
BIOGRAPHICAL SKETCH

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NAME Chin Chiang	POSITION TITLE		
eRA COMMONS USER NAME chin_chiang	Associate Professor		
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
State University of New York at Buffalo	BS	1984	Chemical Engineer
Washington State University, Pullman	M.S.	1986	Chemical Engineer
Washington State University, Pullman	Ph.D.	1990	Genetics/Cell Biology

A. Positions and Honors

Professional Experience

- 1990-95 Postdoctoral Fellow, Department of Molecular Biology and Genetics, The Johns Hopkins University School of Medicine, and Associate, Howard Hughes Medical Institute, Baltimore, MD, Laboratory of Dr. Philip A. Beachy
- 1995-97 Research Associate, National Institute of Child Health and Human Development, Laboratory of Mammalian Genes and Development, Bethesda, MD, Laboratory of Dr. Heiner Westphal
- 1997-2002 Assistant Professor, Department of Cell Biology, Vanderbilt University School of Medicine, Nashville, TN
- 2002-Pres Associate Professor, Department of Cell and Developmental Biology, Vanderbilt University School of Medicine, Nashville, TN

Awards and Honors

- HHMI New Faculty Developmental Award, 1997-2000
Basil O'Connor Starter Research Award, 1999-2001
V Foundation Scholar Award, 1999-2001

B. Selected Peer-Reviewed Publications

1. **Chiang, C.**, Patel, N., Young, K. and Beachy, P.A. 1994. The novel homeodomain gene *buttonless* specifies differentiation and axonal guidance functions of *Drosophila* dorsal median cells. Development 120:3581-3593.
2. Chang, D.T., Lopez, A., von Kessler, D.P., **Chiang, C.**, Simandl, K., Renbin, Z., Seldin, M.F., Fallon, J.F. and Beachy, P.A. 1994. Products, genetic linkage, and limb patterning activity of a murine hedgehog gene. Development 120:3339-3353.
3. **Chiang, C.**, Yong, K.E., and Beachy, P.A. 1995. Control of *drosophila* tracheal branching by the novel homeodomain gene *unplugged*, a regulatory target for genes of the *bithorax* complex. Development 121:3901-3912.
4. Roelink, H., Porter, J., **Chiang, C.**, Tanabe, Y., Chang, D.T., Beachy, P.A. and Jessell, T.M. 1995. Concentration-dependent induction of floor plate and motor neuron differentiation by the amino terminal autoproteolytic fragment of Sonic Hedgehog. Cell 81:445-455.
5. Fan, C.-M., Porter, J.A., **Chiang, C.**, Chang, D.T., Beachy, P.A., Tessier-Lavigne, M., 1995. Long-range sclerotome induction by Sonic Hedgehog: direct role of the amino-terminal cleavage product and modulation by the cyclic AMP signalling pathway. Cell 81:457-465.
6. Lopez, A., Chang, D.T., **Chiang, C.**, Porter, J., Maria, A.R., Simandl, K., Beachy, P.A. and Fallon, J.F. 1995. Limb patterning activity and restricted posterior localization of the amino-terminal product of hedgehog autoproteolysis. Current Biology 5:791-796.
7. Hynes, M., Porter, J.A., **Chiang, C.**, Chang, D., Tessier-Lavigne, M., Beachy, P.A. and Rosenthal, A. 1995. Induction of midbrain dopaminergic neurons by Sonic Hedgehog. Neuron 15:35-44.

8. **Chiang, C.**, Young, K. and Beachy, P.A. 1995. Control of tracheal branching by the novel homeodomain gene unplugged, a regulatory target for genes of the bithorax complex. Development 121:3901-3912.
9. **Chiang, C.**, Litingtung, Y., Lee, E., Young, K., Corden, J.L., Westphal, H. and Beachy, P.A. 1996. Cyclopia and defective axial patterning in mice lacking Sonic Hedgehog gene function. Nature 383:407-413.
10. Sheng, H.Z., Bertuzzi, S., **Chiang, C.**, Shawlot, W., Taira, M., Dawid, I. and Westphal, H. 1997. Expression of Lhx5, the mouse ortholog of Xim-5, suggests a role in forebrain specification. Dev. Dyn. 208:266-277.
11. Knezevic, V., De Santo, R., Schughart, K., Huffstadt, U., **Chiang, C.**, Mahon, K.A. and Mackem, S. 1997. Hoxd-12 differentially affects preaxial and postaxial chondrogenic branches in the limb and regulates sonic hedgehog in a positive feedback loop. Development 124:4523-4536.
12. Kos, L., **Chiang, C.** and Mahon, K. 1998. Mediolateral patterning of somites: Sonic hedgehog and other axial signals regulate Nkx-3.1 expression. Mech. Dev., 70:25-34.
13. Litingtung, Y., Lei, L., Westphal, H. and **Chiang, C.** 1998. Sonic Hedgehog is essential for the development of the foregut. Nature Genet., 20:58-61.
14. **Chiang, C.**, Swan, R.Z., Grachtchouk, M., Bolinger, M., Litingtung, Y., Robertson, E.K., Cooper, M.K., Gaffield, W., Westphal, H., Beachy, P.A. and Dlugosz, A.A. 1999. Essential role for Sonic hedgehog during hair follicle morphogenesis. Dev. Biol., 205:1-9.
15. Borycki, A.-G., Brunk, B., Tajbakhsh, S., Buckingham, M., **Chiang, C.** and Emerson, Jr., C.P. 1999. Multiple trophic and inductive functions of Sonic hedgehog during embryogenesis. Development 126:4053-5063.
16. Pierani, A., Brenner-Morton, S., **Chiang, C.** and Jessel, T.M. 1999. A Sonic hedgehog-independent, retinoid-activated pathway of neurogenesis in the ventral spinal cord. Cell 97:903-915.
17. Litingtung, Y. and **Chiang, C.** 2000. Control of Shh activity and signaling in the neural tube. Dev. Dynamics, 219:143-154.
18. Litingtung, Y. and **Chiang, C.** 2000. Specification of neuronal cell types in the ventral spinal cord is mediated by antagonistic interaction between Shh and Gli3. Nature Neuroscience, 3:979-985.
19. Park, J.H., Huang, F.L., Li, J., Balschun, D., Reymann, K.G., **Chiang, C.**, Westphal, H., Huang, K.-P. 2000. Neurogranin in spatial learning, induction of long-term potentiation, and autophosphorylation of calcium/calmodulin-dependent kinase II. Proc. Natl. Acad. Sci., 97:11232-11237.
20. Mo, R., Kim, J. H., Zhang, J., **Chiang, C.**, Hui, C.C. and Kim, P. C. 2001. Anorectal malformation caused by defects in sonic hedgehog signaling. Am. J. Pathol. 159:765-74.
21. **Chiang, C.**, Litingtung, Y., Harris, M.P., Simandl, B.K., Li, Y., Beachy, P.A. and Fallon, J.F. 2001. Manifestation of the limb prepatter: limb development in the absence of Sonic hedgehog function. Dev. Biol. 236: 421-435.
22. Ohkubo Y., **Chiang C.**, Rubenstein J.L. 2002. Coordinate regulation and synergistic actions of BMP4, SHH and FGF8 in the rostral prosencephalon regulate morphogenesis of the telencephalic and optic vesicles. Neuroscience.111:1-17.
23. Perriton, C.L., Powles, N., **Chiang, C.**, Maconochie, M. and Cohn, M.J. 2002. Sonic hedgehog signaling from the urethral plate controls external genital development. Dev. Biol. 247:26-46.
24. Liu, W., Chien, J.S., Raft, S., Li, G., Zhang, H., **Chiang, C.** and Frenz, D.A. 2002. Sonic hedgehog regulates otic capsule chondrogenesis and inner ear development in the mouse embryo. Dev. Biol. 248:240-252.
25. Litingtung, Y., Dahn, R.D., Li, Y., Fallon, J.F. and **Chiang, C.** 2002. Shh and Gli3 are dispensable for limb skeleton formation but regulate digit number and identity. Nature 418:979-983.
26. Powles, N., Marshall, H., Economou, A., **Chiang, C.**, Murakami, A., Dickson, C., Krumlauf, R., Maconochie, M. 2004. Regulatory analysis of the mouse Fgf3 gene: control of embryonic expression patterns and dependence upon sonic hedgehog (Shh) signalling. Dev. Dyn. 230:44-56.
27. Li, Y., Zhang, H., Choi, S.C., Litingtung, Y. and **Chiang, C.** 2004. Sonic hedgehog signaling regulates Gli3 processing, mesenchymal proliferation and differentiation during mouse lung organogenesis. Dev. Biol. 270: 214-31.
28. Takamoto, N., Moses, K., **Chiang, C.**, Zimmer, W.E., Schwartz, R.B., DeMayo, F.J., Tsai, M.-J. and Tsai, S. 2005. COUP-TFII is essential for radial and anterior-posterior patterning of the stomach. Development. 132:2179-2189.

29. Oh, S. Xi, H. and **Chiang, C.** 2005. Specific requirements of Sonic hedgehog signaling during oligodendrocyte development. Dev. Dyn. 234:498-96.
30. von Bokhoven, H., Celli, J., van Reeuwijk, J., Rinne, T., Glaudemans, B., van Beusekom, E., Rieu, P., Newbury-Ecob, R. A., **Chiang, C.** and Brunner, H.G., 2005. *N-MYC* haploinsufficiency is associated with reduced brain size and intestinal atresias in Feingold syndrome. Nature Genetics 37:465-67.
31. Li, Y., Zhang, H., Litingtung Y. and **Chiang, C.** 2006. Cholesterol modification restricts the spread of Shh gradient in the limb bud. Proc. Natl. Acad. Sci. 103:6548-53.
32. Guerrero, I and **Chiang, C.** 2007. A conserved mechanism of Hedgehog gradient formation by lipid modifications. Trends in Cell Biology. 17:1-5
33. Li. Y., Litingtung Y., ten Dijke, P. and **Chiang, C.** 2007. Loss of Noggin-Mediated Bmp7 Antagonism in the Pathogenesis of Esophageal Atresia. Dev. Dyn. 236:746-54
34. Huang, X., Litingtung, Y. and **Chiang, C.** 2007. Region-specific requirement of cholesterol modification of Sonic Hedgehog in patterning the telencephalon and spinal cord. Development, 134:2095-2105.
35. Huang X., Litingtung, Y. and **Chiang C.** 2007. Ectopic Sonic hedgehog signaling impairs telencephalic dorsal midline development: implication for human holoprosencephaly. Human Mol. Genet. 16:1454-68
36. Zhang H., Lawson, W.E., Polosukhin, V.V., Pozzi, A., Blackwell, T.S., Litingtung, Y. and **Chiang, C.** 2007. Inhibitor of Differentiation 1 Promotes Endothelial Survival in a Bleomycin Model of Lung Injury in Mice. Am J Pathology, 171:1113-26.
37. Fogel, J.L., Huang, X., **Chiang, C.**, and Agarwala, S. 2008. Ventral specification and perturbed boundary formation in the mouse midbrain in the absence of Hedgehog signaling. Dev. Dyn. 235:1359-72
38. Li. Y., Gordon, J., Manley, N.R., Litingtung, Y. and **Chiang, C.** 2008. Bmp4 is required for tracheal initiation: a novel mouse model for tracheal agenesis. Dev. Biol. Jul. [Epub ahead of print].
39. Huang, X., Goudy, S.L., Ketova, T., Litingtung, Y. and **Chiang, C.** 2008. Gli3-deficient mice exhibit cleft palate associated with abnormal tongue development. Dev. Dyn. 237:3079-3087.

C. Research Support

Ongoing Research Support

R01 HD049667-02 Chiang (PI) 08/01/06-05/31/11

NIH/NICHHD

Regulation of Shh Signaling Activity in Limb Patterning

The major goal of this project is to understand the mechanism by which Shh regulate limb patterns during embryonic development.

Role: PI

6-FY07-399 Chiang (PI) 06/01/07-05/31/10

March of Dimes

Molecular Pathogenesis of Esophageal Atresia and Tracheal Atresia

The goal of the proposed project is to study the role of Bmp signaling pathway that regulates the growth and patterning of the trachea and esophagus.

Role: PI

Completed Research Support

R01 NS42205-04 Chiang (PI) 08/01/01-07/31/07

NIH/NINDS

Control of SHH Activity and Signaling in the Neural Tube

(Current application is a competitive renewal of this project)

The specific aims of this project are: 1) Cholesterol-modified Shh is essential to the normal differentiation of ventral neuronal cell types in the neural tube; 2) Shh counteracts Gli3 repressor function in the generation of ventral neural progenitor cells; 3) Gli3 repressor interferes with FA signaling in the ventral neural tube.

Role: PI

0555170B Chiang (PI) 07/01/05 - 06/30/07

American Heart Association

Gli3 Mouse Mutant as a Model for Pulmonary Atresia

The main goal of this project is to elucidate the mechanism by which Gli3 affects sixth arch artery development.

Role: PI

6-FY04-56 Chiang (PI) 06/01/04-05/31/07

March of Dimes

Molecular Basis of Gli3 Mutations in Human Syndromes

The major goal of this project is to reveal unexpected findings regarding Gli3 activities and shed light on the intricate mechanisms governing the essential roles of Gli3 in development and disease.

Role: PI