

CURRICULUM VITAE
The Johns Hopkins University School of Medicine
NICHOLAS ROGER GAIANO
September 23rd, 2008

Current Appointments:

Associate Professor, Dept. of Neurology, Johns Hopkins Univ. School of Medicine
Associate Professor, Dept. of Neuroscience, Johns Hopkins Univ. School of Medicine
Associate Professor, Dept. of Oncology, Johns Hopkins Univ. School of Medicine

Personal Data:

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Education and Training:

1991 B.S., Biochemistry, Cornell University, Ithaca, N.Y.
1997 Ph.D., Massachusetts Institute of Technology, Cambridge, MA.
1997–2002 Post-doctoral Fellow, NYU School of Medicine, N.Y. N.Y.

Professional Experience:

4/02– Faculty member in the Neuroregeneration and Stem Cell Program, Institute for Cell Engineering, Johns Hopkins University School of Medicine
4/02– Assistant Professor, Departments of Neurology and Neuroscience, Johns Hopkins University School of Medicine
7/03– Assistant Professor, Department of Oncology, Johns Hopkins University School of Medicine
10/07– Associate Professor, Departments of Neurology, Neuroscience and Oncology, Johns Hopkins University School of Medicine

Fellowships and Awards

Robert C. Byrd Scholarship / NYS	9/87
Empire State Scholarship of Excellence / NYS	9/87 – 5/91
Thomas J. Watson Memorial Scholarship / IBM	9/87 – 5/91
Postdoctoral Fellowship / American Cancer Society	10/97 – 9/00
Career Award in the Biomedical Sciences / Burroughs Wellcome Fund	9/01 – 8/06
Kimmel Scholar Award / Sidney Kimmel Foundation for Cancer Research	7/03 – 6/06
Lucien J. Rubenstein Award for Best Paper in Neuro-oncology (AANP)	9/05
NARSAD Young Investigator Award	7/08 – 6/10

Other Professional Activities

Ad hoc grant reviewer for NIH Study Section Neurogenesis and Cell Fate (NCF)(Feb 2006)
Ad hoc grant reviewer for HHMI, NSF, and the Israel Science Foundation.
Co-editor of Special Issue/Book of *Dev Neurosci* entitled “Notch signaling and nervous system development.” (Vol. 28, No. 1–2, 2006). Publisher: S. Karger AG, Basel, Switzerland.
Co-organizer of 2006 Northeast Regional Society for Dev. Biol. Meeting in Woods Hole, MA.
Scientific Advisor Board Member, Malia’s CORD Foundation. (2007-present)
Ad hoc grant reviewer for NIGMS/NIH Special Emphasis Panel on Program Project (P01) grant proposals for basic research on human embryonic stem cells (April 2008)

Publications:

1. Lin, S., **Gaiano, N.**, Culp, P., Burns, J. C., Freidmann, T., Yee, J.-K., Hopkins, N. (1994). Integration and germ-line transmission of a pseudotyped retroviral vector in zebrafish. Science 265: 666-9.
2. **Gaiano, N.**, Hopkins, N. (1996). Introducing genes into zebrafish. BBA Reviews on Cancer 1288: O11-4. Review.
3. **Gaiano, N.**, Allende, M., Amsterdam, A., Kawakami, K., Hopkins, N. (1996). Highly efficient germ-line transmission of proviral insertions in zebrafish. PNAS 93: 7777-82.
4. **Gaiano, N.**, Amsterdam, A., Kawakami, K., Allende, M., Becker, T., Hopkins, N. (1996). Insertional mutagenesis and rapid cloning of essential genes in zebrafish. Nature 383:829-32.
5. Allende, M., Amsterdam, A., Becker, T., Kawakami, K., **Gaiano, N.**, Hopkins, N. (1996). Insertional mutagenesis in zebrafish identifies two genes, *pescadillo* and *dead eye*, essential for embryonic development. Genes Dev 10: 3141-55.
6. Amsterdam, A., Yoon, C., Allende, M., Becker, T., Kawakami, K., Burgess, S., **Gaiano, N.**, Hopkins, N. (1997). Retrovirus-mediated insertional mutagenesis in zebrafish and identification of a molecular marker for embryonic germ cells. CSH Symp Quant Biol 62: 437-50. Review.
7. **Gaiano, N.**, Fishell, G. (1998). Transplantation as a tool to study progenitors within the vertebrate nervous system. J Neurobiol 36: 152-61. Review.
8. **Gaiano, N.**, Kohtz, J. D., Turnbull, D. H., Fishell, G. (1999). A method for rapid gain-of-function studies in the mouse embryonic nervous system. Nat Neurosci 2: 812-9.
9. **Gaiano, N.**, Nye, J. S., Fishell, G. (2000). Radial glial identity is promoted by Notch1 signaling in the murine forebrain. Neuron 26: 395-404.
10. Corbin, J., **Gaiano, N.**, Machold, R., Langston, A., Fishell, G. (2000). Multiple defects in telencephalic development associated with the loss of the Gsh-2 homeodomain gene. Development 127: 5007-20.
11. Chambers, C. B., Peng, Y., Nguyen, H., **Gaiano, N.**, Fishell, G., Nye, J. S. (2001). Spatio-temporal selectivity of response to Notch1 signals in mammalian forebrain precursors. Development 128: 689-702.
12. Lee, J. D., Kraus, P., **Gaiano, N.**, Nery, S., Kohtz, J., Fishell, G., Loomis, C. A., Treisman, J. E. (2001). An acylatable residue of Hedgehog is differentially required in Drosophila and mouse limb development. Dev Biol 233: 122-36.
13. Kohtz, J. D., Lee, H. Y., **Gaiano, N.**, Segal, J., Ng, E., Larson, T., Baker, D. P., Garber, E. A., Williams, K. P., Fishell, G. (2001). N-terminal fatty-acylation of sonic hedgehog enhances the induction of rodent ventral forebrain neurons. Development 128: 2351-63.
14. Rallu, M., Machold, R., **Gaiano, N.**, Corbin, J., McMahon, A. P., Fishell, G. (2002). Dorsoventral patterning is established in the telencephalon of mutants lacking both Gli3 and Hedgehog signaling. Development 129: 4963-74.
15. **Gaiano, N.**, Fishell, G. (2002). The role of Notch in promoting glial and neural stem cell fates. Ann Rev Neurosci 25: 471-90. Review.
16. Corbin, J., Rutlin, M., **Gaiano, N.**, Fishell, G. (2003). Combinatorial function of the homeodomain proteins Nkx2.1 and Gsh2 in ventral telencephalic patterning. Development 130: 4895-906.
17. Yoon, K., Nery, S., Rutlin, M., Radtke, F., and Fishell, G.* , **Gaiano, N.*** (2004). FGFR signaling promotes radial glial identity and interacts with Notch1 signaling in telencephalic progenitors. J Neurosci 24: 9497-506. *Co-senior.
18. Duncan, A. W., Rattis, F. M., DiMascio, L. N., Congdon, K. L., Pazianos, G., Yoon, K., Cook, M., Willert, K., **Gaiano, N.**, Reya, T. (2005). Integration of Notch and Wnt signaling in hematopoietic stem cell maintenance. Nat Immuno 6: 314-22.
18. Ever, L., **Gaiano, N.** (2005). Radial ‘glial’ progenitors: neurogenesis and signaling. Curr Opin in Neurobiol 15: 29-33. Review.

20. Yoon, K., **Gaiano, N.** (2005). Notch signaling in the mammalian central nervous system: Insights from mouse mutants. *Nat Neurosci* 8: 709-15. Review.
21. Dang, L., Fan, X., Chaudry, A., Wang, M., **Gaiano, N.***, Eberhart, C.* (2006). Notch3 signaling initiates choroid plexus tumor formation. *Oncogene* 25: 487-91. *Co-senior.
22. Dang, L., Yoon, K., Wang, M., **Gaiano, N.** (2006). Notch3 signaling promotes radial glial/progenitor character in the mammalian telencephalon. *Dev Neurosci* 28: 58-69.
23. Mizutani, K., **Gaiano, N.** (2006). Chalk one up for ‘nature’ during neocortical neurogenesis. “News and Views” article. *Nat Neurosci* 9: 717-8. Review.
24. Hellström, M., Phng, L., Hofmann, J. J., Wallgard, E., Coultas, L., Lindblom, P., Alva, J., Nilsson, A. K., Karlsson, L., **Gaiano, N.**, Yoon, K., Rossant, J., Iruela-Arispe, M. L., Kalén, M., Gerhardt, H., Betsholtz, C. (2007). Dll4 signalling through Notch regulates formation of tip cells during angiogenesis. *Nature* 445: 776-80.
25. Mizutani, K., Yoon, K., Dang, L., Tokunaga, A., **Gaiano, N.** (2007). Differential Notch signaling distinguishes neural stem cells from intermediate progenitors. *Nature* 449: 351-5.
26. Wu, M., Kwon, H. Y., Rattis, F., Blum, J., Zhao, C., Ashkenazi, R., Jackson, T.L., **Gaiano, N.**, Oliver, T., Reya, T. (2007). Imaging hematopoietic precursor division in real-time. *Cell Stem Cell* 1: 541-54.
27. Ever, L., Zhao, R., Eswarakumar, V., **Gaiano, N.** (2007). Fibroblast growth factor receptor 2 plays an essential role in telencephalic progenitors. *Dev Neurosci* Pub online Dec 12, 2007.
28. Yu, X., Zou, J., Ye, Z., Hammond, H., Chen, G., Mali, P., Li, Y.-M., Civin, C., **Gaiano, N.**, Cheng, L. (2008). Notch signaling activation in human embryonic stem cells is required for embryonic but not trophoblastic lineage commitment. *Cell Stem Cell* 2: 461-71.
29. Corbin, J. G., **Gaiano, N.**, Juliano, S. L., Poluch, S., Stancik, E., Haydar, T. F. (2008) Regulation of neural progenitor cell development in the nervous system. *J Neurochem* 106: 2272-87. Review.
30. Pierfelice, T., Schreck, K., Eberhart, C.G., **Gaiano, N.** (2008). Notch, neural stem cells and brain tumors. *CSH Symp Quant Biol* 73, *In press*. Review.
31. Mizutani, K., Yoon, K., Zhao, R., **Gaiano, N.** (2008). NF-κB signaling regulates neurogenesis and laminar fate in the embryonic neocortex. *In revision*.
30. Alberi, L., Smith-Hicks, C., Flannery, R. J., Peirfelice, T., Shepherd, J. D., Mattson, M. P., Kuhl, D., Worley, P. F., **Gaiano, N.** (2008). Activity-dependent Notch signaling in neurons requires Arc/Arg3.1. *Submitted*.

Inventions: 11/17/2003: A Transgenic Mouse Line Expressing Green Fluorescent Protein in Cells Containing Endogenous Notch Pathway Activation (JHU Ref 4338). This transgenic mouse line is currently maintained and distributed by the Jackson Labs in Bar Harbor, Maine. (<http://jaxmice.jax.org/strain/005854.html>)

Grant Support:

Current Funding:

R01 NS046731 (9/04-5/09)

NINDS/NIH

Title: Notch and FGF signaling in mammalian neural progenitors.

Role: Principal Investigator.

Total Direct Costs: \$1,156,250

2008 NARSAD Young Investigator Award (7/08-6/10)

National Alliance for Research on Schizophrenia and Depression

Title: Notch signaling in synaptic plasticity

Role: Principal Investigator.

Total Direct Costs: \$60,000.

Exploratory Research Grant (7/08-6/10)
Maryland Stem Cell Research Fund/TEDCO
Title: Exploring the role of NF- κ B signaling in human neural stem cells.
Role: Principal Investigator.
Total Direct Costs: \$200,000.

R01 NS055089 (7/07-6/12)
NINDS/NIH
Title: Notch signaling in brain tumors.
Role: Co-Investigator. (P.I. – C. Eberhart, Pathology Dept., JHU)
Total Direct Costs: \$1,125,000

Investigator-Initiated Research Grant (7/08-6/11)
Maryland Stem Cell Research Fund/TEDCO
Title: The novel protein Botch promotes neurogenesis through regulation of the Notch pathway.
Role: Co-Investigator. (P.I. – V. Dawson, Neurology Dept., JHU)
Total Direct Costs: \$1,500,000.

Completed Funding:

Career Award in the Biomedical Sciences (9/02-8/06; last year was a no-cost extension)
Burroughs Wellcome Fund
Title: Neural stem cells in the mammalian forebrain: the roles of Notch and FGF signaling
Role: Principal Investigator
Total Direct Costs: \$384,000.

Kimmel Scholar Award (7/03-6/06; last year was a no-cost extension)
Sidney Kimmel Foundation for Cancer Research
Title: The role of Notch and FGF signaling in regulating neural progenitor proliferation.
Role: Principal Investigator
Total Direct Costs: \$174,000.

R21 MH073006 (4/06-3/08); NIMH/NIH
Title: NF- κ B signaling in mammalian forebrain progenitors.
Role: Principal Investigator.
Total Direct Costs: \$244,325.

Editorial Activities:

2006– Editorial Board, *Developmental Neuroscience*
2007– Editorial Board, *The Open Neuroscience Journal*

Book Editing: Co-edited a special double issue/book of *Developmental Neuroscience* (Vol. 28, No. 1–2, 2006) entitled “Notch in the developing nervous system.” Publisher: S. Karger AG, Basel, Switzerland. ISBN 3–8055–8086–X.

Ad-hoc manuscript review for 27 journals:

Cell, Nature, Nat Neurosci, Neuron, Genes Dev, PNAS, Cell Stem Cell, PLoS Biology, PLoS Genetics, Dev Cell, J Neurosci, Development, Oncogene, Dev Biol, Mol Cell Neurosci, Dev Dyn, Stem Cells, Cereb Cortex, Ann Neurol, Mol Sys Biol, Mech Dev, J Comp Neurol, Eur J Neurosci, J Neurochem, Neuroscience, Faseb J, Bioessays.

Invited Talks (meetings are underlined):**2003**

- 2/24/03 *Carnegie Institution of Washington* – Baltimore, MD, “Notch and FGF signaling in mammalian neural progenitors.” Host: Marnie Halpern.
- 3/14/03 *Rutgers University* – Piscataway, NJ, “Interactions between Notch and FGF signaling in mammalian neural stem cells.” Host: Marty Grumet.
- 5/23/03 *University of Wisconsin* – Madison, WI, “Molecular regulation of mammalian forebrain progenitors.” Hosted by graduate students.
- 11/10/03 *Annual Society for Neuroscience Meeting, Satellite Symposium* – New Orleans, LA, “Methods of delivering cells via in utero surgery.”

2004

- 1/29/04 *Univ. of Cincinnati College of Medicine* – Cincinnati, OH, “Notch regulates neural progenitors in the embryonic forebrain.” Hosted by graduate students.
- 2/12/04 *National Institutes of Health (NHGRI)* – Bethesda, MD, “Notch and FGF signaling in mammalian neural stem cells.” Host: Shawn Burgess.
- 12/9/04 *Georgetown University School of Medicine* – Washington, DC, “Notch and FGF signaling regulate neural progenitors in the mammalian brain.” Host: Joshua Corbin.

2005

- 3/18/05 *Developing Nervous System – at the Nobel Forum of the Karolinska Institute* – Stockholm, Sweden, “A transgenic Notch reporter mouse reveals differential utilization of Notch signaling in telencephalic progenitors.”
- 4/24/05 *Society for Developmental Biology Northeast Regional Meeting* – Wood Hole, MA, “Differential utilization of Notch signaling in embryonic telencephalic progenitors.”
- 9/12/05 *Stem Cells and Axonal Regeneration: Strategies for the Treatment of ALS* – Cold Spring Harbor Laboratory, Banbury Center Conference, Huntington, NY, “Embryonic neural stem cell heterogeneity (in the forebrain).”
- 11/28/05 *Children’s National Medical Center* – Washington, D.C. “Molecular regulation of embryonic mammalian neural stem cells.” Host: Tarik Haydar.

2006

- 5/3/06 *Society for Developmental Biology Mid-Atlantic Regional Meeting* – Baltimore, MD, “Neural progenitor heterogeneity revealed by differential Notch signaling.”
- 9/21/06 *Case Western Reserve University* – Cleveland, OH, “Notch/CBF1 signaling is differentially utilized in telencephalic neural stem cells and neuroblasts.” Host: Heather Broihier.
- 10/4/06 *St. Jude Children’s Research Hospital* – Memphis, TN, “Notch signaling during neural development and cancer.” Host: Richard Gilbertson.
- 11/14/06 *University of Maryland Medical School* – Baltimore, MD, “Differential Notch signaling in telencephalic neural stem cells and neuroblasts.” Host: David Litwack
- 12/8/06 *University of Vermont (UVM)* – Burlington, VT, “Notch signaling during neural development and cancer.” Host: Umadevi Wesley.

2007

- 1/17/07 *Uniformed Services University of the Health Sciences* – Bethesda, MD. “Differential Notch signaling in telencephalic neural stem cells and neuroblasts.” Host: S. Juliano.
- 2/12/07 *Spinal Cord Tumor Workshop – Office of Rare Diseases, NIH* – Bethesda, MD. “Molecular regulation of neural tube development.” Organized by Richard Gilbertson.
- 3/20/07 *University of Pittsburgh School of Medicine* – Pittsburgh, PA. “Differential Notch signaling in telencephalic neural stem cells and neuroblasts.” Host: Laura Lillien.
- 4/26/07 *University of Chicago* – Chicago, IL. “Differential Notch signaling in telencephalic neural stem cells and neuroblasts.” Host: Sara Szuchet.

- 9/4/07 *University of Tokyo* – Tokyo, Japan. “Notch signaling in telencephalic neural stem cells and intermediate neural progenitors.” Host: Yukiko Gotoh.
- 9/5/07 *The RIKEN Brain Science Institute* – Saitama, Japan. “Notch signaling in telencephalic neural stem cells and intermediate neural progenitors.” Host: Mineko Kengaku.
- 9/6/07 *Kyoto University* – Kyoto, Japan. “Notch signaling in telencephalic neural stem cells and intermediate neural progenitors.” Host: Ryoichiro Kageyama.
- 9/10/07 *30th Annual Meeting of the Japan Neuroscience Society* – Yokohama, Japan. Invited speaker in symposium on Notch signaling and neural development. “Notch differentially regulates neural stem and progenitor cells.”
- 9/23/07 *The Notch Meeting* – Athens, Greece. Invited speaker in session on Developmental Regulation and Cell Fate. “Notch in neural stem cells: not so simple after all.”
- 10/25/07 *Karolinska Institute* – Stockholm, Sweden. “Embryonic neural stem cell regulation: a new look at the role of Notch, and a new player - NF- κ B” Host: Ola Hermanson.

2008

- 1/24/08 *Yale University School of Medicine* – New Haven, CT. “Embryonic neural stem cell regulation: a new look at the role of Notch, and introducing a new player - NF- κ B.” Host: Nenad Sestan.
- 3/1/08 *39th Annual Meeting of the American Society for Neurochemistry* – San Antonio, TX. Invited speaker in symposium on Regulation of Neural Progenitor Cell Development. “Notch and NF- κ B signaling in telencephalic progenitors.”
- 4/4/08 *Duke University School of Medicine* – Durham, NC. “Notch in neural stem cells: not so simple after all.” Host: Tannishtha Reya.
- 4/28/08 *University of Michigan* – Ann Arbor, MI. Speaker in 8th Annual Neuroscience Spring Symposium. “Molecular regulation of embryonic neural stem cells.” Hosted by graduate students.
- 5/08/08 *Pohang University of Science and Technology* – Pohang, Korea. “Notch and NF- κ B signaling in mammalian neural stem cells.” Host: Young-Yun Kong.
- 5/09/08 *Annual Meeting of the Korean Society for Biochemistry and Molecular Biology* – Seoul, Korea. Invited speaker. “Embryonic neural stem cell regulation: a new look at the role of Notch, and introducing a new player - NF- κ B.”
- 5/31/08 *73rd Cold Spring Harbor Symposium on Quantitative Biology* – “Control and Regulation of Stem Cells” – Cold Spring Harbor, NY. Invited speaker. “Notch and NF- κ B signaling in embryonic neural stem cells.”
- 6/12/08 *Northwestern University School of Medicine* – Chicago, IL. “Notch and NF- κ B signaling in embryonic neural stem cells.” Host: Jhumku Kohtz.
- 9/19/08 *Carnegie Institution of Washington* – Baltimore, MD, “Notch and NF- κ B signaling in embryonic neural stem cells.” Host: Marnie Halpern.
- 11/14/08 *Instituto de Fisiología Celular, Universidad Autónoma de México* – Mexico City, Mexico. “Molecular regulation of embryonic neural stem cells.” Host: Iván Velasco.
- 11/17/08 *Rensselaer Polytechnic Institute* – Troy, NY. “Molecular regulation of neural stem cells.” Host: Andrea Page-McCaw.