

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
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NAME Richard S. Nowakowski, Ph.D.		POSITION TITLE Professor of Neuroscience New Jersey Professor of Spinal Cord Research	
eRA COMMONS USER NAME rsnowakowski			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of Wisconsin	B.A.	1971	Psychology and Chemistry
Harvard University	Ph.D.	1976	Cell and Developmental Biology
Duke University	Postdoc.	1976-79	Neuroscience
Max Planck Institute for Biophysical Chemistry	Postdoc.	1979-81	Neuroscience

Please refer to the application instructions in order to complete sections A, B, and C of the Biographical Sketch.

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

1969-71 Research Assistant, Wisconsin Regional Primate Research Center
 1971-76 Predoctoral Fellow, Department of Neuropathology, Harvard Medical School
 1972 Summer Research Fellow, Institute for Biological Research, Belgrade, Yugoslavia
 1976-79 Postdoctoral Fellow, NIH Individual Fellowship, Depts of Psychology and Physiology, Duke University
 1979-81 Wissenschaftlicher Assistent (Research Assistant Professor), Department of Neurobiology, Max-Planck-Institute for Biophysical Chemistry, Goettingen, West Germany
 1981-85 Assistant Professor of Anatomy, Department of Anatomy, University of Mississippi Medical Center
 1985-2005 Associate Professor, Department of Neuroscience and Cell Biology, UMDNJ-Robert Wood Johnson Medical School
 2004- New Jersey Professor of Spinal Cord Research
 2004- Associate Member, Keck Center for Collaborative Neuroscience, Rutgers University
 2005- Professor, Department of Neuroscience and Cell Biology, UMDNJ-Robert Wood Johnson Medical School
 2006- Executive Committee, New Jersey Stem Cell Institute
 2006- Director, Postdoctoral Career Development Program

Member, NIH Study Section (Neurology B1), 1991-1995 (Chair, 1993-1995)
 Scientific Advisory Board, National Alliance for Autism Research (1996-present)
 Member, NASA Hypergravity Oversight Group, 1998-present
 Member, NIH MDCN7 Study Section, 1999-2002 (Chair, 2000-2002)
 Member, NSF Developmental Neuroscience Review Panel, 1999-2002
 Editorial Board (1999-present) and Senior Editor (2002-present), Developmental Neuroscience,
 Associate Editor, Journal of Neuroscience (2000-present)
 Editorial Board, Journal of Comparative Neurology (2002-present)
 Member, NIH NTS Study Section (2003-present)
 Editorial Board, Cerebral Cortex (2004-present)

HONORS:

Mary Shine Peterson Undergraduate Scholarship in Biochemistry
 Phi Beta Kappa, Sigma Xi
 Woodrow Wilson Fellowship, 1971-1972
 National Science Foundation Fellowship, 1972-1975
 Academia Rodinensis pro Remediatione, elected member 1984

Recipient of Research Career Development Award (RCDA) from NIH, 1985
Fellow, American Academy for the Advancement of Science
Special Lecture Award, Tokai University, Isehara, Japan
Plenary Speaker, Hellenic Society for Neuroscience, 2002
New Jersey Professor of Spinal Cord Research
Plenary Speaker, Second International Spinal Cord Injury Treatments and Trials Symposium
Plenary Speaker, European Association of Pediatrics

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

- Nowakowski, R. S.** and P. Rakic. The mode of migration of neurons to the hippocampus: a Golgi and electron microscopic analysis in foetal rhesus monkey. *J.Neurocytol.* 8: 697-718, 1979.
- Nowakowski, R. S.** and P. Rakic. The site of origin and route and rate of migration of neurons to the hippocampal region of the rhesus monkey. *J.Comp Neurol.* 196: 129-154, 1981.
- Rakic, P. and **R.S. Nowakowski**. The time of origin of neurons in the hippocampal region of the rhesus monkey. *J.Comp Neurol.* 196: 99-128, 1981.
- Miller, M. W. and **R.S. Nowakowski**. Use of bromodeoxyuridine-immunohistochemistry to examine the proliferation, migration and time of origin of cells in the central nervous system. *Brain Res.* 457: 44-52, 1988.
- Nowakowski, R.S.**, S.B. Lewin, and M.W. Miller. Bromodeoxyuridine immunohistochemical determination of the lengths of the cell cycle and the DNA-synthetic phase for an anatomically defined population. *J.Neurocytol.* 18: 311-318, 1989.
- Takahashi, T., **R.S. Nowakowski**, and V. S. Caviness, Jr. BUdR as an S-phase marker for quantitative studies of cytokinetic behaviour in the murine cerebral ventricular zone. *J.Neurocytol.* 21: 185-197, 1992.
- Takahashi, T., **R.S. Nowakowski**, and V. S. Caviness, Jr. Cell cycle parameters and patterns of nuclear movement in the neocortical proliferative zone of the fetal mouse. *J.Neurosci.* 13: 820-833, 1993.
- Takahashi, T., **R.S. Nowakowski**, and V. S. Caviness, Jr. Mode of cell proliferation in the developing mouse neocortex. *Proc.Natl.Acad.Sci.U.S.A* 91: 375-379, 1994.
- Caviness, V. S., Jr., T. Takahashi, and **R.S. Nowakowski**. Numbers, time and neocortical neuronogenesis: a general developmental and evolutionary model. *Trends Neurosci.* 18: 379-383, 1995.
- Takahashi, T., **R.S. Nowakowski**, and V. S. Caviness, Jr. The cell cycle of the pseudostratified ventricular epithelium of the embryonic murine cerebral wall. *J.Neurosci.* 15: 6046-6057, 1995.
- Takahashi, T., **R.S. Nowakowski**, and V. S. Caviness, Jr. Early ontogeny of the secondary proliferative population of the embryonic murine cerebral wall. *J.Neurosci.* 15: 6058-6068, 1995.
- Caviness, V. S., Jr., T. Takahashi, S. Miyama, **R.S. Nowakowski**, and I. Delalle. Regulation of normal proliferation in the developing cerebrum potential actions of trophic factors. *Exp.Neurol.* 137: 357-366, 1996.
- Takahashi, T., **R.S. Nowakowski**, and V. S. Caviness, Jr. Interkinetic and migratory behavior of a cohort of neocortical neurons arising in the early embryonic murine cerebral wall. *J.Neurosci.* 16: 5762-5776, 1996.
- Takahashi, T., **R.S. Nowakowski**, and V. S. Caviness, Jr. The leaving or Q fraction of the murine cerebral proliferative epithelium: a general model of neocortical neuronogenesis. *J.Neurosci.* 16: 6183-6196, 1996.
- Cai, L., N. L. Hayes, and **R.S. Nowakowski**. Local homogeneity of cell cycle length in developing mouse cortex. *J.Neurosci.* 17: 2079-2087, 1997.
- Cai, L., N. L. Hayes, and **R.S. Nowakowski**. Synchrony of clonal cell proliferation and contiguity of clonally related cells: production of mosaicism in the ventricular zone of developing mouse neocortex. *J.Neurosci.* 17: 2088-2100, 1997.
- Miyama, S., T. Takahashi, **R.S. Nowakowski**, and V. S. Caviness, Jr. A gradient in the duration of the G1 phase in the murine neocortical proliferative epithelium. *Cereb.Cortex* 7: 678-689, 1997.
- Takahashi, T., **R.S. Nowakowski**, and V. S. Caviness, Jr. The mathematics of neocortical neuronogenesis. *Dev.Neurosci.* 19: 17-22, 1997.
- Caviness, V. S., Jr., T. Takahashi, and **R.S. Nowakowski**. The G1 restriction point as critical regulator of neocortical neuronogenesis. *Neurochem.Res.* 24: 497-506, 1999.

- Delalle, I., T. Takahashi, **R.S. Nowakowski**, L. H. Tsai, and V. S. Caviness, Jr. Cyclin E-p27 opposition and regulation of the G1 phase of the cell cycle in the murine neocortical PVE: a quantitative analysis of mRNA in situ hybridization. *Cereb.Cortex* 9: 824-832, 1999.
- Nowakowski, R.S.** and N. L. Hayes. CNS development: an overview. *Dev.Psychopathol.* 11: 395-417, 1999.
- Takahashi, T., T. Goto, S. Miyama, **R.S. Nowakowski**, and V. S. Caviness, Jr. Sequence of neuron origin and neocortical laminar fate: relation to cell cycle of origin in the developing murine cerebral wall. *J.Neurosci.* 19: 10357-10371, 1999.
- Gilmore, E. C., **R.S. Nowakowski**, V. S. Caviness, Jr., and K. Herrup. Cell birth, cell death, cell diversity and DNA breaks: how do they all fit together? *Trends Neurosci.* 23: 100-105, 2000.
- Hayes, N. L. and **R.S. Nowakowski**. Exploiting the dynamics of S-phase tracers in developing brain: interkinetic nuclear migration for cells entering versus leaving the S- phase. *Dev.Neurosci.* 22: 44-55, 2000.
- Verney, C., T. Takahashi, P. G. Bhide, **R.S. Nowakowski**, and V. S. Caviness, Jr. Independent controls for neocortical neuron production and histogenetic cell death. *Dev.Neurosci.* 22: 125-138, 2000.
- Levison, S., **Nowakowski, R.S.** Whither stem cell biology?. *Dev Neurosci* 22: 5-6.(2000)
- Haydar TF, **Nowakowski RS**, Yarowsky PJ, Krueger BK Role of Founder Cell Deficit and Delayed Neuronogenesis in Microencephaly of the Trisomy 16 Mouse. *J. Neurosci.* 20: 4156-4164, 2000.
- Gilmore, E., **R.S. Nowakowski**, V.S. Caviness, Jr. and K. Herrup (2000) Cell birth, cell death, cell diversity and DNA breaks: how do they all fit together? *Trends in Neuroscience* 23: 100-105.
- Caviness, V.S., Jr., T. Takahashi and **R.S. Nowakowski** (2000) Neocortical malformation as consequence of non adaptive regulation of neuronogenetic sequence. In: *Pathology of Development of Cerebral Cortex. Mental Retard. Devel. Disabil.* 6: 22-33.
- Nowakowski R.S.** and Hayes N.L. (2000) New Neurons: Extraordinary Evidence or Extraordinary Conclusion? *Science* 288:771a-773a.
- Caviness, V.S., Jr., T. Takahashi and **R.S. Nowakowski** (2000) Neuronogenesis and the early events of neocortical histogenesis., In: *Development of Cerebral Cortex* (Ed. A. Goffinet and P. Rakic). In: *Results and Problems in Cell Differentiation.* 30: 107-143.
- Takahashi, T., **Nowakowski, R. S.**, and Caviness, V. S., Jr. (2001) Neocortical Neuronogenesis: Regulation, Control Points and a Strategy of Structural Variation. In: *Handbook of Cognitive Developmental Neuroscience* (Nelson CA, Luciana M, eds), in press. Cambridge, MA: MIT Press, p. 3-22.
- Cahana, A., T. Escamez, **R.S. Nowakowski**, N.L. Hayes, M.B. Giacobini, A. von Holst, O. Shmueli, T. Sapir, S. K. McConnell, W. Wurst, S. Martinez, and O. Reiner (2001). Targeted mutagenesis of Lis1 disrupts cortical development and LIS1 homodimerization. *PNAS*, 98: 6429-34.
- RS Nowakowski** and NL Hayes (2001) Stem Cells: The Promises and Pitfalls (Commentary). *Neuropsychopharmacology*, 25:799-804.
- Hayes, NL and **RS Nowakowski** (2002) Dynamics of cell proliferation in the adult dentate gyrus of two inbred strains of mice. *Dev. Brain Research.* 134:77-85.
- Caviness, V.S., Jr., **R.S. Nowakowski** and T. Takahashi (2002) Neocortical neuronogenesis: the G1 restriction point as master integrative mechanism. In: **The Newborn Brain - Scientific Basis and Clinical Applications** (H. Lagerkrantz, Editor).
- RS Nowakowski**, VS Caviness, Jr., T Takahashi and NL Hayes (2002) Population Dynamics during Cell Proliferation and Neuronogenesis in the Developing Murine Neocortex. In: **Cerebral Cortex**, Vol. 1 of Series: **Results and Problems in Cell Differentiation**, (C. Hohmann, Editor).
- Rachel, RA, G. Dölen, NL Hayes, A. Lu, L Erskine, **RS Nowakowski**, and CA Mason. (2002). Spatiotemporal features of early neuronogenesis differ in wild-type and albino mouse retina. *J. Neuroscience*, 22: 4249-4263.
- Goto, T, T. Takahashi, S. Miyama, P. Bhide, **RS Nowakowski**, VS Caviness, Jr. (2002) FGF-2 and gap junction blockade and regulation of cell production in explants of the murine proliferative ventricular epithelium: implications for an hypothesis relating to mitogen-antimitogen opposition. *J. Neuroscience Research*, 69:714-22.
- Cai, L., N.L. Hayes, T. Takahashi, V.S. Caviness, Jr. and **R.S. Nowakowski** (2003). Size Distribution of Retrovirally Marked Lineages Matches Prediction from Population Measurements of Cell Cycle Behavior in Early Developing Mouse Neocortex. *J. Neuroscience Research*, 69:731-44.

- Caviness, V.S., Jr., T. Goto, T. Tarui, T. Takahashi, P. G. Bhide and **R.S. Nowakowski** (2003). Cell Output, Cell Cycle Duration and Neuronal Specification: A Model of Integrated Mechanisms of the Neocortical Proliferative Process. *Cerebral Cortex* 13:592–598.
- Complex Trait Consortium (79 authors including **R.S. Nowakowski**) (2003) The nature and identification of quantitative trait loci: a community's view. *Nature Reviews Genetics* 4: 911-916.
- Complex Trait Consortium (104 authors including **R.S. Nowakowski**) (2004) The Collaborative Cross: A Community Resource for the Genetic Analysis of Complex Traits. *Nature Genetics*, 11:1133-7.
- Bhide, P.G. and **R.S. Nowakowski**, 2004. Neural Stem Cells: A Perspective and Synopsis of the Current Status. *Dev Neurosci.* 26:81.
- Zheng, W., **R.S. Nowakowski**, and F.M. Vaccarino, 2004. Fibroblast Growth Factor 2 Is Required for Maintaining the Neural Stem Cell Pool in the Mouse Brain Subventricular Zone. *Dev Neurosci* 26:181-196.
- Sekiguchi, M., Takagi, K, Takagi, N., Date, I., Takeo, S., Tanaka, O., Yamato, I., Kobashikawa, S., Kojun Torigoe, K. and **Nowakowski, R.S.** 2005. Time course and sequence of pathological changes in the cerebellum of microsphere-embolized rats. *Exp. Neurol.*, 191: 266-275.
- Tarui, T., Takahashi, T., **Nowakowski, R.S.**, Hayes, N.L., Bhide, P.G., Caviness, V.S., Jr., 2005 Overexpression of p27Kip1 alters laminar fate of neocortical neurons by altering probability of cell cycle exit. *Cerebral Cortex*, 15:1343-1355.
- Nowakowski, R.S.**, 2006. Stable Neuron Numbers from Cradle to Grave PNAS, 103:12219-12220.
- Suter, B, **Nowakowski, R.S.**, Bhide, P.G., and Caviness, V.S, Jr. 2007. Navigating Neocortical Neurogenesis And Neuronal Specification: A Positional Information System Encoded by Neurogenetic Gradients. *J. Neuroscience.* *J Neurosci.* 27:10777-84.
- Nowakowski, R.S.** and N.L. Hayes, 2007. Cell Cycle and Neurogenesis. In: *Adult Neurogenesis* (Eds. F.H. Gage, G. Kemperman, and H. Song). Cold Spring Harbor Press, New York, pp. 7-23.
- Caviness VS, Bhide PG, **Nowakowski R.S.**, 2008. Histogenetic processes leading to the laminated neocortex: migration is only a part of the story. *Dev Neurosci.* 30:82-95.
- Nowakowski, R.S.** and Hayes, N.L., 2008. Radiation, retardation and the developing brain: time is the crucial variable. *Acta Paediatrica*, 97: 527-531.
- Caviness, V.S., P.G. Bhide and **R.S. Nowakowski**, 2009. Neocortical neurogenesis: morphogenetic gradients and beyond. *Trends in Neuroscience*, 32:443-450.
- Nguyen, T.T., **R.S. Nowakowski** and I.P. Androulakis, 2009. Unsupervised selection of highly coexpressed and noncoexpressed genes using a consensus clustering approach *OMICS* 13:219-237.
- Nowakowski, R.S.**, Araki, K.Y., Stein-O'Brien, G.L., Cai, L., Bhide, P.G., and Caviness, V.S., Jr., submitted. The transcriptome of the murine neocortical PVE. *Cerebral Cortex* (accepted pending minor revisions).
- Kulkarni, V, N.L. Hayes and **R.S. Nowakowski**, in preparation. Regionalization of the Ventricular Zone by Cell Cycle Dynamics in the Developing Mouse Hippocampus. Submitted to *Cerebral Cortex*.
- Hayes, NL, and **RS Nowakowski**, in preparation. Genetic controls of Adult Neurogenesis in the mouse. to be submitted to *J. Neurosci.*

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

“Neuronogenesis in the Non-pigmented Retina”; Principal Investigator: Richard S. Nowakowski. Agency: NEI/NINDS. Funding period: 5/1/2004-5/30/2010 (includes one year no cost extension). This grant provides support for an analysis of the cell cycle and cell proliferation in genetic models of human ocular and cutaneous albinism, using pigmented and non-pigmented mouse retina.

“Five-Year Named Chair for Senior Faculty”; Principal Investigator: Richard S. Nowakowski. Agency: New Jersey Commission on Spinal Cord Research. Funding period: 6/15/2005-6/30/2009 (5 years). This grant provides support for an analysis of the cell cycle and stem/progenitor cell proliferation after spinal cord injury.