center, White Plains, NY

June 18, 1998

"Dementia in Schizophrenia: Neurodegeneration or Neurodevelopment?" -- Presidential Symposium, 1998 American Association of Neuropathologists Annual Meeting, Minneapolis, MN

August 6, 1998

"Clinicopathological Investigations of Dementia in Schizophrenia" -- Grand Rounds, Department of Neurological Sciences, Rush-Presbyterian-St. Luke's Medical Center, Chicago, IL

March 1, 1999

"Cellular and Molecular Neuropathology in the Olfactory System - A Model for Studying Neurodevelopmental Processes in Schizophrenia" -- Neuroscience Seminar, Department of Psychiatry, College of Physicians and Surgeons of Columbia University, New York, NY

April 12-13, 1999

"Neuropathology of Schizophrenia" -- Grand Rounds and Research Seminar, Department of Psychiatry, University of Iowa, Iowa City, IA

May 6, 1999

"Quantitative Neurohistological Features of 'Dementia Lacking Distinctive Histopathology'" -- Alzheimer's Association Multidisciplinary Conference on Pick's Disease and Frontotemporal Dementias, Philadelphia, PA

May 14, 1999

"Neuropathology of the Olfactory System in Schizophrenia" -- Symposium:  
"Temporolimbic Function in Schizophrenia: An Integrative Approach from  
Behavior to the Molecule," Society of Biological Psychiatry 53rd Annual Meeting,  
Washington, DC

June 14, 1999

"Neuropathology of Schizophrenia in Late Life" -- Harvard Medical School  
Symposium: "Late Life Schizophrenia: State of the Science," Beverly Hills, CA

August 7, 1999

"Neurodegeneration in Schizophrenia" -- Molecular Approaches to Psychiatric  
Research Symposium, XIth World Congress for Psychiatry, Hamburg,  
GERMANY

September 24, 1999

"Cellular and Molecular Neuropathology of the Entorhinal Cortex in  
Schizophrenia" -- New York Academy of Sciences Conference on "The  
Parahippocampal Region: Basic Science and Clinical Implications," Baltimore,  
MD

February 17, 2000

"A Neuropathological Perspective of Development and Degeneration in  
Schizophrenia" -- Grand Rounds, Department of Psychiatry, University of  
Washington, Seattle, WA

March 7, 2000

"Towards a Developmental Neuropathology of Schizophrenia" -- Grand Rounds,  
Neuropsychiatric Institute, University of California at Los Angeles, Los Angeles,  
CA

September 1, 2000

"Aspects of synaptic connectivity/maturation that are altered in schizophrenia" --  
International Congress of Neuropathology / Schizophrenia Satellite Meeting,  
Oxford, UNITED KINGDOM

January 26, 2001

"Towards a Molecular Neuropathology of Schizophrenia" -- Aventis  
Pharmaceuticals, Bridgewater, NJ

March 27, 2001

"Neuropathology of Schizophrenia" -- National Association of Veterans  
Administration Psychiatrists in Administration and Leadership: "Schizophrenia:  
Scientific, Clinical, and Economic Challenges to the VA," Ellicott City, MD

September 21, 2001

“Single Cell Gene Expression Profiling in Alzheimer’s Disease and Other Neuropsychiatric Illnesses” – IRCCS S. Giovanni di Dio Symposium: “The Shadow Line from Normal Aging to Dementia: Clinical, Genetic and Ethical Aspects,” Brescia, ITALY

February 21, 2002

“The Grail in the Graveyard: Neuropathology’s Insights into Schizophrenia” – Grand Rounds, Department of Psychiatry, University of Pennsylvania, Philadelphia, PA

May 14, 2002

“Cell-Type Specific Gene Expression Profiling in Neuropsychiatric Illness” – Aventis Pharmaceuticals, Bridgewater, NJ

September 28, 2002

“The Entorhinal Cortex in Aging and Dementia – Clinical Neurobiology, Cellular and Molecular Neuropathology” – First International Dementia Congress, Chicago, IL

## **Bibliography**

Arnold, S.E., Kahn, R.J., Faldetta, L., McNair, D.M.: Tricyclic antidepressants and peripheral anticholinergic activity. *Psychopharmacology* 74: 325-328, 1981.

Arnold, S.E.: Psychosis and *Mycoplasma pneumoniae*. *Hillside Journal of Clinical Psychiatry* 2:231-235, 1987.

Arnold, S.E., Biller, J.: Spontaneous cerebral embolism from descending thoracic aortic aneurysm. *Angiology* 42:69-72, 1991.

Arnold, S.E., Hyman, B.T., Van Hoesen, G.W., Damasio, A.R.: Some cytoarchitectural abnormalities of the entorhinal cortex in schizophrenia. *Archives of General Psychiatry* 48:625-632, 1991.

Arnold, S.E., Hyman, B.T., Flory, J., Damasio, A.R., Van Hoesen, G.W.: The topographical and neuroanatomical distribution of neurofibrillary tangles and neuritic plaques in the cerebral cortex of patients with Alzheimer's disease. *Cerebral Cortex* 1:103-116, 1991.

Arnold, S.E., Lee, V.M.-Y., Gur, R.E., Trojanowski, J.Q.: The expression of two microtubule-associated proteins (MAP2 and MAP5) is disturbed in specific subfields of the hippocampal formation in schizophrenia. *Proceedings of the National Academy of Sciences (USA)* 88:10850-10854, 1991.

Hyman, B.T., Flory, J.E., Arnold, S.E., Van Hoesen, G.W., Schelper, R.L., Ghanbari, H., Haigler, H.: Quantitative assessment of Alz-50 immunoreactivity in Alzheimer's disease. *Journal of Geriatric Psychiatry and Neurology* 4:231-235, 1991.

Arnold, S.E.: Estrogen for refractory aggression after traumatic brain injury (case report). *American Journal of Psychiatry* 150:1564-1565, 1993.

Arnold, S.E., Hyman, B.T., Van Hoesen, G.W.: Neuropathological changes of the temporal pole in Alzheimer's disease and Pick's disease. *Archives of Neurology* 51:145-150, 1994.

Arnold, S.E., Franz, B.R., Trojanowski, J.Q.: Elderly patients with schizophrenia exhibit infrequent neurodegenerative lesions. *Neurobiology of Aging* 15:299-303, 1994.

Houlihan, D.J., Flaum, M., Arnold, S.E., Keshavan, M., Alliger, R.: Further evidence for olfactory identification deficits in schizophrenia. *Schizophrenia Research* 12:179-82, 1994.

Gur, R.C., Harper-Mozley, L., Resnick, S.M., Karp, J.S., Alavi, A., Arnold, S.E., Gur, R.E. Gender differences in regional and hemispheric cerebral glucose metabolism. *Science* 267:528-531, 1995.

Holdnack, J.A., Moberg, P.J., Arnold, S.E., Gur, R.C., Gur, R.E.: MMPI characteristics in adults diagnosed with ADD: a preliminary report. *International Journal of Neuropsychology* 79: 47-58, 1995.

Arnold, S.E., Gur, R.E., Shapiro, R.M., Fisher, K.R., Moberg, P.J., Gibney, M.R., Blackwell, P., Trojanowski, J.Q.: Prospective clinicopathologic studies of schizophrenia: accrual and assessment. *American Journal of Psychiatry* 152:731-737, 1995.

Arnold, S.E., Franz, B.R., Gur, R.C., Gur, R.E., Shapiro, R.M., Moberg, P.J., Trojanowski, J.Q.: Smaller neuron size in hippocampal subfields that mediate cortical-hippocampal interactions in schizophrenia. *American Journal of Psychiatry* 152:738-748 1995b.

Martinoli, M.-G., Trojanowski, J.Q., Schmidt, M.L., Arnold, S.E., Fujiwara, T.M., Lee, V. M.-Y., Hurtig, H., Julien, J.-P., Clark, C. Correlation of apolipoprotein E allele E4 and neuropathologic findings in patients with dementia. *Acta Neuropathologica* 90:239-243, 1995.

Gur, R.E., Mozley, P.D., Resnick, S.M., Harper-Mozley, L., Shtasel, D.L., Gallagher, F., Arnold, S.E., Karp, J.S., Alavi, A., Reivich, M., Gur, R.C.: Resting cerebral glucose metabolism in first episode and previously treated patients with schizophrenia relates to clinical features. *Archives of General Psychiatry* 52:657-667, 1995.

Holdnack, J.A., Moberg, P.J., Arnold, S.E., Gur, R.C., Gur, R.E. Speed of processing and verbal learning deficits in adults diagnosed with attention deficit disorder. *Neuropsychiatry, Neuropsychology and Behavioral Neurology* 8:282-292, 1995.

Arnold, S.E., Trojanowski, J.Q.: Human fetal hippocampal development. I: Cytoarchitecture, myeloarchitecture and neuronal morphology. *Journal of Comparative Neurology* 367:274-292, 1996.

Arnold, S.E., Trojanowski, J.Q.: Human fetal hippocampal development. II: The neuronal cytoskeleton. *Journal of Comparative Neurology* 367:293-307, 1996.

Arnold S.E., Franz, B.R., Trojanowski, J.Q., Moberg, P.J., Gur, R.E.: Glial fibrillary acidic protein immunoreactive astrocytosis in elderly patients with schizophrenia and dementia. *Acta Neuropathologica* 91:269-277, 1996.

Moberg P.J., Doty R.L., Mahr R.N., Meshulam R.I., Arnold S.E., Turetsky B.I., Gur R.E.: Olfactory identification in elderly schizophrenia and Alzheimer's disease. *Neurobiology of Aging* 18:163-167, 1997.

Prohovnik, I., Arnold, S.E., Smith, G., Lucas, L.R.: Physostigmine reversal of scopolamine-induced hypofrontality. *Journal of Cerebral Blood Flow and Metabolism* 17:220-228, 1997.

Gurevich, E.V., Bordelon, Y., Shapiro, R.M., Arnold, S.E., Gur, R.E., Joyce, J.N.: Elevated mesolimbic dopamine D3 receptors in schizophrenics are decreased by antipsychotics. *Archives of General Psychiatry* 54: 225-232, 1997.

Smutzer, G., Zimmerman, J.E., Hahn, C.-G., Ruscheinsky, D.D., Rodriguez, A., Arnold, S.E.: Inositol 1,4,5-triphosphate receptor expression in mammalian olfactory tissue. *Molecular Brain Research* 44:347-354, 1997.

Arnold, S.E., Han, L.-Y., Ruscheinsky, D.R.: Further evidence of cytoarchitectural abnormalities of the entorhinal cortex in schizophrenia using spatial point pattern analyses. *Biological Psychiatry* 42:639-647, 1997.

Arnold, S.E., Joo, E.-J., Martinoli, M.-G., Trojanowski, J.Q., Gur, R.E., Cannon, T., Price, A. Apolipoprotein E genotype in schizophrenia: Frequency, age of onset, and neuropathologic features. *NeuroReport* 8:1523-1526, 1997.

Moberg, P.J., Doty, R.L., Turetsky, B.I., Arnold, S.E., Mahr, R.N., Gur, R.C., Bilker, W., Gur, R.E. Olfactory identification deficits in schizophrenia: Correlation with duration of illness. *American Journal of Psychiatry* 154:1016-1018, 1997.

Smutzer, G., Zimmerman, J.E., Han, L.-Y., Ruscheinsky, D.D., Arnold, S.E., Yu, X., Kratskin, I. Inositol 1,4,5-triphosphate receptor expression in odontoblast cells. *Biochimica Biophysica Acta* 1358:221-228, 1997.

Arnold, S.E., Trojanowski, J.Q., Gur, R.E., Blackwell, P., Han, L.-Y., Choi, C.H.: Absence of neurodegeneration and neural injury in the cerebral cortex in a sample of elderly patients with schizophrenia. *Archives of General Psychiatry* 55:225-232, 1998.

Smutzer, G.S., Trojanowski, J.Q., Lee, V.M.-Y., Arnold, S.E. : The human olfactory mucosa in schizophrenia. *Annals of Otolaryngology and Laryngology* 107:349-355, 1998.

Tran, K.D., Smutzer, G.S., Doty, R.L., Arnold, S.E.: Reduced Purkinje cell size in the cerebellar vermis of elderly patients with schizophrenia. *American Journal of Psychiatry*, 155:1288-1290, 1998.

Arnold, S.E., Trojanowski, J.Q., Parchi, P.: Protease-resistant prion proteins are not present in the brains of patients with sporadic "poor outcome" schizophrenia. *Journal of Neurology, Neurosurgery, and Psychiatry*, 66:90-92, 1999.

McBride, T., Arnold, S.E., Gur, R.C.: A comparative volumetric analysis of the prefrontal cortex in human and baboon MRI. *Brain, Behavior and Evolution*, 54:159-166, 1999.

Duda, J.E., Shah, U., Arnold, S.E., Lee, V.M.-Y., Lee, Trojanowski, J.Q.: Expression of  $\alpha$ -synuclein in olfactory mucosa in neurodegenerative diseases and controls. *Experimental Neurology*, 160:515-522, 1999.

Turetsky, B.I., Moberg, P.J., Yousem, D.M., Doty, R.L., Arnold, S.E., Gur, R.E.: Olfactory bulb volume is reduced in patients with schizophrenia. *American Journal of Psychiatry*, 157:828-830, 2000.

Hurtig, H.I., Trojanowski, J.Q., Galvin, J., Ewbank, D., Clark, C.M., Stern, M.B., Gollomp, S., Glosser, G., Lee, V.M.-Y., Arnold, S.E.: Lewy body pathology in Parkinson's disease: An analysis of 42 patients with and without dementia. *Neurology*, 54:1916-1921, 2000.

Arnold, S.E., Trojanowski, J.Q., Clark, C.M., Grossman, M., Han, L.-Y.: Quantitative neurohistological features of frontotemporal degeneration. *Neurobiology of Aging* 21:913-919, 2000.

Falke, E., Han, L.-Y., Arnold, S.E.: Absence of neurodegeneration in thalamus and caudate in elderly patients with schizophrenia. *PsychiatryResearch*, 93:103-110, 2000.

Gur R.E., Cowell P.E., Latshaw A., Turetsky B.I., Grossman R.I., Arnold S.E., Bilker, W.B., Gur R.C.: Reduced dorsal and orbital prefrontal gray matter volumes in schizophrenia. *Archives of General Psychiatry*, 57:761-768, 2000.

Gur R.E., Turetsky B.I., Cowell P.E., Finkelman C., Maany V., Grossman R.I., Arnold S.E., Bilker W.B., Gur R.C.: Temporolimbic volume reductions in schizophrenia. *Archives of General Psychiatry*, 57:769-775, 2000.

Mitchell, T.W., Nissanov, J., Han, L-Y., Mufson, E.J., Schneider, J.A., Cochran, E.J., Bennett, D.A., Lee, V.M.-Y., Trojanowski, J.Q., Arnold, S.E.: Novel method to quantify neuropil threads in brains from elders with or without cognitive impairment. *Journal of Histochemistry & Cytochemistry*, 48:1627-1637, 2000.

Zhukareva, V., Vogelsberg-Ragaglia, V., Van Deerlin, V.M.D., Bruce, J. Schuck, T., Grossman, M., Clark, C.M., Arnold, S.E., Masliah, E., Galasko, D., Trojanowski, J.Q., Lee, V.M.-Y.: Loss of brain tau defines novel sporadic and familial tauopathies with frontotemporal dementia. *Annals of Neurology*, 49:165-175, 2001.

Kurtz, M.M., Moberg, P.J., Harper-Mozley, L., Hickey, T. Arnold, S.E., Bilker, W.B., Gur, R.E.: The relationship of neuropsychological impairment to functional outcome in elderly patients with schizophrenia. *International Journal of Geriatric Psychiatry*, 16:631-638, 2001.

Hemby, S.E., Ginsberg, S.D., Brunk, B., Arnold, S.E., Trojanowski, J.Q., Eberwine, J.H.: Gene expression profile for schizophrenia: Discrete neuron transcription patterns in the entorhinal cortex. *Archives of General Psychiatry*, 59:631-640, 2002.

Arnold, S.E., Han, L.-Y., Moberg, P.J., Turetsky, B.I., Gur, R.E., Hahn, C.-G.: Dysregulation of olfactory receptor neuron lineage in schizophrenia. *Archives of General Psychiatry*, 58:829-835, 2001.

Rioux, L., Nissanov, J., Lauber, K., Bilker, W.B., Arnold, S.E.: Number and distribution of microtubule-associated protein 2-immunoreactive interstitial neurons in the parahippocampal white matter in schizophrenia. Submitted.

Rioux, L., Ruscheinsky, D., Arnold, S.E.: Expression and phosphorylation of microtubule-associated protein MAP2 in the olfactory bulb in schizophrenia. Submitted.

Rioux, L., Arnold, S.E.: Differential expression of microtubule-associated proteins during the differentiation of hippocampal cell line HC2S2. Submitted.

Mitchell, T.W., Mufson, E.J., Schneider, J.A., Cochran, E.J., Nissanov, J., Han, L.-Y., Bienias, J.L., Lee, V.M.-Y., Trojanowski, J.Q., Bennett, D.A., Arnold, S.E.: Parahippocampal tau pathology in healthy aging, mild cognitive impairment and early Alzheimer's disease. *Annals of Neurology*, 51:182-189, 2002.

Wilson, R.S., Barnes, L.L., Mendes de Leon, C.F., Aggarwal, N.T., Schneider, J.S., Bach, J., Pilat, J., Beckett, L.A., Arnold, S.E., Evans, D.A., Bennett, D.A.: Depressive symptoms, cognitive decline, and risk of Alzheimer's disease in older persons. *Neurology*, in press, 2002.

McBride, T., Moberg, P.J., Arnold, S.E., Mozley, L.H., Mahr, R.N., Gibney, M., Kumar, A., & Gur, R.E.: Neuropsychological functioning in elderly patients with schizophrenia and Alzheimer's disease. *Schizophrenia Research*, 55(3), 217-227, 2002.

Kapfhamer, D., Valladares, O., Sun, Y., Nolan, P.M., Hellman, K., Rux, J.J., Arnold, S.E., Abel, E., Veasey, S.C., Bucan, M.: RAB3A regulates rest-activity behavior and sleep in the mouse. *Nature Genetics*, in press. Berretini, W., Buono, R., Overhauser, J., Ballas, C., Thomes, J, Arnold, S.E.,

Sacdeva, U., Yang, F., McNabb, L., Friedlander, J., Vuoristo, J., Detera-Wadleigh, S., Henn, F., Ala-Kokko, Ferraro, T.N., Wildenauer, D.: A novel 18p11.2 candidate gene for susceptibility to psychotic disorders. Submitted.

Bennett, D.A., Wilson, R.S. Schneider, J.A., Evans, D.A., Arnold, S.E., Cochran, E.J., Berry-Kravis, E., Bienias, J.: Apolipoprotein E e4 allele, Alzheimer's disease pathology, and the clinical expression of Alzheimer's disease. Submitted.

Rioux, L., Arnold, S.E.: The expression of retinoic acid receptor alpha is increased in the granule cells of the dentate gyrus in schizophrenia. Submitted.

Bennett, D.A., Wilson, R.S., Schneider, J.A., Evans, D.A., Mendes de Leon, C.F., Arnold, S.E., Barnes, L.L., Bienias, J.L.: Education modifies the relation of Alzheimer's disease pathology to level of cognitive function. Submitted.

### **Abstracts (past 4 years)**

Arnold, S.E., Han, L.-Y., Rittenhouse, J., Bucan, M.: Timing, topography, and mode of neurodegeneration in the spm mouse model of Niemann-Pick Type C disease. *Society for Neuroscience* 23: 1874, 1997.

Hemby, S., Arnold, S.E., Trojanowski, J.Q., Eberwine, J.: Candidate gene expression in individual entorhinal cortex neurons in schizophrenia. *Society for Neuroscience* 23: 1953, 1997.

Schatzberg, A.F., Kumar, A., Alexopoulos, G.S., Arnold, S.E., Krishnan, R.R., Robinson, R., Yesavage, G.: Is there a distinct "vascular depression" in late-life? *American College of Neuropsychopharmacology* 36: 2, 1997.

Smutzer, G.S., Zimmerman, J.E., Han, L.-Y., Ruschinsky, D., Arnold, S.E., Yu, X., Kratskin, I. Localized expression of inositol 1,4,5 triphosphate receptors in rat odontoblasts suggests a role for IP3 in calcium-mediated secretion during dentin formation. *International Society for Olfaction and Taste* 12: 88, 1997.

Arnold, S.E., Israeli, N.E., Han, L.-Y., Smutzer, G.S., Rioux, L., Leslie, G.J. Olfactory neuroepithelium and bulb as a model system for studying developmental neuropathology in schizophrenia. *Society for Neuroscience*, 24: 1274, 1998.

Rioux, L., Leslie, G.J., Arnold, S.E. Differential expression of cytoskeletal proteins during the differentiation of hippocampal neurons in culture. *Society for Neuroscience*, 24:1996, 1998.

Eberwine, J.H., Ginsburg, S.E., Arnold, S.E., Trojanowski, J.Q., Hemby, S.E.: Gene expression profile of schizophrenia: Analysis from individual entorhinal cortical neurons. *Society for Neuroscience*, 24: 1274, 1998.

Tran, K.D, Smutzer, G.S., Doty, R.L., Arnold, S.E.: Glomerular synaptophysin immunoreactivity is normal in the olfactory bulb of patients with neurodegenerative diseases. *Society for Neuroscience*, 24: 1883, 1998.

McBride T., Moberg P.J., Mahr R., Arnold S.E., Gur R.E.: Neuropsychological functioning in elderly patients with schizophrenia and Alzheimer's disease. *Archives of Clinical Neuropsychology*, 14:57-58, 1999.

T.W. Mitchell, J. Nissanov, L.-Y. Han, V.M.-Y. Lee, J.Q. Trojanowski, E.J. Mufson, J.A. Schneider, E. Cochran, D.A. Bennett, S.E. Arnold. Correlation of neurofibrillary tangles and neuropil thread burden in mild cognitive impairment and dementia. *Society for Neuroscience*, 25: 28, 1999.

L. Rioux, L.-Y. Han, S.E. Arnold: Number and distribution of microtubule associated protein 2 immunoreactive interstitial neurons in the parahippocampal white matter in schizophrenia. *Society for Neuroscience*, 25: 573, 1999.

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## **Editorials, Reviews, Chapters, including participation in committee reports**

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