

Pasko Rakic

Degrees: MD (1960); PhD (1969) University of Belgrade, Former Yugoslavia

Position: Professor of Neuroscience and Neurology, Yale University School of Medicine

Research Interests: Developmental Neurobiology; Cellular and Molecular Mechanisms of Neuronal Proliferation, Migration, Axonal Navigation and Synaptogenesis; Genetic and Epigenetic Regulation of Neuronal Interactions during Development in Spontaneous and Induced Mutations; Neuropathology of Congenital Disorders; Brain Evolution.

Professional Experience:

1961-62 Resident in Neurosurgery, University Hospital, Belgrade

1962-66 Clinical and Research Fellow in Neurosurgery, Harvard Medical School, Boston

1967-69 Assistant Professor of Dev. Biology & Genetics, Biological Institute, Belgrade

1969-72 Assistant Professor of Neuropathology, Harvard Medical School, Boston

1972-78 Associate Professor of Neuropathology, Harvard Medical School

1978-01 Chairman, Section of Neurobiology, Yale University School of Medicine

2001-2015 Chairman, Department of Neurobiology, Yale University School of Medicine

2004-2015 Director, Kavli Institute for Neuroscience, Yale University

1978 - Dorys McConnell Duberg Chair in Neuroscience, Yale University

Honors and Awards:

Member: National Academy of Sciences (USA), 1985; American Academy of Arts and Sciences, 1994; National Institute of Medicine (USA), 1999; President, Cajal Club, 1992; Selby Fellow, Australian Academy of Science, 1983; President, Society for Neuroscience, 1996. **Foreign member:** Croatian Academy of Arts and Sciences, 1990; Serbian Academy of Arts and Sciences, 1985; Norwegian Academy of Science and Letters, 2008; Academia Europea, 2014; Royal Society London, 2016.

Awards: Inaugural (2008) Kavli Neuroscience Prize; Bristol-Myers Squibb Neuroscience Award, 2002; Gerard Prize, SFN, 2002; Pasarow Foundation Award, 2001; Marta Philipson Award, Stockholm 2000; Karl Spencer Lashley Award, Amer. Philosophical Society, 1986; Grass Foundation Award, 1985; Francois I Medal, College de France, 1986; Kreig Cortical Discoverer Award, 1989; F.O. Schmitt Medal, 1992; Fyssen International Science Prize, Paris, 1992; Weinstein-Goldenson Scientific Award (United Cerebral Palsy Foundation) 1994; Henry Gray Award, AAA, 1996; Javits Award, 1984-91, 1991-97; Krieg Lifetime Achievement Award shared with Paul Allen, 2010; Max Cowan Award, 2013; Sandy Palay Award, 2014; Child Mind Institute Award, NYC, 2014; Becker Award "Gesellschaft fuer Neuropaediatric" 2014; Cajal Diploma, Cajal Institute, Madrid, 2015)

Honorary degrees: MS, Yale University, 1978; Doctor Honoris Causa, Albert Sent-Georgyi University, Szeged (Hungary); Doctor Honoris Causa Universitatis Studiorum Zagrebiensis, 1997 (Croatia); Doctor Honoris Causa, University of Buenos Aires, 2011 (Argentina).

Eponymous Lectures: Jenkins Memorial (Oxford, UK); Ariens Kappers (Royal Netherlands Academy of Sciences); Gordon Holmes (London); Pickney Harmon (Cajal Club), Bernard Sacks (AAPN), Grass Foundtion (SFN); Yesup (Columbia Univ), Philip Bard (Johns Hopkins), Key Note Speaker (IBRO); Sally Harrington Goldwater; C.N.Woolsey (Madison); Ramon y Cajal lecture, Cajal Institute,

Madrid; R.J. Terry (UWSL St. Louis); D.O. Hebb (Montreal); Cotzias (Am. Academy of Neurology); Mountcastle (Johns Hopkins); Talarich Lecture (Toronto); Hunt-Wilson (AANS); Special Presidential Lecture (SFN); Storer Lecture UC Davis; Key Note Speaker (Soc. Genetic Psychiatry); Sherington Centennial (Oxford, UK); Key Note Speaker (Soc. Biological Psychiatry); James Arthur (Am. Museum of Natural History); Nobel Forum, Stockholm (Sweden); Sherington Centennial (Oxford, UK); Key-note at Soc. Biological Psychiatry; Janelia Farm (HHMI); E.G. Jones Memorial, UC Davis; Zach Hall, USC, Los Angeles, CA; Key-note, Swedish Society of Human Genetics, Uppsala, Sweden; Laureate Lecture, Pittsburgh, PA; Key-note, British Genetic Society, London, UK; Darwin's Centennial (Cambridge, UK); Royal Society, London, UK. Numerous additional plenary and eponymous lectures in over 35 countries.

Professional Societies: American Association of Advancement of Science (Fellow); American Association of Anatomists; Association of Research in Vision and Ophthalmology, Cajal Club; International Brain Research Organization (IBRO); International Society for Developmental Neuroscience, International Society of Psychiatric Genetics, Neuroscience Research Program; Society for Neuroscience, American College of Neuropsychopharmacology (ACNP).

Editorial Boards: Advances in Neurology (1988-); Brain Research (1977-); Exp. Brain Res. (1977-); Glia (1988-2003); J. Cognitive Science (1988-2008); J. Comp. Neurology (1979-); J. Neurocytology (1975-98); J. Neuroscience (1981-90 and 1999-2004); Neuroscience (1973-); Neuroscience Research (1996-2001); Cerebral Cortex, Co-founder and Editor-in-Chief (1991-).

Advisory Activities: *Board Member:* Kuratorium, Max-Planck Institute, Germany, 1982-96; Councilor, Society for Neuroscience, 1980-84; United Nations Commission on Radiological Protection (ICRP), 1983; U.S. National Committee for IBRO, 1982-88, Chairman, 1988-92; British Neurological Research Trust, 1988-93; Board of Trustees, Neuroscience Institute, Rockefeller University (1988-91); Frontier Research Program, RIKEN, Tokyo, Japan, 1992-95; External Evaluation Committee, Max-Delbruck Center for Molecular Medicine, Berlin, Chairman, 1998; Advisory Board, National Alliance for Autism Research, 1994- ; March of Dimes Basil O'Connor Award Committee, 1994-1999; AAAS Biological Sciences Committee, 1997-2000; Hyseq Inc., Sunnyvale, 1988-2001; Wright Foundation, Geneva, Paterson Medical Foundation, 2006-; 1996-99; Board, Mutagenesis Center, Jackson Laboratory Bar Harbor, 1999-2004;; Wolfson Neurology Initiative, 2011; Allan Institute for Brain Science, Seattle, WA 2013-2015; Reseach Council, Brain and Behavior Research Foundation, 2006-present National Institute of Biological Sciences, Beijing, China. 2007-; Croatian Brain Institute, 1995-present

NIH Study Sections: Neurology A, 1978-82; Visual Sciences B, 1984-88; NIH Special Foreign Currency Grants, 1972-78; Special Consultant NIH Program Project Review Section, 1977; Advisor to NIDA, Grant Review Panel, 1975-77; Technical Review Panel on Neuroscience, NIDA-ADAMHA, 1979; NIMH Panel on Neural Development, 1993; NIH/SCR/DBD, 2014.

Consultant for: National Science Foundation; Atomic Energy Control Board (Canada); Canadian Medical Research Council; The March of Dimes Foundation; J.S. Guggenheim Memorial Foundation; Huntington Chorea Foundation; Human Frontier Foundation; Brain & Behavior Research Foundation-NARSAD; Allen Institute for Brain Science, Seattle WA

Grants: Principal Investigator: Regeneration of the CNS (1974-77); Neuropathology of Congenital Disorders; Human Frontier Research Grant (1990-93); Director, Javits Center of Excellence in Neuroscience (1985-90); Program Project on Developmental Neurobiology of Neocortex (1982-2003); Stress Activated Protein Kinase in Neuronal Apoptosis (1999-2009); Notch Signaling in the Brain (2001-2011); Neurogenetic Processes in Fetal Brain (1970-2016); Prenatal Development of the Visual System (1977-present); Origin of Species-specific Cortical Distinctions (2008-present).

Organizer of international symposia: Local Circuit Neurons (1975); Development and Modifiability of the Neocortex (1981); Determinants of Neuronal Connections (1983); Principles of Neuronal Migration

(1984); Brain Beyond Genes (1986); Developmental Determinants of Pattern Formation (1987); Dahlem Conference on Neurobiology of Neocortex (1987); Functions of Glia (1989); Specification of Cerebral Cortex (1991); Domains of Vision (1996); Genetic Factors Controlling Forebrain Development (2000); Prefrontal Cortex, Working Memory, Flexible Behavior', in memoriam of Patricia S. Goldman-Rakic (2006); FENS-Development and Plasticity of Cortical Representation (2011).

Teaching Experience: Core Neuroscience Course, Harvard (1970-77); Development of the CNS, Harvard (1970-77); Advanced Human Neuroscience, Harvard (1970-77); Neuroscience Course, Stanford (1976); Principles of Development, Belgrade Univ. (1971-73). Principles of Neurobiology (Cold Spring Harbor, 1977); Development of the Nervous System (Cold Spring Harbor, 1978-86); Molecular Neurobiology of Human Diseases (Cold Spring Harbor, 1988, 1989); Neurobiology (MBL, Woods Hole, 1978); Immunogenetics (Cold Spring Harbor, 1976); Advanced Study Institute Summer Schools, Crete (Greece, 1978, 1997), Varenna (Italy, 1981, 1991), Porto (Portugal, 1982); International School of Biophysics, Erice (Italy, 1985), Trieste (Italy, 1986, 1988, 1990, 2001); Review and Update in Neurobiology (MBL, Woods Hole, 1984-94); IBRO Summer School, Zadar (Croatia, 2005); Development of the CNS, Yale (1979-1994); Basic Neurosciences, Yale (1985,1987); Brain and Mind, Yale (2003-) Director of the Neuroscience Core Curriculum Course, Yale (1978-2010); Mentor for Ph.D. Neurobiology and Neuroscience students at Harvard and Yale Universities.

Graduate Students (GS) and Postdoctoral Fellows (PF) selected from over 50, seven of which became Chairs of Departments or Directors of Institutes:

Richard Nowakowski, GS, Professor & Chairman, Dept. Neurobiology, UF Tallahassee, FL
Carla Shatz, PF, Professor and Director Bio-X Stanford University, Palo Alto, CA
Ivica Kostovic, PF, Director, Croatian Brain Institute, University of Zagreb, Croatia
Pat Levitt, PF, Professor, University of Southern California, Los Angeles, CA
Anthony La Mantia, GS, Professor & Chairman Neuroscience Inst., GWU, Washington, DC
Nada Zecevic, GS, Professor, University of Connecticut, Farmington, CT
Jean-Pierre Bourgeois, PF, Researcher CNRS, Pasteur Institute, Paris, France
Rodrigo Kuljis, PF, Professor and Chair of Neurology, University of Miami, Miami, FL
Robert Williams, PF, Chair, Computational Genomics, UT-Oak Ridge National Laboratory
Douglas Meinecke, PF, Chief, Developmental Neuroscience Program, NIMH, Bethesda, MD
Richard Cameron, PF, Associate Professor, Medical College of Georgia, Augusta, GA
Hitoshi Komuro, PF, Associate Professor, Cleveland Clinic Foundation, Cleveland, OH
Eva Anton, PF, Professor, Univ North Carolina Chapel Hill, NC
Maria Donoghue, PF, Associate Professor, Georgetown Univ. Washington, DC
Chia-Yi (Alex) Kuan, GS; PF, Professor, Emory University, Atlanta GA
Tarik Hydar, PF, Professor, Boston University, Boston, MA
Nenad Sestan, GS: PF, Professor, Yale University, New Haven, CT
Skirmantas Janusonis, PF, Associate Professor, UC Santa Barbara, CA
Matthew Sarkisian, PF, Assistant Professor, University of Florida, Gainesville, FL
Alvaro Duque PF, Research Scientist, Yale University, New Haven, CT
Albert Ayoub, PF, Research Scientist, Yale University, New Haven, CT
Jon Arrelano, PF, Research Scientist, Yale University, New Haven, CT
Yury Morozov, PF, Research Scientist, Yale University, New Haven, CT
Masaaki Torri, PF, Assistant Professor, George Washington University, Washington, DC
Joshua Breunig, GS, PF, Assistant Professor, Cedars-Sinai MC, Los Angeles, CA
Kazue Hashimoto-Torii, PF, Assistant Professor GWU, Washington, DC
Brian, Rash, PF, Associate Research Scientist, Yale University, New Haven, CT
Martin Dominguez, MD, PhD, Resident, Columbia Univeristy, New York, NY

Jamie Benoit, GS, Research Fellow. MIT. Boston, MA

SCIENTIFIC PUBLICATIONS

Biometrics (as of July, 2016): Citations: 63,830; h-index 129; i10 index 345

From Google Scholar: <https://scholar.google.com/citations?user=WNEBDpQAAAAJ&hl=en>

List of all original works (chronologically):

- Divac I, Rakic P, Mihailovic LJ. 1965 Inhibition and caudate nucleus. *Yugoslav Physiol. Pharmacol. Acta* 1: 79-86
- Hamlin H, Rakic P, Yakovlev PI. 1965 Stereotactic imprecision. *Confin. Neurol.* 26: 426-436
- Rakic P. 1965 Mesocoelic recess in the human brain. *Neurol.* 15: 708-7157
- Rakic P. 1968 Studies on the proliferation, migration, and differentiation of neuroblasts during neurohistogenesis in mammals, particularly man. Thesis for Sc.D. degree (in Serbo-Croatian), Belgrade, 191 pages
- Rakic P, Yakovlev PI. 1968 Development of the corpus callosum and cavum septi in man. *J. Comp. Neurol.* 132: 45-72
- Rakic P, Sidman RL. 1968 Supravital DNA synthesis in the developing human and mouse brain. *J. Neuropath. Exp. Neurol.* 27: 246-276
- Rakic P, Sidman RL. 1968 Subcommissural organ and adjacent ependyma: autoradiographic study of their origin in the mouse brain. *Am. J. Anat.* 122: 317-335
- Rakic P, Sidman, RL. 1969 Telencephalic origin of pulvinar neurons in the fetal human brain. *Z. Anat. Entwickl.-Gesch.* 129: 53-82
- Rakic P, Sidman RL. 1970 Histogenesis of cortical layers in human cerebellum, particularly the lamina dissecans. *J. Comp. Neurol.* 139: 473-500
- Rakic P. 1971 Neuron-glia relationship during granule cell migration in developing cerebellar cortex. A Golgi and electronmicroscopic study in *Macacus rhesus*. *J. Comp. Neurol.* 141: 283-312
- Rakic P. 1971 Guidance of neurons migrating to the fetal monkey neocortex. *Brain Res.* 33:471-476
- Rakic P. 1972 Mode of cell migration to the superficial layers of fetal monkey neocortex. *J. Comp. Neurol.* 145: 61-84
- Rakic P. 1972 Extrinsic cytological determinants of basket and stellate cell dendritic pattern in cerebellar molecular layer. *J. Comp. Neurol.* 146: 335-354
- Rakic P, Sidman RL. 1973 Weaver mutant mouse cerebellum; defective neuronal migration secondary to specific abnormality of Bergmann glia. *Proc. Natl. Acad. Sci. (USA)* 70: 240-244
- Rakic P. 1973 Kinetics of proliferation and latency between final cell division and onset of differentiation of cerebellar stellate and basket neurons. *J. Comp. Neurol.* 147: 523-546
- Sidman RL, Rakic P. 1973 Neuronal migration with special reference to developing human brain: a review. *Brain Res.* 62: 1-35
- Rakic P, Sidman, RL. 1973 Sequence of developmental abnormalities leading to granule cell deficit in cerebellar cortex of weaver mutant mice. *J. Comp. Neurol.* 152: 103-132

- Rakic P, Sidman RL. 1973 Organization of cerebellar cortex secondary to deficit of granular cells in weaver mutant mice. *J. Comp. Neurol.* 152: 133-162
- Rakic P. 1974 Embryonic development of the LP-pulvinar complex in man. In: LP-pulvinar Complex. (Cooper IS, Riklan M, Rakic P. eds.) Charles C. Thomas, Springfield, pp. 3-25
- Nowakowski RS, Rakic P. 1974 Clearance rate of exogenous ³H-thymidine from the plasma of pregnant rhesus monkeys. *Cell and Tissue Kinetics* 7: 189-194
- Rakic P. 1974 Neurons in the monkey visual cortex: Systematic relation between time of origin and eventual disposition. *Science* 183: 425-427
- Rakic P, Stensaas LJ, Sayre EP, Sidman RL. 1974 Computer-aided three-dimensional reconstruction and quantitative analysis of cells from serial electronmicroscopic montages of fetal monkey brain. *Nature* 250: 31-34
- Rakic P. 1974 Intrinsic and extrinsic factors influencing the shape of neurons and their assembly into neuronal circuits. In: Frontiers in Neurology and Neuroscience Research. (Seeman P, Brown GM. eds.) Toronto Univ. Press, pp. 112-132
- Sidman RL, Rakic P. 1974 Neuronal migrations in human brain development. In: Pre- and Post-Natal Development of the Human Brain. (Berenberg S, Caniaris M, Masse NP. eds.) *Modern Problems in Pediatrics* 13: 13-43
- Rakic P. 1975 Timing of major ontogenetic events in the visual cortex of the rhesus monkey. In: Brain Mechanisms in Mental Retardation. (Buchwald NA, Brazier M. eds.) Academic Press, New York, pp. 3-40
- Rakic P. 1975 Local circuit neurons. *Neuroscience Research Program Bulletin* 13: 1-399. Published as a book in 1976 by MIT Press, Cambridge, 161 pages
- Nowakowski RS, LaVail JH, Rakic P. 1975 The correlation of the time of origin of neurons with their axonal projection: The combined use of ³H-thymidine autoradiography and horseradish peroxidase histochemistry. *Brain Res.* 99: 363-368
- Rakic P. 1975 Role of cell interaction in development of dendritic patterns. In: Physiology and Pathology of Dendrites. (Kreutzberg G. ed.) Raven Press, New York, *Advances in Neurology* 12: 117-134
- Rakic P. 1975 Cell migration and neuronal ectopias in the brain. In: Morphogenesis and Malformation of the Brain and Face. (Bergsma D. ed.) Birth Defects: Original Series. Vol. 9. Liss, New York, pp. 95-129
- Rakic P. 1975 Effects of local cellular environments on the differentiation of local circuit neurons. *Neuroscience Research Program Bulletin.* 13: 400-407
- Rakic P. 1976 Synaptic specificity in the cerebellar cortex: Study of anomalous circuits induced by a single gene mutation in mice. In: The Synapse. *Cold Spring Harbor Symposia on Quantitative Biology* 40: 333-346
- Zecevic N, Rakic P. 1976 Differentiation of Purkinje cells and their relationship to other components of developing cerebellar cortex in man. *J. Comp. Neurol.* 167: 27-48
- Rakic P. 1976 Prenatal genesis of connections subserving ocular dominance in the rhesus monkey. *Nature* 261: 467-471
- Rakic P. 1976 Differences in the time of origin and in eventual distribution of neurons in areas 17 and 18 of the visual cortex in the rhesus monkey. *Exp. Brain Res. Suppl.* 1: 244-248

- Divac I, LaVail JH, Rakic P, Winston K. 1977 Heterogeneous afferents to the inferior parietal lobule of the rhesus monkey revealed by retrograde transport method. *Brain Res.* 123: 197-207
- Rakic P. 1977 Genesis of the dorsal lateral geniculate nucleus in the rhesus monkey: site and time of origin, kinetics of proliferation, routes of migration and pattern of distribution of neurons. *J. Comp. Neurol.* 176: 23-52
- Rakic P. 1977 Prenatal development of the visual system in the rhesus monkey. *Phil. Trans. Roy. Soc. Lond. B.* 278: 245-260
- Rakic P. 1978 Neuronal migration and contact guidance in primate telencephalon. *Postgraduate Medical Journal* 54: 25-40
- Caviness VS, Jr, Rakic P. 1978 Mechanisms of cortical development: a view from mutations in mice. *Ann. Rev. Neurosci.* 1: 297-326.
- Lenn JN, Halfon N, Rakic P. 1978 Development of the interpeduncular nucleus in the midbrain of rhesus monkey and human. *Anat. Embryol.* 152: 273- 289
- Knyihar E, Csillik B, Rakic P. 1978 Transient synaptic contacts in the embryonic primate spinal cord. *Science* 202: 1206-1209
- Goldman PS, Rakic P. 1979 Impact of the outside world upon the developing primate brain. Perspective from neurobiology. *Bulletin of the Menninger Foundation* 43: 20-28
- Brand S, Rakic P. 1979 Genesis of the primate neostriatum: ³H-thymidine autoradiographic analysis of the time of neuron origin in the rhesus monkey. *Neuroscience* 4: 767-778
- Schmechel DE, Rakic P. 1979 A Golgi study of radial glial cells in developing monkey telencephalon. *Anat. Embryol.* 156: 115-152
- Rakic P. 1979 Genesis of visual connections in the rhesus monkey. In: Developmental Neurobiology of Vision. (Freeman R. ed.) Plenum, New York, pp. 249-260
- Nowakowski RS, Rakic P. 1979 Mode of migration of neurons to the hippocampus: A Golgi and electron microscopic analysis in fetal rhesus monkey. *J. Neurocytol.* 8: 697-71
- Rakic P. 1980 Genetic and epigenetic determinants of local neuronal circuits in the mammalian central nervous system. In: Neurosciences Fourth Study Program (Schmitt FO, Worden FG. eds.) MIT Press Cambridge, pp. 109-127
- Schmechel DE, Rakic, P 1979 Arrested proliferation of radial glial cells during midgestation in rhesus monkey. *Nature* 227: 303-305
- Levitt P, Rakic P. 1980 Immunoperoxidase localization of glial fibrillary acid protein in radial glial cells and astrocytes of the developing rhesus monkey brain. *J. Comp. Neurol.* 193: 815-840
- Kostovic I, Rakic P. 1980 Cytology and time of origin of interstitial neurons in the white matter in infant and adult human and monkey telencephalon. *J. Neurocytol.* 9: 219-242
- Brand S, Rakic P. 1980 Neurogenesis of the nucleus accumbens septi and neighboring septal nuclei in the rhesus monkey: a combined ³H-thymidine and electron microscopic study. *Neurosci.* 5: 2125-2138
- Rakic P. 1981 Developmental events leading to laminar and areal organization of the neocortex. In: The Organization of Cerebral Cortex (Schmitt FO, Worden FG, Adelman G, Dennis SG. eds.) MIT Press, Cambridge, pp. 7-28
- Rakic P, Nowakowski RS. 1981 Time of origin of neurons in the hippocampal region of the rhesus monkey. *J. Comp. Neurol.* 196: 99-124

- Nowakowski RS, Rakic P. 1981 Site of origin and route of migration in the hippocampal region of the rhesus monkey. *J. Comp. Neurol.* 196: 125-154
- Cooper J, Rakic P. 1981 Neurogenetic gradients in the superior and inferior colliculi of the rhesus monkey. *J. Comp. Neurol.* 202: 309-334
- Shatz CJ, Rakic P. 1981 The genesis of efferent connections from the visual cortex of the fetal rhesus monkey. *J. Comp. Neurol.* 196: 287-307
- Rakic P. 1981 Development of visual centers in the primate brain depends on binocular competition before birth. *Science* 214: 928-931
- Levitt P, Cooper ML, Rakic P. 1981 Coexistence of neuronal and glial precursor cells in the cerebral ventricular zone of the fetal monkey: An ultrastructural immunoperoxidase analysis. *J. Neurosci.* 1: 27-39
- Rakic P. 1981 Neuron-glial interaction during brain development. *Trends in Neuroscience* 4: 184-187
- Gould BB, Rakic P. 1981 The total number, time of origin and kinetics of proliferation of neurons comprising the deep cerebellar nuclei in the rhesus monkey. *Exp. Brain Res.* 44: 195-206
- Ogren MP, Rakic P. 1981 The prenatal development of the pulvinar in the monkey: ³H-thymidine autoradiographic and morphometric analyses. *Anat. Embryol.* 162: 1-20
- Rakic P. 1982 The role of neuronal-glial interaction during brain development. In: Neuronal-glial Cell Interrelationships. (Sears TA. ed.) Dahlem Konferenzen, Springer, Berlin, pp. 25-38
- Levitt P, Rakic P. 1982 The time of genesis, embryonic origin and differentiation of the brainstem monoamine neurons in the rhesus monkey. *Dev. Brain Res.* 4: 35-57
- Rakic P, Goldman-Rakic PS. 1982 Development and Modifiability of the Cerebral Cortex. (Edited volume for MIT Press, Cambridge, MA). *Neurosciences Res. Prog. Bull.* 20: 429-611
- Csillik B, Knyihar E, Rakic P. 1982 Transganglionic degenerative proliferation in the Rolando substance of the primate spinal cord: decoupling and restoration of synaptic connectivity in the central nervous system after peripheral nerve lesions. *Folia Morphologica (Csr)* 30: 189-194
- Strichartz GR, Aguayo AJ, Cowan WM, Distel H, Lim L, McKhann GM, Mugnaini E, Rakic P, Rickmann MJ, Spitzer NC, Webster H deF. 1982 Ontogeny. State of the art report. In: Neuron-glial Cell Interrelationships. (Sears TA, ed.) Springer, Berlin, pp. 93-114
- Sidman RL, Rakic P. 1982 Development of the human central nervous system. In: Histology and Histopathology of the Nervous System. (Haymaker W, Adams RD. eds.) CC. Thomas, pp. 3-145
- Knyihar-Csillik E, Csillik B, Rakic P. 1982 Ultrastructure of normal and degenerating glomerular terminals of dorsal root axons in the substantia gelatinosa of the rhesus monkey. *J. Comp. Neurol.* 210: 357-375
- Knyihar-Csillik E, Csillik B, Rakic P. 1982 Preterminal synaptology of dorsal root glomerular terminals in the substantia gelatinosa of the spinal cord in the rhesus monkey. *J. Comp. Neurol.* 210: 376-399
- Rakic P. 1982 La migration neurale. In: Naissance du Cerveau. *Compte Rendu- Monaco* 4. Corps Medical Imp. Lafayette, pp. 13-18
- Rakic P. 1982 Early developmental events: cell lineages, acquisitions of neuronal positions, and areal and laminar development. *Neurosciences Res. Prog. Bull.* 20: 439-451
- Duffy CJ, Rakic P. 1983 Differentiation of granule cells in the dentate gyrus of the rhesus monkey: a quantitative Golgi study. *J. Comp. Neurol.* 214: 224-337

- Levitt P, Cooper ML, Rakic P. 1983 Early divergence and changing proportions of neuronal and glial precursor cells in the primate cerebral ventricular zone. *Dev. Biology* 96: 472-484
- Rakic P, Riley KP. 1983 Overproduction and elimination of retinal axons in the fetal rhesus monkey. *Science* 209: 1441-1444
- Rakic P, Riley KP. 1983 Regulation of axon numbers in the primate optic nerve by prenatal binocular competition. *Nature* 305: 135-137
- Rakic P. 1983 Geniculo-cortical connections in primates: Normal and experimentally altered development. *Progress in Brain Res.* 58: 393-404
- Cooper ML, Rakic P. 1983 Gradients of cellular maturation and synaptogenesis in the superior colliculus of the fetal rhesus monkey. *J. Comp. Neurol.* 215: 165-186
- Kostovic I, Rakic P. 1984 Development of prestriate visual projections in the monkey and human fetal cerebrum revealed by transient cholinesterase staining. *J. Neurosci.* 4: 25-42
- Rakic P. 1984 Emergence of neuronal and glial cell lineages in primate brain. In: Cellular and Molecular Biology of Neural Development. (Black IB. ed.) Plenum, New York, pp. 29-50
- Rakic P. 1984 Organizing principles for development of primate cerebral cortex. In: Organizing Principles for Brain Development. (Sharma S. ed.) Plenum, New York, pp. 21-48
- Goldman-Rakic PS, Rakic P. 1984 Experimental modification of gyral patterns. In: Cerebral Dominance: The Biological Foundation. (Geschwind N, Galaburda AM. eds.) Harvard University Press, Cambridge, MA, pp. 179-192
- Brand S, Rakic P. 1984 Cytodifferentiation and synaptogenesis in the neostriatum of the fetal and neonatal rhesus monkeys. *Anat. Embryol.* 169: 21-34
- Levitt PR, Rakic P, Goldman-Rakic PS. 1984 Region-specific distribution of catecholamine afferents in primate cerebral cortex: A fluorescence histochemical analysis. *J. Comp. Neurol.* 225: 1-14
- Eckenhoff MF, Rakic P. 1984 Radial organization of the hippocampal dentate gyrus: A Golgi, ultrastructural and immunohistochemical analysis in the developing rhesus monkey. *J. Comp. Neurol.* 223: 1-21
- Levitt P, Rakic P, de Camilli P, Greengard, P. 1984 Emergence of cyclic guanosine 3':5'-monophosphate-dependent protein kinase immunoreactivity in developing rhesus monkey cerebellum: Correlative immunocytochemical and electron microscopic analysis. *J. Neurosci.* 4: 2553-2564
- Rakic P. 1984 Defective cell-to-cell interactions as causations of brain malformations. In: Malformations of Development. Biological and Psychological Sources and Consequences. (Gollin ES, ed.) Academic Press, New York, pp. 239-285
- Rakic P. 1984 Neurogenesis in Primates. In: Nervous System Development and Repair. Discussions in Neurosciences 1: 43-48
- Levitt PR, Rakic P, Goldman-Rakic PS. 1984 Comparative assessment of monoamine afferents in mammalian cerebral cortex. In: Monoamine Innervation of Cerebral Cortex. (Descarries L, Reader P, Jasper H, eds.) Liss, New York, pp. 41-59
- Rakic P, Goldman-Rakic PS. 1985 Use of fetal neurosurgery for experimental studies of structural and functional brain development in nonhuman primates. In: Perinatal Neurology and Neurosurgery. (Thompson RA, Green JR, Johnsen SD, eds.) Spectrum, New York, pp. 1-15

- Rakic P. 1985 Mechanisms of neuronal migration in developing cerebellar cortex. In: Molecular Basis of Neural Development. (Edelman GE, Cowan WM, Gall E. eds.) Wiley and Sons, New York, pp. 139-160
- Rakic P. 1985 Limits of neurogenesis in primates. *Science* 227: 1054-1056
- Easter SS, Jr, Purves D, Rakic P, Spitzer NC. 1985 The changing view of neural specificity. *Science* 230: 507-511
- Williams RW, Rakic P. 1985 Dispersion of growing axons within the optic nerve of the embryonic monkey. *Proc. Natl. Acad. Sci. (USA)* 82: 3906-3910
- Rakic P. 1985 DNA synthesis and cell division in the adult primate brain. *Ann. N.Y. Acad. Sci.* 457: 193-211
- Vinters HV, Gatti RA, Rakic P. 1985 Sequence of cellular events in cerebellar ontogeny relevant to expression of neuronal abnormalities in ataxia-telangiectasia. In: Ataxia-Telangiectasia: Genetics, Neuropathology and Immunology of a Degenerative Disease of Childhood. (Gatti RA, Swift M. eds.) Liss, New York, pp. 233-255
- Rakic P. 1985 Contact regulation of neuronal migration. In: The Cell in Contact: Adhesions and Junctions as Morphogenetic Determinants. (Edelman GM, Thiery J-P. eds.) Wiley & Sons, New York, pp. 67-91
- Rakic P. 1985 Timing of determination of neuronal and glial progenitor cells in the primate brain. In: Frontiers in Physiological Research. (Garlick DG, Korner PI. eds.) Australian Academy of Science, Canberra, pp. 63-68
- Nishimura Y, Rakic P. 1985 Development of the rhesus monkey retina: I. Emergence of the inner plexiform layer and its synapses. *J. Comp. Neurol.* 241: 420-434
- Garcia-Segura LM, Rakic P. 1985 Differential distribution of intermembranous particles in the plasmalemma of the migrating cerebellar granule cells. *Dev. Brain Res.* 23: 145-149.
- Knyihar-Csillik E, Rakic P, Csillik B. 1985 Fine structure of growth cones in the upper dorsal horn of the adult primate spinal cord in the course of reactive synaptogenesis. *Cell Tissue Res.* 239: 633-641
- Nishimura Y, Schwartz ML, Rakic P. 1985 Localization of aminobutyric acid and glutamic acid decarboxylase in rhesus monkey retina. *Brain Res.* 359: 351-355
- Rakic P. 1986 Mechanism of ocular dominance segregation in the lateral geniculate nucleus: competitive elimination hypothesis. *Trends in Neuroscience* 9: 11-15
- Nishimura Y, Schwartz ML, Rakic P. 1986 GABA and GAD immunoreactivity of photoreceptor terminals in primate retina. *Nature* 230: 753-756
- Schull WJ, Dobbing J, Kameyama, Y, O'Rahilly R, Rakic P, Silini G. 1986 Developmental effects of irradiation on the brain of the embryo and fetus. *Ann. ICRP* 16: 1-43
- Knyihar-Csillik E, Rakic P, Csillik B. 1986 Reactive synapto-neogenesis in the upper dorsal horn of the adult primate: Regenerative or collateral sprouting? In: Development and Plasticity of the Mammalian Spinal Cord. (Goldberger M, Gorio A, Murray M. eds.) Raven Press, New York, pp. 191-210
- Rakic P. 1986 Normal and abnormal neuronal migration during brain development. In: Radiation Risks to the Developing Nervous System. (H. Kriegel, W. Schmahl, G.B. Gerber and F.E. Stieve, eds.) Gustav Fischer, Stuttgart, pp. 35-44

- Rakic P, Bourgeois J-P, Eckenhoff ME, Zecevic N, Goldman-Rakic PS. 1986 Concurrent overproduction of synapses in diverse regions of the primate cerebral cortex. *Science* 232: 232-235
- Nishimura Y, Rakic P. 1987 Development of the rhesus monkey retina: II. A three-dimensional analysis of the sequences of synaptic combinations in the inner plexiform layer. *J. Comp. Neurol.* 262: 290-313
- Knyihar-Csillik E, Rakic P, Csillik B. 1987 Transganglionic-degenerative atrophy in the substantia gelatinosa of the spinal cord after peripheral nerve transection in rhesus monkeys. *Cell Tissue Res.* 247: 599-604
- Nishimura Y, Rakic P. 1987 Synaptogenesis in the primate retina proceeds from the ganglion cells toward the photoreceptors. *Neurosci. Res. Suppl.* 6: 253-268
- Rakic P. 1988 Specification of cerebral cortical areas. *Science* 241: 170-176
- Rakic P, Singer W. (eds.) 1988 Neurobiology of the Neocortex. Wiley and Sons, New York, NY, 461 pages
- Leranth C, Frotscher M, Rakic P. 1988 CCK-immunoreactive terminals form different types of synapses in the rat and monkey hippocampus. *Histochemistry* 88: 343-352
- Rakic P. 1988 Defects of neuronal migration and pathogenesis of cortical malformations. *Prog. Brain Res.* 73: 15-37
- Lidow MS, Goldman-Rakic PS, Rakic P, Gallager D. 1988 Differential quenching and limits of resolution in autoradiograms of brain tissue labeled with [³H] and [¹²⁵I]-compounds. *Brain Res.* 459: 105-119
- Eckenhoff ME, Rakic P. 1988 Nature and fate of proliferative cells in the hippocampal dentate gyrus during the life span of the rhesus monkey. *J. Neurosci.* 8: 2729-2747
- Williams RW, Rakic P. 1988 Elimination of neurons in the rhesus monkey's lateral geniculate nucleus during development. *J. Comp. Neurol.* 272: 424-436
- Rakic P. 1988 Intrinsic and extrinsic determinants of neocortical parcellation: A radial unit model. In: Neurobiology of the Neocortex. (Rakic P, Singer W. eds.) Wiley & Sons, New York, pp. 5-27
- Rakic P, Goldman-Rakic PS, Gallager D. 1988 Quantitative autoradiography of major neurotransmitter receptors in the monkey striate and extrastriate cortex. *J. Neurosci.* 8: 3670-90
- Williams RW, Rakic P. 1988 Three-dimensional counting: An accurate and direct method to estimate numbers of cells in sectioned material. *J. Comp. Neurol.* 278: 344-352
- Rakic P. 1989 “Especificacion de las Areas Corticiales Cerebrales” In: *Cerebro Humano y Tecnologia Inteligente*, Instituto de Ciencias del Hombre, pp. 23-48.
- Kuljis RO, Rakic P. 1989 Multiple types of neuropeptide Y-containing neurons in primate neocortex. *J. Comp. Neurol.* 280: 369-385
- Rakic P. 1989 Competitive interactions during neural and synaptic development. In: From Neuron to Reading. (Galaburda AM. ed.) MIT Press, Cambridge, MA, pp. 443-45
- Kuljis RO, Rakic P. 1989 Neuropeptide Y-containing neurons are situated predominantly outside cytochrome oxidase puffs in macaque visual cortex. *Visual Neurosciences* 2: 57-62
- Lidow MS, Goldman-Rakic PS, Gallager DW, Rakic P. 1989 Quantitative autoradiographic mapping of serotonin 5-HT₁ and 5-HT₂ receptors and uptake sites in neocortex of rhesus monkey. *J. Comp. Neurol.* 280:27-42

- Bourgeois, J-P, Jastreboff P, Rakic P. 1989 Synaptogenesis in the visual cortex of normal and preterm monkeys: Evidence for intrinsic regulation of synaptic overproduction. *Proc. Nat. Acad. Sci. (USA)* 86: 4297-4301
- LaMantia AS, Rakic P. 1990 Cytological and quantitative characteristics of four cerebral commissures in the rhesus monkey. *J. Comp. Neurol.* 291: 520-537
- Meinecke DL, Tallman J, Rakic P. 1989 GABA_A/benzodiazepine receptor-like immunoreactivity in rat and monkey cerebellum: Light and electron microscopic immunocytochemistry using monoclonal antibodies. *Brain Res.* 493: 303-319
- Zecevic N, Bourgeois J-P, Rakic P. 1989 Synaptic density in motor cortex of rhesus monkey during fetal and postnatal life. *Dev. Brain Res.* 50: 11-32
- Lidow MS, Goldman-Rakic PS, Gallager DW, Geschwind DH, Rakic P. 1989 Distribution of major neurotransmitter receptors in the primary motor and somatosensory cortex of the rhesus monkey. *Neurosci.* 32: 609-627
- Knyihar-Csillik E, Rakic P, Csillik B. 1989 Transganglionic degeneration in the Rolando substance of the primate spinal cord evoked by axotomy-induced transganglionic degenerative atrophy of central primary sensory terminal. *Cell Tissue Res.* 258: 515-525
- Lidow MS, Gallager DW, Rakic P, Goldman-Rakic PS. 1989 Regional differences in the distribution of muscarinic cholinergic receptors in macaque cerebral cortex. *J. Comp. Neurol.* 289: 247-259
- Lidow MS, Goldman-Rakic P, Rakic P, Innis RB. 1989 Dopamine D2 receptors in the cerebral cortex: distribution and pharmacological characterization with [³H] raclopride. *Proc. Nat. Acad. Sci. (USA)* 86: 6412-6416
- Kordower JH, Rakic P. 1990 Neurogenesis of the magnocellular basal nuclei in the rhesus monkey. *J. Comp. Neurol.* 291: 637-653
- Wikler KC, Williams RW, Rakic P. 1990 The photoreceptor mosaic: Number, distribution, and patterns of rods and cones in the rhesus monkey retina. *J. Comp. Neurol.* 297: 499-508
- Kostovic I, Rakic P. 1990 Developmental history of the transient subplate zone in the visual and somatosensory cortex of the macaque monkey and human brain. *J. Comp. Neurol.* 297: 441-470
- Wikler KC, Rakic P. 1990 Distribution of photoreceptor subtypes in the retina of diurnal and nocturnal primates. *J. Neurosci.* 10: 3390-3400
- LaMantia AS, Rakic P. 1990 Axon overproduction and elimination in the corpus callosum of the developing rhesus monkey. *J. Neurosci.* 10: 2156-2175
- Meinecke DL, Rakic P. 1990 Developmental expression of GABA and GABA_A receptors in an inhibitory synaptic circuit of the rat cerebellum. *Dev. Brain Res.* 55: 73-86
- Kuljis RO, Rakic P. 1990 Hypercolumns in primate visual cortex develop in the absence of cues from photoreceptors. *Proc. Nat. Acad. Sci. (USA)* 87: 5303-5306
- Rakic P. 1990 Principles of neuronal cell migration. *Experientia* 46: 882-891
- Lidow MS, Goldman-Rakic PS, Gallager DW, Rakic P. 1991 Distribution of dopaminergic receptors in the primate cerebral cortex: quantitative autoradiographic analysis using [³H]raclopride, [³H]spiperone and [³H]SCH23390. *Neurosci.* 40: 657-671
- Wikler KC, Rakic P. 1991 Relation of an array of early-differentiating cones to the photoreceptor mosaic in the primate retina. *Nature* 351: 397-400

- Rakic P. 1991 Experimental manipulation of cerebral cortical areas in primates. *Phil. Trans. Roy. Soc. Lond. B* 331: 291-294
- Schwartz ML, Rakic P, Goldman-Rakic PS. 1991 Early phenotype expression of cortical neurons: Evidence that a subclass of migrating neurons have callosal axons. *Proc. Natl. Acad. Sci. (USA)* 88: 1354-1358
- Rakic P. 1991 Development of the primate cerebral cortex. In: Child and Adolescent Psychiatry. (Lewis M, ed), Williams and Wilkins, Baltimore, pp. 11-28
- LaVail MM, Rapaport DH, Rakic P. 1991 Cytogenesis in the monkey retina. *J. Comp. Neurol.* 309: 86-114
- Rakic P. 1991 Plasticity of Cortical Development. In: Plasticity of Development. (Brauth SE, Hall W, Dooling RJ. eds.) MIT Press, Cambridge, MA, pp. 127-161
- Rakic P. 1991 Critical cellular events during cortical evolution: Radial Unit Hypothesis. In: The Neocortex: Ontogeny and Phylogeny. (Finley BL, Innocenti G. eds.) Plenum, New York, pp. 21-32
- Cameron RS, Rakic P. 1991 Glial cell lineage in the cerebral cortex: Review and synthesis. *Glia* 4: 124-137
- Williams RW, Borodkin M, Rakic P. 1991 Growth cone distribution patterns in the optic nerve of fetal monkeys: Implications for mechanisms of axonal guidance. *J. Neurosci.* 11: 1081-94
- Lidow MS, Goldman-Rakic PS, Rakic P, Gallager DW. 1991 Autoradiographic comparison of D1 specific binding of [³H]SCH39166 and [³H]SCH23390 in the primate cerebral cortex. *Brain Res.* 537: 349-354
- Rakic P. 1991 Radial unit hypothesis of cerebral cortical evolution. *Exp. Brain Res. Ser.* 21: 25-43
- Rakic P. 1991 Glial cells in development: In vivo and in vitro approaches. In: Glial-Neuronal Interactions. Abbott J, Lieberman EM, Raff M. eds. *Proc. N.Y. Acad. Sci.*, pp. 96-99
- Eckenhoff ME, Rakic P. 1991 A quantitative analysis of synaptogenesis in the molecular layer of the dentate gyrus in the rhesus monkey. *Dev. Brain Res.* 564: 129-135
- Rakic P, Suner I, Williams RW. 1991 A novel cytoarchitectonic area induced experimentally within the primate visual cortex. *Proc. Nat. Acad. Sci. (USA)* 88: 2083-2087
- Rakic P. 1991 Radial unit hypothesis of cerebral cortical evolution. *Pont. Acad. Sci.* 78: 25-43.
- Zecevic N, Rakic P. 1991 Synaptogenesis in monkey somatosensory cortex. *Cerebral Cortex* 1: 510-523
- Rakic P. 1991 Development of the primate visual system throughout life. In: The Changing Visual System: Maturation and Aging in the Central Nervous System. (Bagnoli P, Hodos W. eds. Plenum Press, London, pp. 1-9
- Lidow MS, Goldman-Rakic PS, Rakic P. 1991 Synchronized overproduction of neurotransmitter receptors in diverse regions of the primate cerebral cortex. *Proc. Nat. Acad. Sci. (USA)* 88: 10218-10221
- Meinecke DL, Rakic P. 1992 Expression of GABA and GABA_A receptors by neurons in the subplate zone in developing primate occipital cortex: Evidence for transient local circuits. *J. Comp. Neurol.* 317: 91-101
- Komuro H, Rakic P. 1992 Selective role of N-type calcium channels in neuronal migration. *Science* 257: 806-809
- Rapaport DH, Fletcher J, LaVail MM, Rakic P. 1992 Genesis of subclasses of neurons in the retinal ganglion cell layer of the monkey. *J. Comp. Neurol.* 322:577-588

- Kordower JH, Piecinski P, Rakic P. 1992 Neurogenesis of the amygdalar complex in the rhesus monkey. *Dev. Brain Res.* 68: 9-15
- Rakic P. 1992 Development of primate visual system: From photoreceptors to cortical modules. In: Visual System from Genesis to Maturity. R. Lent, ed. Birkhauser, Boston, pp. 1-17
- Lidow MS, Rakic P. 1992 Scheduling of monoaminergic neurotransmitter receptor expression in the primate neocortex during postnatal development. *Cerebral Cortex* 2: 401-416
- Rakic P. 1992 Dividing up the neocortex. *Science* 258: 1421-1422
- Ouimet CC, LaMantia AS, Goldman-Rakic PS, Rakic P, Greengard P. 1992 Immunocytochemical localization of DARP-32, a dopamine and cyclic AMP-regulated phosphoprotein, in the primate brain. *J. Comp. Neurol.* 323: 209-218
- Rakic P, Kornack DR. 1993 Constraints on neurogenesis in adult primate brain: An evolutionary advantage? In: Neuronal Cell Death and Repair. (Cuello AC, ed.) Restorative Neurology 6, Elsevier, Amsterdam, pp. 257-266
- Meinecke DL, Rakic P. 1993 Low affinity nerve growth factor receptor immunoreactivity in embryonic monkey telencephalon: Timing and localization in diverse cellular elements. *Neurosci.* 54: 105-116
- Bourgeois J-P, Rakic P. 1993 Changing of synaptic density in the primary visual cortex of the rhesus monkey from fetal to adult stage. *J. Neurosci.* 13: 2801-2820
- Komuro H, Rakic P. 1993 Modulation of neuronal migration by NMDA receptors. *Science* 260: 95-97
- Csillik B, Tojti L, Kovacs T, Kukla E, Rakic P, Knyihar-Csillik E. 1993 Distribution of calcitonin gene related peptide in vertebrate neuromuscular junctions: Its relationship to the acetylcholine receptor. *J. Histochem. and Cytochem.* 41: 1547-1555
- Rakic P. 1994 Evolution of neocortical parcellation: The perspective from experimental neuroembryology. In Origin of the Brain (Changeux J-P, Chavillon J. eds.) Oxford Univ. Press, pp. 84-103
- Lidow MS, Rakic P. 1994 Unique profiles of α 1-, α 2-, and β -adrenergic receptors in the developing cortical plate and transient embryonic zones of the rhesus monkey. *J. Neurosci.* 14: 4064-4078
- Cameron R, Klein L, Shyjan AW, Rakic P, Levenson R. 1994 Neurons and astroglia express distinct subsets of Na, K-ATPase δ and β subunits, *Mol. Brain Res.* 21: 333-343
- Van Eerdenburg FJCM, Rakic P. 1994 Early neurogenesis in the anterior hypothalamus of the rhesus monkey. *Dev. Brain Res.* 79: 290-296
- Cameron S, Rakic P. 1994 Identification of membrane proteins that comprise the plasmalemmal junction between migrating neurons and radial glial cells. *J. Neurosci.* 14: 3139-55
- Bourgeois J-P, Goldman-Rakic PS, Rakic P. 1994 Synaptogenesis in the prefrontal cortex of rhesus monkey. *Cerebral Cortex* 4: 78-96
- Rakic P, Cameron RS, Komuro H. 1994 Recognition, adhesion, transmembrane signaling, and cell motility in guided neuronal migration. *Current Opinion in Neurobiology* 4: 63-69
- LaMantia AS, Rakic P. 1994 Axon overproduction and elimination in the anterior commissure of the developing rhesus monkey. *J. Comp. Neurol.* 340: 328-336
- Rakic P. 1994 Corticogenesis in human and non-human primates. In: Cognitive Neuroscience. A Handbook for the Field (Gazzaniga MS. ed.) MIT Press, pp. 127-145
- Wikler KS, Rakic P. 1994 An array of early-differentiating cones precedes the emergence of the photoreceptor mosaic in the fetal monkey retina. *Proc. Nat. Acad. Sci. (USA)* 91: 6534-6538

- Rakic P, Bourgeois J-P, Goldman-Rakic PS. 1994 Synaptic development of the cerebral cortex: Implication for learning, memory, and mental illness. *Prog. Brain Res.* 102: 227-234
- Rakic P. 1994 Development of frontal lobe: A view from the back. In: Epilepsy and Functional Anatomy of the Frontal Lobe (Jasper H, Rigio S, Goldman Rakic PS. eds.) Raven Press, Advances in Neurology, pp. 1-9
- Komuro H, Rakic P. 1995 Dynamics of granule cell migration: A confocal microscopic study in acute cerebellar slice preparations. *J. Neurosci.* 15: 1110-1120
- Rakic P, Lidow MS. 1995 Distribution and density of neurotransmitter receptors in the visual cortex devoid of retinal input from early embryonic stages. *J. Neurosci.* 15: 2561-2574
- Rakic P, Komuro H. 1995 The role of receptor-channel activity during neuronal cell migration. *J. Neurobiol.* 26: 299-315
- Rakic P. 1995 Radial glial cells: Scaffolding for brain construction. In: Neuroglial Cells (Ketterman H, Ransom BR. eds.) Oxford Univ. Press, New York, 746-762
- Granger B, LeSurd AM, Rakic P, Bourgeois J-P. 1995 Tempo of neurogenesis and synaptogenesis in the primate cingulate mesocortex: Comparison with the neocortex. *J Comp Neurol.* 360: 363-76
- Knyhar-Csillik E, Csillik B, Rakic P. 1995 Structure of the embryonic primate spinal cord at closure of the first reflex arch. *Anat. Embryol.* 191: 519-540
- Rakic P, Caviness VS, Jr. 1995 Cortical development: View from neurological mutants two decades later. *Neuron* 14: 1101-1104
- Lidow MS, Rakic P. 1995 Neurotransmitters receptors in the proliferative zones of the developing primate occipital lobe. *J. Comp. Neurol.* 360: 393-402
- Rapaport DH, Rakic P, Yasamura D, LaVail MM. 1995 Genesis of the retinal pigment epithelium in the macaque monkey. *J. Comp. Neurol.* 363: 359-376
- Kornack DR, Rakic P. 1995 Radial and horizontal deployment of clonally related cells in the primate neocortex: Relationship to distinct mitotic lineages. *Neuron* 15: 311-321
- Rakic P. 1995 A small step for the cell - a giant leap for mankind: a hypothesis of neocortical expansion during evolution. *Trends in Neuroscience* 18: 383-388
- Rakic P. 1995 Radial versus tangential migration of neuronal clones in the developing cerebral cortex *Proc. Nat. Acad. Sci. (USA)* 92: 11323-11327
- Rapaport DH, Rakic, P, LaVail M. 1996 Spatiotemporal gradients of cell genesis in the primate retina. *Perspective on Dev. Neurobiol.* 3: 142-159
- Rakic P. 1996 Development of cerebral cortex in human and nonhuman primates. In: Child and Adolescent Psychiatry. (Lewis M. ed), Williams & Wilkins, Baltimore, Second Edition, pp. 9-30
- Bouergois J-P, Rakic P. 1996 Synptoarchitecture of the occipital cortex in macaque monkey devoid of retinal input from early embryonic stages. *Euro. J. Neurosci.* 8: 942-950
- Komuro H, Rakic P. 1996 Intracellular Ca²⁺ fluctuations modulate the rate of neuronal migration. *Neuron* 17: 275-285
- Wikler KC, Rakic P. 1996 Development of photoreceptor mosaic in the primate retina. *Perspcetive on Developmental Neurobiology* 3: 161-175
- Suner I, Rakic P. 1996 Numerical Relationship between Neurons in the Lateral Geniculate Nucleus and Primary Visual Cortex in Adult Macaque Monkeys. *Visual Neurosci.* 13: 585-590

- Anton ES, Cameron RS, Rakic P. 1996 Role of neuron-glia junctional proteins in the maintenance and termination of neuronal migration across the embryonic cerebral wall. *J. Neurosci.* 16: 2283-2293
- Mrzljak L, Levey AI, Rakic P. 1996 Selective expression of m2 muscarinic receptor in parvocellular channel of the primate visual cortex. *Proc. Nat. Acad. Sci. (USA)* 93: 7337-7340
- Kuida K, Zheng TS, Na S, Kuang C-Y, Yang D, Karasuyama H, Rakic P, Flavell RA. 1996 Decreased apoptosis in the brain and premature lethality in CPP32-deficient mice. *Nature* 384: 368-372
- Rakic P, Knyihar-Csillik E, Csillik B. 1996 Polarity of microtubule assembly during neuronal migration. *Proc. Nat. Acad. Sci. (USA)* 93: 9218-9222
- Wikler KC, Rakic P, Bhattacharyya N, MacLeish PR. 1997 Early emergence of photoreceptor mosaicism in the primate retina revealed by a novel cone-specific monoclonal antibody. *J. Comp. Neurol.* 377: 500-508
- Kuan C-Y, Elliot E, Flavell RA, Rakic P. 1997 Restrictive clonal allocation in the chimeric mouse brain. *Proc. Nat. Acad. Sci. (USA)* 94: 3374-3379
- Goldman-Rakic PS, Bourgeois J-P, Rakic P. 1997 Synaptic substrate of cognitive development: Lifespan analysis of synaptogenesis in the prefrontal cortex of the nonhuman primate. In: Development of Prefrontal Cortex. Evolution, Neurobiology and Behavior. (Krasnogor, NA, Lyon GR, Goldman-Rakic PS. eds. Paul H. Brakes, Baltimore. pp. 27-47
- Algan O, Rakic P. 1997 Radiation-induced area- and lamina-specific deletion of neurons in the primate visual cortex. *J. Comp. Neurol.* 381: 335-352
- Cameron RS, Ruffin JW, Cho NK, Cameron LP, Rakic P. 1997 Developmental expression, pattern of distribution, and effect on cell aggregation implicate a neuron-glia junctional domain polypeptide in neuronal migration. *J. Comp. Neurol.* 387: 467-488
- Rakic P. 1997 Intra and extracellular control of neuronal migration: relevance to cortical malformations. In: Normal and Abnormal Development of Cortex. (Galaburda AM, Christen Y. eds) Research and Perspectives in Neurosciences, Springer, pp. 81-89
- Knyihar-Csillik E, Seres L, Rakic P, Csillik B. 1997 Dorsal root origin of axonal growth cones: regenerative synapto-neogenesis in the upper spinal dorsal horn of primates. *Neurobiology* 5: 481-488
- Anton ES, Marchionni MA, Lee K-F, Rakic P. 1997 Role of GGF/ neuregulin signaling in interactions between migrating neurons and radial glia in the developing cerebral cortex. *Development* 124: 3501-3510
- Meissirel C, Wikler KC, Chalupa LM, Rakic P. 1997 Early divergence of M and P visual subsystems in the embryonic primate brain. *Proc. Nat. Acad. Sci. (USA)* 94: 5900-5905
- Yang D, Kuan C-Y, Whitmarsh AJ, Rincon M, Zheng TS, Davis J, Rakic P, Flavell RA. 1997 Absence of excitotoxicity-induced apoptosis in the hippocampus of mice lacking the Jnk3 gene. *Nature* 389: 865-870
- Rakic P. 1998 Images in neuroscience. Brain development, VI: radial migration and cortical evolution. *Am J Psychiatry* 155: 1150-1151.
- Komuro H, Rakic P. 1998 *In vitro* analysis of signal mechanisms involved in neuronal migration. In: The Neuron In Tissue Culture. (Haynes LW. ed.) IBRO Methods in Neuroscience Series, John Wiley, New York, pp.57-70
- Csillik B, Rakic P, Knyuhar-Csillik E. 1998 Peptidergic innervation and the nicotinic acetylcholine receptor in the primate basal forebrain. *Euro. J. Neurosci.* 10: 537-585

- Kornack DR, Rakic P. 1998 Changes in cell cycle kinetics during the development and evolution of primate neocortex. *Proc. Nat. Acad. Sci. (USA)* 95: 1242-1246
- Kuida K, Haydar T, Kuan C-Y, Yong G, Taya C, Karasuyama A, Su SH, Rakic P, Flavell R.A. 1998 Reduced apoptosis and cytochrome c-mediated caspase activation in mice lacking Caspase-9. *Cell* 94: 325-33
- Rakic P. 1998 Genesis of topographic and cellular diversity in the primate retina. In: Development and Organization of the Retina: From Molecules to Function. (Chalupa L, Finley B. eds.) pp.61-75
- Komuro H, Rakic P. 1998 Distinct Modes of Neuronal Migration in Different Domains of Developing Cerebellar Cortex. *J. Neurosci.* 15: 1478-1490
- Rakic P. 1998 Critical cellular events in Cortical Development: Opportunities for Biophysics. *Period. Biol.* 100: Suppl. 2: 155-169
- Komuro H, Rakic P. 1998 Orchestration of neuronal migration by the activity of ion channels, neurotransmitter receptors and intracellular Ca^{+2} fluctuations. *J. Neurobiology*, 37: 110-130
- Rakic P. 1998 Young neurons for old brains? *Nature Neurosci.* 1: 643-645
- Rakic P. 1998 Cortical development and evolution. In: Brain and Mind: Evolutionary Perspective. M.S. Gazzaniga and J.S. Altman, eds. HFSP, Strasbourg, pp. 34-40
- Rakic P. 1999 Cerebral cortex, radial unit hypothesis of development. In Encyclopedia of Neuroscience (G. Adelman & B.H. Smith, eds.) Elsevier, Amsterdam, 2nd edition, pp. 343-346
- Donoghue MJ, Rakic P. 1999 Molecular evidence for early specification of presumptive functional domains in the embryonic primate cerebral cortex. *J. Neurosci.* 19: 5967-5979
- Rakic P. 1999 Neuronal Migration. In: Encyclopedia of Neuroscience. G. Adelman and B.H. Smith, eds.) Elsevier, Amsterdam, Second edition, pp.1405-1409
- Knyhar-Csillik E, Rakic P, Csillik B. 1999 Development of glomerular complexes and immunocytochemical differentiation in the superficial dorsal horn of the embryonic primate spinal cord. *Anat. Embryol.* 199: 125-148
- Qi H, Rand MD, Wu X, Sestan N, Wang W, Rakic P, Xu, T, Artavanis-Tsakonas D. 1999 Processing of the Notch ligand Delta by metalloprotease Kuzbanian. *Science* 283: 94-98
- Anton ES, Kreidberg J, Rakic P. 1999 Distinct functions of α_3 and α_v integrin receptors in neuronal migration and laminar organization of the cerebral cortex. *Neuron* 22: 227-289
- Kuan C-Y, Yang D, Semantha-Roy DRT, Davis RJ, Rakic P, Flavell RA. 1999 The Jnk1 and Jnk2 protein kinases are required for regional-specific apoptosis during early brain development. *Neuron* 22: 667-676
- Knyhar-Csillik E, Rakic P, Csillik B. 1999 Illusive transience of parvalbumin expression during embryonic development of the primate spinal cord. *Int. J. Dev. Neurosci.* 17: 79-97
- Donoghue MJ, Rakic P. 1999 Molecular gradients and compartments in the embryonic primate cerebral cortex *Cerebral Cortex* 9: 586: 600
- Sestan N, Artavanis-Tsakonas S, Rakic P. 1999 Contact-dependent inhibition of cortical neurite growth by Notch signaling. *Science* 286:741-745
- Rakic P. 1999 Setting the stage for cognition: Genesis of the primate cerebral cortex. In: Cognitive Neuroscience. A Handbook for the Field. 2nd Edition (Gazzaniga MS ed.) MIT Press, Cambridge, pp.7-21

- Bourgeois J-P, Goldman-Rakic PS, Rakic P. 1999 Formation, elimination and stabilization of synapses in the primate cerebral cortex. In: Cognitive Neuroscience. A Handbook for the Field. 2nd Edition (Gazzaniga MS, ed.) MIT Press, Cambridge. pp. 23-32
- Kornack RD, Rakic P. 1999 Continuation of neurogenesis in the hippocampus of the adult macaque monkey. *Proc. Nat. Acad. Sci. (USA)* 96: 5768-5773
- Haydar T, Bambrick L, Kruger BK, Rakic P. 1999 Embryonic organotypic slice cultures for analysis of proliferation cell death and migration in the cerebral wall. *Brain Res. Protocols* 4: 425-437
- Rakic P. 1999 The importance of being well placed and having the right connections. *Annals NY Acad. Sci.* 882: 90-106
- Haydar TF, Kuan C-Y, Flavell RA, Rakic P. 1999 The Role of Cell Death in Regulating the Size and Shape of the Mammalian Forebrain. *Cerebral Cortex* 9: 621-626
- Rubenstein JLR, Rakic P. 1999 Genetic control of cortical development. *Cerebral Cortex* 9: 521-523
- Rakic P. 1999 Discriminating migrations. *Nature* 400: 315-316
- Rakic P. 2000 Advantages of the mouse model: From spontaneous to induced mutations. In: The Mouse Brain Development (Goffinet A, Rakic P. eds) Springer, Berlin, New York, pp 1-19
- Kuan C-Y, Flavell RA, Rakic, P. 2000 Programmed cell death in mouse brain development. In: The Mouse Brain Development (Goffinet AM, Rakic P. eds) Springer-Verlag, Berlin, New York, pp.145-162
- D'Mello SR, Kuan C-Y, Flavell RA, Rakic P. 2000 Caspase-3 is required for DNA fragmentation but not for cell death in neurons deprived of potassium. *J. Neurosci. Res.* 59: 24-31250
- Roth KA, Kuan C-Y, Hydar TF, Sa-Eipper CD, Shindler KS, Zheng TS, Kuida K, Flavell RA, Rakic P. 2000 Episatitic and independent functions of Caspase-3 and BCL-X_L in developmental programmed cell death. *Proc. Nat. Acad. Sci. (USA)* 97: 466-471
- Selznick LA, Zheng TS, Flavell RA, Rakic P, Roth KA. 2000 Amyloid Beta-induced neuronal death is Bax-dependent but Caspase independent. *J. Neuropath. Exp. Neurol.* 59: 7-15
- Rakic P. 2000 Radial unit hypothesis of neocortical expansion. In: Evolutionary Developmental Biology of the Cerebral Cortex. (G. R. Bok and G. Cardew eds.) *Novartis Foundation Symposium*, 228: 30-45
- Kuan C-Y, Roth KA, Flavell RA, Rakic P. 2000 Mechanism of programmed cell death in the developing brain. *Trends in Neurosciences* 23: 291-29
- Goffinet AM, Rakic P. (eds) 2000 Mouse Brain Development. Springer-Verlag, Berlin. New York, 339 pages.
- Rakic P. 2000 Molecular and cellular mechanisms of neuronal migration: relevance to cortical epilepsies. In: Neocortical Epilepsies (Williamson, P.D. ed) *Advances in Neurology*, 84: 1-14
- Rakic P. 2000 Illegal immigrations. *Neuron* 27: 409-410
- Haydar TF, Wang F, Schwartz ML, Rakic P. 2000 Differential modulation of proliferation in the neocortical ventricular and subventricular zones. *J. Neurosci.* 20: 5764-5774
- Laywell ED, Rakic P, Kukekov VG, Holland EC, Steindler, D. 2000 An identification of a multipotent astrocytic stem cell in the immature and adult mouse brain. *Proc. Nat. Acad. Sci. (USA)* 97: 13883-13888

- Flavell RA, Kuida K, Zheng TS, Haydar T, Kuan C-Y, Su S-H, Rakic P. 2001 The role of caspases in apoptosis *in vivo* by gene targeting. In: Apoptosis in Health and Disease (R. Ruffolo, F. Walsh, eds) International Publishers Direct, Singapore, pp. 47-60
- Rakic P, Kornack RD. 2001 Neocortical expansion and elaboration during primate evolution: A view from neuroembryology. In: Evolutionary Anatomy of Primate Cerebral Cortex (D. Falk and K. Gibson, eds.) Cambridge University Press, pp. 30-56
- D'Sa-Eipper C, Leonard JR, Putcha G, Zheng TS, Flavell RA, Rakic P, Kuida, K, Roth KA. 2001 DNA damage-induced neural precursor cell apoptosis requires p53 and neither Bax nor caspase-3. *Development*, 128: 137-146
- Zaidi AU, D'Sa-Eipper C, Brenner J, Kuida K, Zheng TS, Flavell RA, Rakic P, Roth KA. 2001 Bcl-X_L-caspase-9 interactions in the developing nervous system: Evidence for multiple death pathways. *J. Neurosci.* 21: 169-175
- Bruckner SR, Tammartiello SP, Kuan C-Y, Flavell RA, Rakic P, Estus S. 2001 JNK3 contributes to c-Jun activation and apoptosis but not oxidative stress in NGF-deprived sympathetic neurons. *J. Neurochem.* 78: 298-303
- Kuan C-Y, Flavell RA, Rakic, P. 2001 Caspases and their regulations in apoptosis during brain development. In: Neuronal Death by Accident or by Design. (Henderson, CE., Green, D, Mariani J, Christen Y. eds) Research and Perspectives in Neurosciences, Springer, pp. 75-88
- Sestan N, Rakic P, Donoghue MJ. 2001 Independent parcellation of the embryonic visual cortex and thalamus revealed by combinatorial *Eph/ephrine* gene expression. *Current Biology* 11: 39-43
- Letinic K, Rakic P. 2001 Telencephalic origin of human thalamic GABAergic neurons. *Nature Neurosci.* 4: 931-936
- Komuro H, Yacubova E, Yacubova E, Rakic P. 2001 Mode and Tempo of Tangential Cell Migration in the Cerebellar External Granular Layer. *J. Neurosci.* 21: 527-540
- Kornack RD, Rakic P. 2001 The generation, migration and differentiation of olfactory neurons in adult primate brain. *Proc. Nat. Acad. Sci.(USA)* 98: 4752-4757
- Oppenheim RW, Flavell RA, Rakic P, Vinsant S, Prevette D, Kuan C-Y. 2001 Programmed cell death of developing mammalian neurons following genetic deletion of caspases. *J. Neurosci.* 21: 4752-4760
- Kornack RD, Rakic, P. 2001 Cell proliferation without neurogenesis in the adult primate neocortex. *Science*, 294: 2127-2130
- Zecevic N, Rakic P. 2001 Development of layer I neurons in the primate cerebral cortex. *J. Neurosci.* 21: 5607-5619
- Whitmarsh AJ, Kuan C-Y, Kennedy NJ, Kelkar N, Haydar TF, Mordes JP, Appel M, Rossini AA, Jones SN, Flavell RA, Rakic P, Davis RJ. 2001 Requirement of the JIP1 scaffold protein for stress-induced JNK activation. *Genes Dev.* 15: 2421-32
- Rakic P. 2001 Neurocreationalism: making new cortical maps. *Science* 294: 1011-1012
- Oppenheim RW, Kuan C-Y, Prevette D, Rakic P, Yaginuma H. 2001 Normal programmed cell death in developing avian and mammalian neurons following inhibition or genetic deletion of caspases. In: Neuronal Death by Accident or by Design. (Henderson, CE, Green D, Mariani J, Christen Y. eds) Research and Perspectives in Neurosciences, Springer, pp. 61-74
- Rakic P. 2002 Neurogenesis in adult primate neocortex: an evaluation of the evidence. *Nature Rev. Neurosci.* 3: 650-671

- Rakic P. 2002 Genesis of neocortex in human and nonhuman primates. In: Child and Adolescent Psychiatry. (M. Lewis, ed), Williams and Wilkins, Baltimore, Third Edition, pp. 22-46
- Sestan N, Rakic P. 2002 Notch signaling in the Brain: More than just a developmental story. In: Notch from Neurodevelopment to Neurodegeneration (Israel A, De Strooper B, Chechler, F, Christian Y. eds) Research and Perspectives in Neurosciences, Springer, pp. 19-40
- Rakic P. 2002 Adult neurogenesis: An identity crisis. *J. Neurosci.* 22: 614-618
- Rakic P. 2002 Evolving concepts of cortical radial and areal specification. *Prog. Brain Res.* 136: 265-280
- Azmitia E, DeFelipe J, Jones EG, Rakic P, Ribak C. (eds) 2002 Evolving Views of Cajal's Neuron. Elsevier, Amsterdam, 506 pages
- Rakic P. 2002 Neurogenesis in adult primates. *Prog. Brain Res.* 138: 3-14
- Schindler M, Wang L, Selemon LD, Goldman-Rakic PS, Rakic P, Csernansky GD. 2001 Abnormalities of thalamic volume and shape detected in fetally-irradiated rhesus monkeys with high dimensional brain mapping. *Biol. Psychiatry* 22: 827-883
- Roncarati R, Sestan N, Scheinfeld MH, Berechid BE, Lopez PA, Meucci O, McGlade JC, Rakic P, D'Adamio L. 2002 The γ -secretase-generated intracellular domain of β -amyloid precursor protein binds Numb and inhibits Notch signaling. *Proc. Nat. Acad. Sci.(USA)* 99: 7102-7107
- Rakic P. 2002 Pre and post-developmental neurogenesis in primates. *Clinical Neurosci. Res.* 2: 29-39
- Gelowitz D, Rakic P, Goldman-Rakic PS, Selemon L. 2002 Craniofacial dysmorphogenesis in fetally irradiated nonhuman primates: implications for the neurodevelopmental hypothesis of schizophrenia. *Biol. Psychiatry* 52: 716-720
- Letinic K, Zoncu R, Rakic P. 2002 Origin of GABAergic neurons in the human neocortex. *Nature* 417: 645-649
- Haydar TF, Ang ESBC, Jr, Rakic P. 2003 Mitotic spindle rotation and mode of cell division in the developing telencephalon. *Proc. Nat. Acad. Sci. (USA)* 100: 2890-2895
- Li M, Sarkisian MR, Mehal, W, Rakic P, Flavell RA. 2003 Phosphatidylserine receptor is required for clearance of apoptotic cells. *Science* 302: 1560-1563
- Ang ESBC, Jr, Haydar TF, Gluncic V, Rakic P. 2003 Four-dimensional migratory coordinates of GABAergic interneurons in the developing mouse cortex. *J. Neurosci.* 23: 5805-5815
- Rakic P. 2003 Elusive radial glial cells: Historical and evolutionary perspective. *Glia*, 43: 19-32
- Rakic P. 2003 Developmental and evolutionary adaptations of cortical radial glia. *Cerebral Cortex* 13: 541-549
- Kuan C-Y, Whitmarsh AL, Yang DD, Liao G, Schloemer AJ, Dong C, Bao J, Banasiak K, Haddad VGG, Flavell RA, Davis RJ, Rakic P. 2004 A critical role of neural-specific JNK isoform for ischemic apoptosis. *Proc. Nat. Acad. Sci. (USA)*, 100: 15184-15189
- Hunot S, Vila M, Teismann O, Davis RJ, Hirsch ES, Przedborski S, Rakic P, Flavell RA. 2004 NK-mediated induction of Cyclooxygenase-2 is required for neurodegeneration in a mouse model of Parkinson's disease. *Proc. Nat. Acad. Sci. (USA)* 101: 665-670
- Gongidi V, Ring C, Rakic P, Anton ES. 2004 Sparc-like 1 is a radial glia-associated terminator of neuronal migration in cerebral cortex. *Neuron* 41: 57-69
- Rakic P. 2004 Radial glial cells: Scaffolding for Cortical Development and Evolution. In: Neuroglia (H. Kettermann and B.R. Ransom, eds.) Oxford Univ. Press, New York, pp. 389-404

- Rakic P. 2004 Neuroscience: immigration denied. *Nature* 427: 685-686
- Janusonis S, Gluncic V, Rakic P. 2004 Early serotonergic projections to Cajal-Retzius cells: relevance for cortical development. *J Neurosci.* 24: 1652-1959
- Markakis EF, Palmer TD, Randolph-Moore L, Rakic P, Gage FH 2004 Novel Neuronal Phenotypes from Neural Progenitor Cells. *J. Neurosci.* 24: 2886-2897
- Miska EA, Alvarez-Saavedra E, Townsend M, Yoshii A, Sestan N, Rakic P, Constantine-Paton M, Horvitz HR. 2004 Microarray analysis of microRNA expression in the developing mammalian brain. *Genome Biol. Epub* 5:R68: 1-13
- Rakic P. 2004 Genetic control of cortical convolutions. *Science* 303: 1983-1984
- Rakic P, Ang ESBC, Breunig J. 2004 Setting the Stage for Cognition: Genesis of the Primate Cerebral Cortex. In: *The Cognitive Neuroscience III*. M. Gazzaniga, ed. The MIT Press. pp. 33-47
- Kuan C-Y, Schloemer AJ, Lu A, Weng W-L, Williams MT, Strauss KI, Vorhees CV, Flavell RA, Davis RJ, Sharp FR, Rakic P. 2004 Hypoxia-Ischemia Induces DNA Synthesis without Cell Proliferation in Dying Neurons in Adult Rodent Brain, *J. Neurosci.* 24: 10763-10772
- Chi H, Sarkisian MR, Rakic P, Flavell RA. 2005 Loss of MEKK4 Results in enhanced apoptosis and defective neural tube development. *Proc. Nat. Acad. Sci. (USA)* 102: 3846-3851
- Selemon LD, Wang L, Nebel MB, Csernansky JG, Goldman-Rakic PS, Rakic P. 2005 Direct and indirect effects of fetal irradiation on cortical gray and white matter volume in the macaque. *Biol Psychiatry.* 57: c83-90
- Rakic P. 2005 Vive la difference! *Neuron* 47: 323-325
- Silva RM, Kuan CY, Rakic P, Burke RE. 2005 Mixed lineage kinase-c-jun N-terminal kinase signaling pathway: A new therapeutic target in Parkinson's disease. *Mov Disord.* 20: 653-664
- Chi H, Sarkisian MR, Rakic P, Flavell RA. 2005 Loss of mitogen-activated protein kinase kinase kinase 4 (MEKK4) results in enhanced apoptosis and defective neural tube development. *Proc Natl Acad Sci (USA)* 102: 3846-51
- Rakic P. 2005 Less is more: progenitor death and cortical size. *Nature Neurosci.* 8: 981-2
- Morozov YM, Ayoub AE, Rakic P. 2006 Translocation of Synaptically Connected Interneurons Across the Dentate Gyrus of The Early Postnatal Rat Hippocampus. *J. Neurosci.* 26: 517-527
- Rakic P. 2006 A century of progress in corticoneurogenesis: from silver impregnation to genetic engineering. *Cereb Cortex* 16, Suppl 1: 3-17
- Gal JS, Morozov YM, Ayoub AE, Chatterjee M, Rakic P, Haydar TF. 2006 Molecular and Morphological Heterogeneity of Neural Precursors in the Mouse Neocortical Proliferative Zones. *J. Neurosci.* 26: 1045-1056
- Sarkisian MR, Bartley CM, Chi H, Nakamura F, Flavell RA, Rakic P. 2006 MEKK4 Regulates Neural Migration and Survival in the Developing Cerebral Cortex. *Neuron* 52: 789-801
- Bystron I, Rakic P, Blakemore C. 2006 First neurons in the human cerebral cortex. *Nature Neurosci.* 9: 880-885
- Adhami F, Liao G, Morozov YM, Schloemer A, Schmithorst VJ, Lorenz JN, Dunn RS, Vorhees CV, Wills-Karpm M, Degen J, Davis, RJ, Mizushima N, Rakic P, Dardzinski BJ, Holland SK, Sharp F, Kuan CY. 2006 Cerebral Ischemia-Hypoxia Induces Intravascular Coagulation and Autophagy. *Am J Pathol.* 169: 566-583

- Ang ESBC, Jr. Gluncic V, Duque A, Rakic P. 2006 Prenatal exposure to ultrasound waves impacts neuronal migration in mice. *Proc. Nat. Acad. Sci. (USA)* 103: 12564-12568
- Rakic P. 2006 No more cortical neurons for you. *Science* 313: 928-929
- Paspalas CD, Rakic P, Goldman-Rakic PS. 2006 Internalization of D(2) dopamine receptors is clathrin-dependent and select to dendro-axonic appositions in primate prefrontal cortex. *Eur J Neurosci.* 24: 1395-1403
- Janusonis S, Anderson GM, Shifrovich I, Rakic P. 2006 Ontogeny of brain and blood serotonin levels in 5-HT receptor knockout mice: potential relevance to the neurobiology of autism. *J Neurochem.* 99: 1019-1031
- Höglinger GU, Breunig JJ, Depboylu C, Rouaux C, Michel PP, Alvarez-Fischer D, Boutillier A-L, DeGregori J, Oertel WH, Rakic P, Hisch EC, Hunot S. 2007 The pRb/E2F cell-cycle pathway mediates cell death in Parkinson's disease. *Proc. Nat. Acad. Sci. (USA)* 104: 3585-3590
- Rakic P, Kornack DR. 2007 The development of cerebral cortex in primates and the evolution of the human brain. In: The Evolution of Primate Nervous Systems (Todd M. Preuss & Jon H. Kaas, eds) Volume V Elsevier, pp. 243-259
- Rasin MR, Valeswara-Rao GV-R, Breunig JJ, Kwan KY, Li H-S, Liu-Chen S, Jan LY, Jan YN, Rakic P, Sestan, N. 2007 Numb and Numbl are required for maintenance of cadherin-based adhesion and plarity of neural progenitors. *Nature Neuroscience* 10: 819-827
- Breunig JJ, Arellano JI, Macklis JD, Rakic P. 2007 Everything that glitters isn't gold: a critical review of analysis of postnatal neural stem cells. *Cell Stem Cell* 1: 612-627
- Burns KA, Ayoub AE, Breunig JJ, Adhami F, Weng WL, Colbert MC, Rakic P, Kuan CY. 2007 Nestin-CreER Mice Reveal DNA Synthesis by Nonapoptotic Neurons following Cerebral Ischemia-Hypoxia. *Cereb Cortex* 17: 2585-92
- Bonnin A, Torii M, Wang L, Rakic P, Levitt P. 2007 Serotonin modulates the response of embryonic thalamocortical axons to netrin-1. *Nature Neurosci.* 10: 588-597
- Berghuis P, Rajnicek AM, Morozov YM, Ross RA, Mulder J, Monory K, Marsicano G, Matteoli M, Canty A, Yanagawa Y, Rakic P, Lutz B, Mackie K, Harkany T. 2007 Hardwiring the Brain: Endocannabinoids Control Axon Guidance. *Science* 316: 1212-1216
- Kennedy NJ, Martin G, Ehrhardt AG, Cavanagh-Kyros J, Kuan C-Y, Rakic P, Flavell RA, Treisman SN, Davis RJ. 2007 Requirement of JIP scaffold proteins for NMDA-mediated signal transduction. *Genes & Dev.* 21: 2336 - 2346
- Rakic P, Hashimoto-Torii K, Sarkisian MR. 2007 Genetic determinants of neuronal migration in the cerebral cortex. In: Cortical Development : Genes and Genetic Abnormalities. (G. Bok, & J. Goode, eds.) *Novartis Foundation Symposium*, pp. 30-45
- Rakic P. 2007 The radial edifice of cortical architecture: From neuronal silhouettes to genetic engineering. Special Issue on : Centenary of Neuroscience Discovery: Reflecting on the Nobel Prize to Golgi and Cajal in 1906. *Brain Res Rev.* 55:204-19
- Breunig JJ, Silbereis J, Vaccarino FM, Šestan N, Rakic P. 2007 Notch regulates cell fate and dendrite morphology of newborn neurons in the postnatal dentate gyrus *Proc. Nat. Acad. Sci. (USA)* 104: 20558-63
- Bystron I, Blakemore C, Rakic P. 2008 Development of human cerebral cortex: Boulder Committee revisited. *Nature Review Neurosci.* 9: 110-122

- Hashimoto-Torii K, Torii M, Sarkisian MR, Bartley CB, Shen, J, Radtke F, Gridley T, Šestan N, Rakic P. 2008 Interaction between Reelin and Notch signaling regulates neuronal migration in the cerebral cortex. *Neuron* 60: 273-284
- Sarkisian MR, Bartley CM, Rakic P. 2008 Trouble Making the First Move: Interpreting Arrested Neuronal Migration in the Cerebral Cortex. *Trends in Neuroscience* 31: 54-61
- Town T, Breunig JJ, Sarkisian MR, Spilianakis C, Ayoub AE, Liu Z, Ferrandino AF, Gallagher AR, Li MO, Rakic P, Flavell RA. 2008 *Stumpy* is required for mammalian ciliogenesis. *Proc. Nat. Acad. Sci. (USA)* 105: 2853-2858
- Dominguez MH, Rakic P. 2008 Neuroanatomy of the FGF system. *J Comp Neurol.* 509: 141-143
- Liu X., Hashimoto-Torii K, Torii M, Rakic P. 2008 The role of ATP signaling in the migration of intermediate neuronal progenitors to the neocortical subventricular zone. *Proc. Nat. Acad. Sci. (USA)* 105:11802-11807
- Rakic P. 2008 Confusing cortical columns *Proc. Nat. Acad. Sci. (USA)* 105:12099-12100
- Metin C, Vallee, RB, Rakic P, Bhide PG. 2008 Modes and mishaps of neuronal migration in the mammalian brain. *J Neurosci.* 28:11746-11752
- Rakic P, Grillner S, Jessell T. 2008 The Kavli Prize winners. *Nature Rev Neurosci.* 12:893-7
- Breunig JJ, Sarkisian MR, Arellano JI, Morozov YM, AE, Sojitra S, Wang B, Flavell RA, Rakic P, Town T. 2008 Primary cilia regulate hippocampal neurogenesis by mediating sonic hedgehog signaling. *Proc. Nat. Acad. Sci. (USA)* 105: 13127-13132
- Morozov YM, Torii M, Rakic P. 2009 Origin, early commitment, migratory routes and destination of Cannabinoid Type 1 receptor-containing interneurons. *Cerebral Cortex* 19 Suppl 1:i78-89
- Rakic P, Ayoub AE, Breunig JJ, Dominguez MH. 2009 Decision by Division: Making Cortical Maps. *Trends in Neuroscience* 32: 291-301
- Letinic K, Sebastian R, Toomre D, Rakic P. 2009 Exocyst is involved in polarized cell migration and cerebral cortical development. *Proc Natl Acad Sci (USA)* 106:11342-7
- Dominguez MH, Rakic P. 2009 Language evolution: The importance of being human. *Nature* 462: 169-170
- Selemon LD, Begović A, Rakic P. 2009 Selective reduction of neuron number and volume of the mediodorsal nucleus of the thalamus in macaques following irradiation at early gestational ages. *J Comp Neurol.* 515: 454-64
- Rakic P, Arellano JI, Breunig JJ. 2009 Development of the Primate Cerebral Cortex. In: The Cognitive Neuroscience IV (Gazzaniga MS ed.) The Forth Eddition. The MIT Press. pp.7-28
- Rakic P. 2009 Evolution of the neocortex: Perspective from developmental biology. *Nature Review Neurosci.* 10: 724-735
- Torii M, Hashimoto-Torii K, Levitt P, Rakic P. 2009 Integration of neuronal clones in the radial cortical columns by EphA/ephrin-A signaling. *Nature* 461: 524-528
- Breunig JJ, Rakic, P. 2010 Profiling identifies precursor suspects: notch family again! *Cell Stem Cell* 6: 401-401
- Jones EG, Rakic P. 2010 Radial columns in cortical architecture: it is the composition that counts. *Cerebral Cortex* 20: 2261-4.
- Breunig JJ, Arellano JI, Rakic P. 2010 Cilia in the brain: going with the flow. *Nature Neurosci.* 13:654-5

- Liu X, Hashimoto-Torii K, Torii M, Ding C, Rakic P. 2010 Gap junctions/hemichannels modulate interkinetic nuclear migration in the forebrain precursors *J Neurosci.* 30: 4197-209
- Clowry G, Molnár Z, Rakic P. 2010 Renewed Focus on The Developing Human Neocortex. *J. Anat.* 207: 276-288
- Imamura F, Ayoub AE, Rakic P, Greer CA. 2011 Timing of neurogenesis is a determinant of olfactory circuitry. *Nature Neurosci.* 14: 331-7
- Hashimoto-Torii K, Kawasaki YI, Kuhn A, Rakic P. 2011 Combined transcriptome analysis of fetal human and mouse cerebral cortex exposed to alcohol. *Proc. Nat. Acad. Sci. (USA)* 108: 4212-7
- Amato S, Liu X, Zheng B, Cantley L, Rakic P, Ma H-Y. 2011 AMP-Activated Protein Kinase Regulates Neuronal Polarization by Interfering with PI 3-Kinase Localization. *Science* 332: 247-251
- Petanjek Z, Judas M, Simic G, Rasin MR, Uylings HB, Rakic P, Kostovic I. 2011 Extraordinary neoteny of synaptic spines in the human prefrontal cortex. *Proc Natl Acad Sci (USA)* 108: 13281-6
- Breunig JJ, Haydar TF, Rakic P. 2011 Neural stem cells: historical perspective and future prospects. *Neuron* 70: 614-625
- Ables JL, Breunig JJ, Eisch AJ, Rakic P. 2011 Not(ch) just development: Notch signalling in the adult brain. *Nat Rev Neurosci.* 12: 269-83
- Breunig JJ, Rakic P. 2011 Coordinating migratory neuron polarization by numb-ing communication. *Dev. Cell* 20:578-80
- Ayoub AE, Oh S, Xie Y, Leng J, Cotney J, Dominguez MH, Noonan JP, Rakic P. 2011 Transcriptional programs in transient embryonic zones of the cerebral cortex defined by high-resolution mRNA sequencing. *Proc Natl Acad Sci (USA)* 108: 14950-14955
- Arellano JI, Rakic P. Neuroscience: Gone with the wean. *Nature* 2011 478: 333-4
- Duque A, Rakic P. 2011 Different effects of bromodeoxyuridine and [3H]thymidine incorporation into DNA on cell proliferation, position, and fate. *J Neurosci.* 31:15205-17
- Huttner A, Rakic P. 2011 Diagnosis in dish: your skin can help your brain. *Nature Med.* 17:1558-9
- Arellano JI, Guadiana SM, Breunig JJ, Rakic P, Sarkisian MR. 2012 Development and distribution of neuronal cilia in mouse neocortex. *J Comp Neurol.* 520: 848-73
- Liu X, Sun L, Torii M, Rakic P. 2012 Connexin 43 controls the multipolar phase of neuronal migration to the cerebral cortex. *Proc Natl Acad Sci (USA)* 109: 8280-5
- Kwan KY, Lam MM, Johnson MB, Dube U, Shim S, Rašin MR, Sousa AM, Fertuzinhos S, Chen JG, Arellano JI, Chan DW, Pletikos M, Vasung L, Rowitch DH, Huang EJ, Schwartz ML, Willemsen R, Oostra BA, Rakic P, Heffer M, Kostović I, Judaš M, Sestan N. 2012 Species-Dependent Posttranscriptional Regulation of NOS1 by FMRP in the Developing Cerebral Cortex. *Cell* 149: 899-911
- Torii M, Hackett TA, Rakic P, Levitt P, Polley DB. 2013 EphA Signaling Impacts Development of Topographic Connectivity in Auditory Corticofugal Systems. *Cerebral Cortex* 23: 775-85
- Seleman LD, Ceritoglu C, Ratnanather JT, Wang L, Harms MP, Aldridge K, Begovic A, Csernansky JG, Miller MI, Rakic P. 2013 Distinct abnormalities of the primate prefrontal cortex caused by ionizing radiation in early or midgestation. *J. Comp. Neurol.* 521:1040-53
- Dominguez MH, Ayoub AE, Rakic P. 2013 POU-III Transcription Factors (Brn1, Brn2, and Oct6) Influence Neurogenesis, Molecular Identity, and Migratory Destination of Upper-Layer Cells of the Cerebral Cortex. *Cerebral Cortex* 23: 2632-43

- Torii M, Rakic P, Levitt P. 2013 Role of EphA/ephrin-A signaling in the development of topographic maps in mouse corticothalamic projections. *J Comp Neurol.* 521: 626-637
- Cohen R, Rezai-Zadeh K, Weitz T, Rentsendorj A, Gate D, Spivak I, Bholat Y, Vasilevko V, Glabe C, Breunig J, Rakic P, Davtyan H, Agadjanyan M, Kepe V, Barrio J, Bannykh S, Szekely C, Pechnick R, Town T. 2013 A transgenic Alzheimer rat with plaques, tau pathology, behavioral impairment, oligomeric A β , and frank neuronal loss. *J. Neurosci.* 15: 6245-6356
- Morozov YM, Dominguez MH, Varela L, Shanabrough M, Koch M, Horvath TL, Rakic P. 2013 Antibodies to cannabinoid type 1 receptor co-react with stomatin-like protein 2 in mouse brain mitochondria. *Eur. J. Neurosci.* 38: 2341- 48
- Han K, Gennarino VA, Lee Y, Pang K, Hashimoto-Torii K, Choufani S, Raju CS, Oldham MC, Weksberg R, Rakic P, Liu Z, Zoghbi HY. 2013 Human-specific regulation of MeCP2 levels in fetal brains by microRNA miR-483-5p. *Genes and Development* 27: 485-90
- Cotney J, Leng J, Jun Yin J, Reilly SK, DeMare LE, Deena Emera D, Ayoub AE, Rakic P, Noonan, JP. 2013 The evolution of lineage-specific regulatory activities in the human embryonic limb. *Cell* 154:185-196
- Geschwind DH, Rakic P. 2013 Cortical evolution: judge the brain by its cover. *Neuron* 80: 633-647
- Sun YY, Morozov YM, Yang D, Li Y, Dunn RS, Rakic P, Chan PH, Abe K, Lindquist DM, Kuan CY. 2014 Synergy of Combined tPA-Edaravone Therapy in Experimental Thrombotic Stroke. *PLoS ONE* 9: e98807
- Hashimoto-Torii K, Torii M, Min J, Ju MJ, Fujimoto M, Nakai A, Fatimy R, Mezger V, Chao J, Brennand K, Gage FH, Rakic P. 2014 Role of Heat Shock Factor 1 in Neuronal Response to Fetal Environmental Risks and Its Relevance to Brain Disorders. *Neuron* 82: 560-72
- Rash BG, Rakic P. 2014 Neuroscience. Genetic resolutions of brain convolutions. *Science* 343: 744-745
- El Fatimy R, Miozzo F, Le Mouël A, Abane R, Schwendimann L, Sabéran-Djoneidi D, de Thonel A, Massaoudi I, Paslaru L, Hashimoto-Torii K, Christians E, Rakic P, Gressens P, Mezger V. 2014 Heat shock factor 2 is a stress-responsive mediator of neuronal migration defects in models of fetal alcohol syndrome. *EMBO Mol Med.* 6: 1043-1061 PMID: 25027850
- Morozov YM, Horvath TL, Rakic P. 2014 A tale of two methods: Identifying neuronal CB1 receptors. *Mol Metab.* 3: 338
- Radonjic NV, Ayoub AE, Memi F, Yu X, Maroof A, Jakovcevski I, Anderson SA, Rakic P, Zecevic N. 2014 Diversity of Cortical Interneurons in Primates: the Role of the Dorsal Proliferative Niche. *Cell Repoprts.* 9: 2139-2151 PMID: 25497090
- Benoit JD, Rakic P, Frick KM. 2015 Prenatal stress induces spatial memory deficits and epigenetic changes in the hippocampus indicative of heterochromatin formation and reduced gene expression. *Behav Brain Res.* 281: 1-8 PMID: 25496779
- Brennand KJ, Savas JN, Kim Y, Tran N, Simone A, Hashimoto-Torii K, Beaumont KG, Kim HJ, Topol A, Ladrán I, Abdelrahim M, Matikainen-Ankney B, Chao Sp-h, Mrksich M, Rakic P, Fang G, Zhang B, Yates JR, Gage FH. 2015 Phenotypic differences in hiPSC NPCs derived from patients with schizophrenia. *Molecular Psychiatry* 20: 361—368
- Duque A, Rakic P. 2015 Identification of Proliferating and Migrating Cells by BrdU and Other Thymidine Analogs: Benefits and Limitations. In: *Immunocytochemistry and Related Techniques* (Merighi A, Lossi L. eds.) *Neuromethods* 10: 123-139

- Benoit J, Ayoub AE, Rakic P. 2015 Transcriptomics of critical period of visual cortical plasticity in mice. *Proc Natl Acad Sci (USA)*. 112: 8094-8099 PMID: 26080443
- Koch M, Varela L, Kim JG, Jung Dae Kim JD, Hernandez F, Simonds SE, Carlos M. Castorena CM, Vianna CR, Elmquist KJK, Morozov YM, Rakic P, Bechmann I, Cowley MA, Szigeti-Buckn K, Dietric MO, Gao XB, Diano S, Horvath TL. 12015 Hypothalamic POMC neurons promote cannabinoid-induced feeding. *Nature* 519: 45-50 PMID: 25745175
- Ayoub AE, Rakic P. 2015 Neuronal Misplacement in Schizophrenia. *Biological Psychiatry* 77: 925-926
- Reilly SK, Yin J, Ayoub AE, Emera D, Leng J, Cotney J, Sarro R, Rakic P, Noonan JP. 2015 Evolutionary Changes in Promoter and Enhancer Activity During Human Corticogenesis. *Science* 347: 1155-1159 PMID: 25745175
- Son AI, Hashimoto-Torii K, Rakic P, Levitt P, Torii M. 2015 EphA4 Has Distinct Functionality From EphA7 in the Corticothalamic System During Mouse Brain Development. *J. Comp. Neurol.* 524: 2080-92 PMID: 26587807
- Benoit J, Ayoub A, Rakic P. 2016 Epigenetic stability in the adult mouse cortex under conditions of pharmacologically induced histone acetylation. *Brain Struct Funct.* 2015 Nov 2. [Epub ahead of print] PMID: 26526554
- Morozov YM, Sun YY, Kuan CY, Rakic P. 2016 Alteration of SLP2-like Immunolabeling in Mitochondria Signifies Early Cellular Damage in Developing and Adult Mouse Brain. *Eur. J. Neurosci.* 43: 245-257 PMID: 26547131
- Rash BG, Ackman JB, Rakic P. 2016 Bidirectional radial Ca²⁺ activity regulates neurogenesis and migration during early cortical column formation. 2: e1501733 doi: 10.1126/sciadv.1501733
- Duque A, Krsnik Z, Kostovic I, Rakic P. 2016 Secondary expansion of the transient subplate zone in the developing cerebrum of human and nonhuman primates. *Proc Natl Acad Sci (USA)* 113: 9892-9897