

## Cited Literature

- Alkema MJ, Bronk M, Verhoeven E, Otte A, van 't Veer LJ, Berns A, and van Lohuizen M. (1997a) Identification of Bmi-1-interacting proteins as constituents of a multimeric mammalian Polycomb complex. *Genes Dev* 11:226-240.
- Alkema MJ, Jacobs H, van Lohuizen M, and Berns A. (1997b) Perturbation of B and T cell development and predisposition to lymphomagenesis in Emu Bmi-1 transgenic mice require the Bmi-1 RING finger. *Oncogene* 15:899-910.
- Alkema MJ, van der Lugt NM, Bobeldijk RC, Berns A, and van Lohuizen M. (1995) Transformation of axial skeleton due to over-expression of bmi-1 in transgenic mice. *Nature* 374:724-727.
- Atsuta T, Fujimura S, Moriya H, Vidal M, Akasaka T, and Koseki H. (2001) Production of monoclonal antibodies against mammalian Ring1B proteins. *Hybridoma* 20:43-46.
- Aybar MJ and Mayor R. (2002) Early induction of neural crest cells: lessons learned from frog, fish and chick. *Curr Opin Genet Dev* 12:452-458.
- Baker JC, Beddington RS, and Harland RM. (1999) Wnt signaling in *Xenopus* embryos inhibits bmp4 expression and activates neural development. *Genes Dev* 13:3149-3159.

- Bang AG, Papalopulu N, Kintner C, and Goulding MD. (1997) Expression of Pax-3 is initiated in the early neural plate by posteriorizing signals produced by the organizer and by posterior non-axial mesoderm. *Development* 124:2075-2085.
- Basch ML, Bronner-Fraser M, and Garcia-Castro MI. (2006) Specification of the neural crest occurs during gastrulation and requires Pax7. *Nature* 441:218-222.
- Baskind HA, Na L, Ma Q, Patel MP, Geenen DL, and Wang QT. (2009) Functional conservation of *asx12*, a murine homolog for the *Drosophila* enhancer of trithorax and Polycomb group gene *asx*. *PLoS ONE* 4:e4750.
- Baylin SB and Ohm JE. (2006) Epigenetic gene silencing in cancer - a mechanism for early oncogenic pathway addiction? *Nat Rev Cancer* 6:107-116.
- Bellmeyer A, Krase J, Lindgren J, and LaBonne C. (2003) The protooncogene *c-myc* is an essential regulator of neural crest formation in *xenopus*. *Dev Cell* 4:827-839.
- Bermejo-Rodriguez C, Perez-Caro M, Perez-Mancera PA, Sanchez-Beato M, Piris MA, and Sanchez-Garcia I. (2006) Mouse cDNA microarray analysis uncovers *Slug* targets in mouse embryonic fibroblasts. *Genomics* 87:113-118.

- Bernstein BE, Mikkelsen TS, Xie X, Kamal M, Huebert DJ, Cuff J, Fry B, Meissner A, Wernig M, Plath K, Jaenisch R, Wagschal A, Feil R, Schreiber SL, and Lander ES. (2006) A bivalent chromatin structure marks key developmental genes in embryonic stem cells. *Cell* 125:315-326.
- Bhattacharyya S, Bailey AP, Bronner-Fraser M, and Streit A. (2004) Segregation of lens and olfactory precursors from a common territory: cell sorting and reciprocity of *Dlx5* and *Pax6* expression. *Dev Biol* 271:403-414.
- Boyer LA, Plath K, Zeitlinger J, Brambrink T, Medeiros LA, Lee TI, Levine SS, Wernig M, Tajonar A, Ray MK, Bell GW, Otte AP, Vidal M, Gifford DK, Young RA, and Jaenisch R. (2006) Polycomb complexes repress developmental regulators in murine embryonic stem cells. *Nature* 441:349-353.
- Bracken AP, Kleine-Kohlbrecher D, Dietrich N, Pasini D, Gargiulo G, Beekman C, Theilgaard-Monch K, Minucci S, Porse BT, Marine JC, Hansen KH, and Helin K. (2007) The Polycomb group proteins bind throughout the *INK4A-ARF* locus and are disassociated in senescent cells. *Genes Dev* 21:525-530.
- Bracken AP, Dietrich N, Pasini D, Hansen KH, and Helin K. (2006) Genome-wide mapping of Polycomb target genes unravels their roles in cell fate transitions. *Genes Dev* 20:1123-1136.

- Bronner-Fraser M. (2002) Molecular analysis of neural crest formation. *J Physiol Paris* 96:3-8.
- Bronner-Fraser M. (1998) Inductive interactions underlie neural crest formation. *Adv Pharmacol* 42:883-887.
- Bronner-Fraser M and Fraser SE. (1989) Developmental potential of avian trunk neural crest cells in situ. *Neuron* 3:755-766.
- Bronner-Fraser M and Fraser SE. (1988) Cell lineage analysis reveals multipotency of some avian neural crest cells. *Nature* 335:161-164.
- Brown ST, Wang J, and Groves AK. (2005) Dlx gene expression during chick inner ear development. *J Comp Neurol* 483:48-65.
- Cao R, Tsukada Y, and Zhang Y. (2005) Role of Bmi-1 and Ring1A in H2A ubiquitylation and Hox gene silencing. *Mol Cell* 20:845-854.
- Chamberlain SJ, Yee D, and Magnuson T. (2008) Polycomb repressive complex 2 is dispensable for maintenance of embryonic stem cell pluripotency. *Stem Cells* 26:1496-1505.
- Cheung M and Briscoe J. (2003) Neural crest development is regulated by the transcription factor Sox9. *Development* 130:5681-5693.

- Cohen KJ, Hanna JS, Prescott JE, and Dang CV. (1996) Transformation by the Bmi-1 oncoprotein correlates with its subnuclear localization but not its transcriptional suppression activity. *Mol Cell Biol* 16:5527-5535.
- Crane JF and Trainor PA. (2006) Neural crest stem and progenitor cells. *Annu Rev Cell Dev Biol* 22:267-286.
- Cui H, Ma J, Ding J, Li T, Alam G, and Ding HF. (2006) Bmi-1 regulates the differentiation and clonogenic self-renewal of I-type neuroblastoma cells in a concentration-dependent manner. *J Biol Chem* 281:34696-34704.
- Davidson EH, Rast JP, Oliveri P, Ransick A, Calestani C, Yuh CH, Minokawa T, Amore G, Hinman V, Arenas-Mena C, Otim O, Brown CT, Livi CB, Lee PY, Revilla R, Rust AG, Pan Z, Schilstra MJ, Clarke PJ, Arnone MI, Rowen L, Cameron RA, McClay DR, Hood L, and Bolouri H. (2002) A genomic regulatory network for development. *Science* 295:1669-1678.
- del Barrio MG and Nieto NM. (2002) Over-expression of Snail family members highlights their ability to promote chick neural crest formation. *Development* 129:1583-1593.
- Delcuve GP, Rastegar M, and Davie JR. (2009) Epigenetic control. *J Cell Physiol* 219:243-250.

- Denkers N, Garcia-Villalba P, Rodesch CK, Nielson KR, and Mauch TJ. (2004) FISHing for chick genes: Triple-label whole-mount fluorescence in situ hybridization detects simultaneous and overlapping gene expression in avian embryos. *Dev Dyn* 229:651-657.
- Dietrich N, Bracken AP, Trinh E, Schjerling CK, Koseki H, Rappsilber J, Helin K, and Hansen KH. (2007) Bypass of senescence by the Polycomb group protein CBX8 through direct binding to the INK4A-ARF locus. *Embo J* 26:1637-1648.
- Dottori M, Gross MK, Labosky P, and Goulding M. (2001) The winged-helix transcription factor Foxd3 suppresses interneuron differentiation and promotes neural crest cell fate. *Development* 128:4127-4138.
- Ezin AM, Fraser SE, and Bronner-Fraser M. (2009) Fate map and morphogenesis of presumptive neural crest and dorsal neural tube. *Dev Biol* Epub ahead of print.
- Fernandez-Garre P, Rodriguez-Gallardo L, Gallego-Diaz V, Alvarez IS, and Puelles L. (2002) Fate map of the chicken neural plate at stage 4. *Development* 129:2807-2822.
- Fraser PE and Sauka-Spengler T. (2004) Expression of the Polycomb group gene bmi-1 in the early chick embryo. *Gene Expr Patterns* 5:23-27.

- Gammill LS and Bronner-Fraser M. (2003) Neural crest specification: migrating into genomics. *Nat Rev Neurosci* 4:795-805.
- Gammill LS and Bronner-Fraser M. (2002) Genomic analysis of neural crest induction. *Development* 129:5731-5741.
- Gans C and Northcutt RG. (1983) Neural crest and the origin of vertebrates: a new head. *Science* 220:268-273.
- Garcia-Castro MI, Marcelle C, and Bronner-Fraser M. (2002) Ectodermal Wnt function as a neural crest inducer. *Science* 297:848-851.
- Garcia-Martinez V, Alvarez IS, and Schoenwolf GC. (1993) Locations of the ectodermal and nonectodermal subdivisions of the epiblast at stages 3 and 4 of avian gastrulation and neurulation. *J Exp Zool* 267:431-446.
- Geiss GK, Bumgarner RE, Birditt B, Dahl T, Dowidar N, Dunaway DL, Fell HP, Ferree S, George RD, Grogan T, James JJ, Maysuria M, Mitton JD, Oliveri P, Osborn JL, Peng T, Ratcliffe AL, Webster PJ, Davidson EH, Hood L, and Dimitrov K. (2008) Direct multiplexed measurement of gene expression with color-coded probe pairs. *Nat Biotechnol* 26:317-325.
- Grinberg AV, Hu CD, and Kerppola TK. (2004) Visualization of Myc/Max/Mad family dimers and the competition for dimerization in living cells. *Mol Cell Biol* 24:4294-4308.



- Hall BK. (2000) The neural crest as a fourth germ layer and vertebrates as quadroblastic not triploblastic. *Evol Dev* 2:3-5.
- Hamburger V and Hamilton HL. (1992) A series of normal stages in the development of the chick embryo. 1951. *Dev Dyn* 195:231-272.
- Haupt Y, Bath ML, Harris AW, and Adams JM. (1993) bmi-1 transgene induces lymphomas and collaborates with myc in tumorigenesis. *Oncogene* 8:3161-3164.
- Haupt Y, Alexander WS, Barri G, Klinken SP, and Adams JM. (1991) Novel zinc finger gene implicated as myc collaborator by retrovirally accelerated lymphomagenesis in E mu-myc transgenic mice. *Cell* 65:753-763.
- Hemenway CS, Halligan BW, and Levy LS. (1998) The Bmi-1 oncoprotein interacts with dinG and MPh2: the role of RING finger domains. *Oncogene* 16:2541-2547.
- Hemmati HD, Nakano I, Lazareff JA, Masterman-Smith M, Geschwind DH, Bronner-Fraser M, and Kornblum HI. (2003) Cancerous stem cells can arise from pediatric brain tumors. *Proc Natl Acad Sci U S A* 100:15178-15183.
- Hemmati-Brivanlou A and Melton D. (1997) Vertebrate neural induction. *Annu Rev Neurosci* 20:43-60.

- Holland LZ and Short S. (2008) Gene duplication, co-option and recruitment during the origin of the vertebrate brain from the invertebrate chordate brain. *Brain Behav Evol* 72:91-105.
- Hong CS and Saint-Jeannet JP. (2007) The activity of Pax3 and Zic1 regulates three distinct cell fates at the neural plate border. *Mol Biol Cell* 18:2192-2202.
- Hu CD and Kerppola TK. (2003) Simultaneous visualization of multiple protein interactions in living cells using multicolor fluorescence complementation analysis. *Nat Biotechnol* 21:539-545.
- Huang X and Saint-Jeannet JP. (2004) Induction of the neural crest and the opportunities of life on the edge. *Dev Biol* 275:1-11.
- Itahana K, Zou Y, Itahana Y, Martinez JL, Beausejour C, Jacobs JJ, Van Lohuizen M, Band V, Campisi J, and Dimri GP. (2003) Control of the replicative life span of human fibroblasts by p16 and the Polycomb protein Bmi-1. *Mol Cell Biol* 23:389-401.
- Jacobs JJ, Kieboom K, Marino S, DePinho RA, and van Lohuizen M. (1999a) The oncogene and Polycomb-group gene bmi-1 regulates cell proliferation and senescence through the ink4a locus. *Nature* 397:164-168.

Jacobs JJ, Scheijen B, Voncken JW, Kieboom K, Berns A, and van Lohuizen M.

(1999b) Bmi-1 collaborates with c-myc in tumorigenesis by inhibiting c-myc-induced apoptosis via INK4a/ARF. *Genes Dev* 13:2678-2690.

Khudyakov J and Bronner-Fraser M. (2009) Comprehensive spatiotemporal

analysis of early chick neural crest network genes. *Dev Dyn* 238:716-723.

Kim E, Goren A, and Ast G. (2008) Alternative splicing: current perspectives.

*Bioessays* 30:38-47.

Kim SH, Mitchell M, Fujii H, Llanos S, and Peters G. (2003) Absence of p16INK4a

and truncation of ARF tumor suppressors in chickens. *Proc Natl Acad Sci U S A* 100:211-216.

Kloosterman WP, Wienholds E, de Bruijn E, Kauppinen S, and Plasterk RH.

(2006) In situ detection of miRNAs in animal embryos using LNA-modified oligonucleotide probes. *Nat Methods* 3:27-29.

Knecht AK and Bronner-Fraser M. (2002) Induction of the neural crest: a

multigene process. *Nat Rev Genet* 3:453-461.

Kohler C and Villar CB. (2008) Programming of gene expression by Polycomb

group proteins. *Trends Cell Biol* 18:236-243.

- Kos R, Reedy MV, Johnson RL, and Erickson CA. (2001) The winged-helix transcription factor FoxD3 is important for establishing the neural crest lineage and repressing melanogenesis in avian embryos. *Development* 128:1467-1479.
- Ku M, Koche RP, Rheinbay E, Mendenhall EM, Endoh M, Mikkelsen TS, Presser A, Nusbaum C, Xie X, Chi AS, Adli M, Kasif S, Ptaszek LM, Cowan CA, Lander ES, Koseki H, and Bernstein BE. (2008) Genomewide analysis of PRC1 and PRC2 occupancy identifies two classes of bivalent domains. *PLoS Genet* 4:e1000242.
- Kubota K, Ohashi A, Imachi H, and Harada H. (2006) Improved in situ hybridization efficiency with locked-nucleic-acid-incorporated DNA probes. *Appl Environ Microbiol* 72:5311-5317.
- Kuroda H, Wessely O, and De Robertis EM. (2004) Neural induction in *Xenopus*: requirement for ectodermal and endomesodermal signals via Chordin, Noggin, beta-Catenin, and Cerberus. *PLoS Biol* 2:E92.
- LaBonne C and Bronner-Fraser M. (2000) Snail-related transcriptional repressors are required in *Xenopus* for both the induction of the neural crest and its subsequent migration. *Dev Biol* 221:195-205.
- LaBonne C and Bronner-Fraser M. (1999) Molecular mechanisms of neural crest formation. *Annu Rev Cell Dev Biol* 15:81-112.

- LaBonne C and Bronner-Fraser M. (1998) Neural crest induction in *Xenopus*: evidence for a two-signal model. *Development* 125:2403-2414.
- Lareau LF, Green RE, Bhatnagar RS, and Brenner SE. (2004) The evolving roles of alternative splicing. *Curr Opin Struct Biol* 14:273-282.
- Launay C, Fromentoux V, Shi DL, and Boucaut JC. (1996) A truncated FGF receptor blocks neural induction by endogenous *Xenopus* inducers. *Development* 122:869-880.
- Le Douarin N, Creuzet S, Couly G, and Dupin E. (2004) Neural crest cell plasticity and its limits. *Development* 131:4637-4650.
- Le Douarin N. (2004) The avian embryo as a model to study the development of the neural crest: a long and still ongoing story. *Mech Dev* 121:1089-1102.
- Le Douarin N and Kalcheim C. (1999) *The Neural Crest*. New York: Cambridge University Press, 2nd edn.
- Lee TI, Jenner RG, Boyer LA, Guenther MG, Levine SS, Kumar RM, Chevalier B, Johnstone SE, Cole MF, Isono K, Koseki H, Fuchikami T, Abe K, Murray HL, Zucker JP, Yuan B, Bell GW, Herbolsheimer E, Hannett NM, Sun K, Odom DT, Otte AP, Volkert TL, Bartel DP, Melton DA, Gifford DK, Jaenisch R, and Young RA. (2006) Control of developmental regulators by Polycomb in human embryonic stem cells. *Cell* 125:301-313.

- Lessard J and Sauvageau G. (2003) Bmi-1 determines the proliferative capacity of normal and leukaemic stem cells. *Nature* 423:255-260.
- Lewis EB. (1978) A gene complex controlling segmentation in *Drosophila*. *Nature* 276:565-570.
- Li J, Bench AJ, Piltz S, Vassiliou G, Baxter EJ, Ferguson-Smith AC, and Green AR. (2005) *L3mbtl*, the mouse orthologue of the imprinted *L3MBTL*, displays a complex pattern of alternative splicing and escapes genomic imprinting. *Genomics* 86:489-494.
- Light W, Vernon AE, Lasorella A, Iavarone A, and LaBonne C. (2005) *Xenopus* Id3 is required downstream of Myc for the formation of multipotent neural crest progenitor cells. *Development* 132:1831-1841.
- Luo T, Lee YH, Saint-Jeannet JP, and Sargent TD. (2003) Induction of neural crest in *Xenopus* by transcription factor AP2alpha. *Proc Natl Acad Sci U S A* 100:532-537.
- Luo T, Matsuo-Takasaki M, Thomas ML, Weeks DL, and Sargent TD. (2002) Transcription factor AP-2 is an essential and direct regulator of epidermal development in *Xenopus*. *Dev Biol* 245:136-144.

- Luo T, Matsuo-Takasaki M, Lim JH, and Sargent TD. (2001a) Differential regulation of Dlx gene expression by a BMP morphogenetic gradient. *Int J Dev Biol* 45:681-684.
- Luo T, Matsuo-Takasaki M, and Sargent TD. (2001b) Distinct roles for Distal-less genes Dlx3 and Dlx5 in regulating ectodermal development in *Xenopus*. *Mol Reprod Dev* 60:331-337.
- Maniatis T and Tasic B. (2002) Alternative pre-mRNA splicing and proteome expansion in metazoans. *Nature* 418:236-243.
- Mayor R, Morgan R, and Sargent MG. (1995) Induction of the prospective neural crest of *Xenopus*. *Development* 121:767-777.
- McKeown SJ, Lee VM, Bronner-Fraser M, Newgreen DF, and Farlie PG. (2005) Sox10 over-expression induces neural crest-like cells from all dorsoventral levels of the neural tube but inhibits differentiation. *Dev Dyn* 233:430-444.
- McLarren KW, Litsiou A, and Streit A. (2003) DLX5 positions the neural crest and preplacode region at the border of the neural plate. *Dev Biol* 259:34-47.
- Mende M, Christophorou NA, and Streit A. (2008) Specific and effective gene knock-down in early chick embryos using morpholinos but not pRFPRNAi vectors. *Mech Dev* 125:947-962.

- Mendenhall EM and Bernstein BE. (2008) Chromatin state maps: new technologies, new insights. *Curr Opin Genet Dev* 18:109-115.
- Merzdorf CS. (2007) Emerging roles for zic genes in early development. *Dev Dyn* 236:922-940.
- Meulemans D and Bronner-Fraser M. (2004) Gene-regulatory interactions in neural crest evolution and development. *Dev Cell* 7:291-299.
- Mikkelsen TS, Ku M, Jaffe DB, Issac B, Lieberman E, Giannoukos G, Alvarez P, Brockman W, Kim TK, Koche RP, Lee W, Mendenhall E, O'Donovan A, Presser A, Russ C, Xie X, Meissner A, Wernig M, Jaenisch R, Nusbaum C, Lander ES, and Bernstein BE. (2007) Genome-wide maps of chromatin state in pluripotent and lineage-committed cells. *Nature* 448:553-560.
- Mohn F, Weber M, Rebhan M, Roloff TC, Richter J, Stadler MB, Bibel M, and Schubeler D. (2008) Lineage-specific Polycomb targets and de novo DNA methylation define restriction and potential of neuronal progenitors. *Mol Cell* 30:755-766.
- Molofsky AV, He S, Bydon M, Morrison SJ, and Pardal R. (2005) Bmi-1 promotes neural stem cell self-renewal and neural development but not mouse growth and survival by repressing the p16Ink4a and p19Arf senescence pathways. *Genes Dev* 19:1432-1437.



Molofsky AV, Pardal R, Iwashita T, Park IK, Clarke MF, and Morrison SJ. (2003)

Bmi-1 dependence distinguishes neural stem cell self-renewal from progenitor proliferation. *Nature* 425:962-967.

Monsoro-Burq AH, Wang E, and Harland R. (2005) Msx1 and Pax3 cooperate to

mediate FGF8 and WNT signals during *Xenopus* neural crest induction.

*Dev Cell* 8:167-178.

Montero-Balaguer M Lang MR, Sachdev SW, Knappmeyer C, Stewart RA, De La

Guardia A, Hatzopoulos AK, and Knapik EW. (2006) The mother superior mutation ablates foxd3 activity in neural crest progenitor cells and

depletes neural crest derivatives in zebrafish. *Dev Dyn* 235:3199-3212.

Moroy T and Heyd F. (2007) The impact of alternative splicing in vivo: mouse

models show the way. *RNA* 13:1155-1171.

Morrison SJ, White PM, Zock C, and Anderson DJ. (1999) Prospective

identification, isolation by flow cytometry, and in vivo self-renewal of multipotent mammalian neural crest stem cells. *Cell* 96:737-749.

Nieto MA, Patel K, and Wilkinson DG. (1996) In situ hybridization analysis of

chick embryos in whole mount and tissue sections. *Methods Cell Biol*

51:219-235.

- Nieto MA, Sargent MG, Wilkinson DG, and Cooke J. (1994) Control of cell behavior during vertebrate development by Slug, a zinc finger gene. *Science* 264:835-839.
- Odenthal J and Nusslein-Volhard C. (1998) fork head domain genes in zebrafish. *Dev Genes Evol* 208:245-258.
- Orkin SH and Zon LI. (1997) Genetics of erythropoiesis: induced mutations in mice and zebrafish. *Annu Rev Genet* 31:33-60.
- Otte AP and Kwaks TH. (2003) Gene repression by Polycomb group protein complexes: a distinct complex for every occasion? *Curr Opin Genet Dev* 13:448-454.
- Park IK, Morrison SJ, and Clarke MF. (2004) Bmi-1, stem cells, and senescence regulation. *J Clin Invest* 113:175-179.
- Park IK, Qian D, Kiel M, Becker MW, Pihalja M, Weissman IL, Morrison SJ, and Clarke MF. (2003) Bmi-1 is required for maintenance of adult self-renewing haematopoietic stem cells. *Nature* 423:302-305.
- Pasini D, Bracken AP, Hansen JB, Capillo M, and Helin K. (2007) The Polycomb group protein Suz12 is required for embryonic stem cell differentiation. *Mol Cell Biol* 27:3769-3779.

- Pasini D, Bracken AP, Jensen MR, Lazzerini Denchi E, and Helin K. (2004) Suz12 is essential for mouse development and for EZH2 histone methyltransferase activity. *Embo J* 23:4061-4071.
- Pera E, Stein S, and Kessel M. (1999) Ectodermal patterning in the avian embryo: epidermis versus neural plate. *Development* 126:63-73.
- Phillips BT, Kwon HJ, Melton C, Houghtaling P, Fritz A, and Riley BB. (2006) Zebrafish msxB, msxC and msxE function together to refine the neural-nonneural border and regulate cranial placodes and neural crest development. *Dev Biol* 294:376-390.
- Pietersen AM, van Lohuizen M. 2008. Stem cell regulation by Polycomb repressors: postponing commitment. *Curr Opin Cell Biol* 20:201-207.
- Raible DW. (2006) Development of the neural crest: achieving specificity in regulatory pathways. *Curr Opin Cell Biol* 18:698-703.
- Ross RA and Spengler BA. (2007) Human neuroblastoma stem cells. *Semin Cancer Biol* 17:241-247.
- Saito Y, Kanai Y, Sakamoto M, Saito H, Ishii H, and Hirohashi S. (2002) Over-expression of a splice variant of DNA methyltransferase 3b, DNMT3b4, associated with DNA hypomethylation on pericentromeric satellite

regions during human hepatocarcinogenesis. *Proc Natl Acad Sci U S A* 99:10060-10065.

Sakai D, Suzuki T, Osumi N, and Wakamatsu Y. (2006) Cooperative action of Sox9, Snail2 and PKA signaling in early neural crest development. *Development* 133:1323-1333.

Sasai N, Mizuseki K, and Sasai Y. (2001) Requirement of FoxD3-class signaling for neural crest determination in *Xenopus*. *Development* 128:2525-2536.

Satijn DP and Otte AP. (1999) RING1 interacts with multiple Polycomb-group proteins and displays tumorigenic activity. *Mol Cell Biol* 19:57-68.

Sato T, Sasai N, and Sasai Y. (2005) Neural crest determination by co-activation of Pax3 and Zic1 genes in *Xenopus* ectoderm. *Development* 132:2355-2363.

Sauka-Spengler T and Bronner-Fraser M. (2008) A gene regulatory network orchestrates neural crest formation. *Nat Rev Mol Cell Biol* 9:557-568.

Sauka-Spengler T, Meulemans D, Jones M, and Bronner-Fraser M. (2007) Ancient evolutionary origin of the neural crest gene regulatory network. *Dev Cell* 13:405-420.

Schuettengruber B, Chourrout D, Vervoort M, Leblanc B, and Cavalli G. (2007) Genome regulation by Polycomb and trithorax proteins. *Cell* 128:735-745.

- Schwartz YB and Pirrotta V. (2008) Polycomb complexes and epigenetic states. *Curr Opin Cell Biol* 20:266-273.
- Schwartz YB and Pirrotta V. (2007) Polycomb silencing mechanisms and the management of genomic programmes. *Nat Rev Genet* 8:9-22.
- Selleck MA and Bronner-Fraser M. (1996) The genesis of avian neural crest cells: a classic embryonic induction. *Proc Natl Acad Sci U S A* 93:9352-9357.
- Shyu YJ, Liu H, Deng X, and Hu CD. (2006) Identification of new fluorescent protein fragments for bimolecular fluorescence complementation analysis under physiological conditions. *Biotechniques* 40:61-66.
- Sieber-Blum M and Hu Y. 2008. Epidermal Neural Crest Stem Cells (EPI-NCSC) and Pluripotency. *Stem Cell Rev* 4:256-60.
- Sparmann A and van Lohuizen M. (2006) Polycomb silencers control cell fate, development and cancer. *Nat Rev Cancer* 6:846-856.
- Squazzo SL, O'Geen H, Komashko VM, Krig SR, Jin VX, Jang SW, Margueron R, Reinberg D, Green R, and Farnham PJ. (2006) Suz12 binds to silenced regions of the genome in a cell-type-specific manner. *Genome Res* 16:890-900.

- Stamm S, Ben-Ari S, Rafalska I, Tang Y, Zhang Z, Toiber D, Thanaraj TA, and Soreq H. 2005. Function of alternative splicing. *Gene* 344:1-20.
- Stewart RA, Arduini BL, Berghmans S, George RE, Kanki JP, Henion PD, and Look AT. (2006) Zebrafish *foxd3* is selectively required for neural crest specification, migration and survival. *Dev Biol* 292:174-188.
- Stock JK, Giadrossi S, Casanova M, Brookes E, Vidal M, Koseki H, Brockdorff N, Fisher AG, and Pombo A. (2007) Ring1-mediated ubiquitination of H2A restrains poised RNA polymerase II at bivalent genes in mouse ES cells. *Nat Cell Biol* 9:1428-1435.
- Streit A and Stern CD. (1999) Establishment and maintenance of the border of the neural plate in the chick: involvement of FGF and BMP activity. *Mech Dev* 82:51-66.
- Su YH, Li E, Geiss GK, Longabaugh WJ, Kramer A, and Davidson EH. (2009) A perturbation model of the gene regulatory network for oral and aboral ectoderm specification in the sea urchin embryo. *Dev Biol* 329:410-21.
- Suzuki A, Ueno N, and Hemmati-Brivanlou A. (1997) *Xenopus msx1* mediates epidermal induction and neural inhibition by BMP4. *Development* 124:3037-3044.

- Tajul-Arifin K, Teasdale R, Ravasi T, Hume DA, and Mattick JS. (2003) Identification and analysis of chromodomain-containing proteins encoded in the mouse transcriptome. *Genome Res* 13:1416-1429.
- Takahara Y, Tomotsune D, Shirai M, Katoh-Fukui Y, Nishii K, Motaleb MA, Nomura M, Tsuchiya R, Fujita Y, Shibata Y, Higashinakagawa T, and Shimada K. (1997) Targeted disruption of the mouse homologue of the *Drosophila* polyhomeotic gene leads to altered anteroposterior patterning and neural crest defects. *Development* 124:3673-3682.
- Tan J, Yang X, Zhuang L, Jiang X, Chen W, Lee PL, Karuturi RK, Tan PB, Liu ET, and Yu Q. (2007) Pharmacologic disruption of Polycomb-repressive complex 2-mediated gene repression selectively induces apoptosis in cancer cells. *Genes Dev* 21:1050-1063.
- Taneyhill LA, Coles EG, and Bronner-Fraser M. (2007) Snail2 directly represses cadherin6B during epithelial-to-mesenchymal transitions of the neural crest. *Development* 134:1481-1490.
- Teng L, Mundell NA, Frist AY, Wang Q, and Labosky PA. (2008) Requirement for Foxd3 in the maintenance of neural crest progenitors. *Development* 135:1615-1624.

- Tomotsune D, Shirai M, Takihara Y, and Shimada K. (2000) Regulation of Hoxb3 expression in the hindbrain and pharyngeal arches by rae28, a member of the mammalian Polycomb group of genes. *Mech Dev* 98:165-169.
- Tribulo C, Aybar MJ, Nguyen VH, Mullins MC, and Mayor R. (2003) Regulation of Msx genes by a Bmp gradient is essential for neural crest specification. *Development* 130:6441-6452.
- van der Lugt NM, Alkema M, Berns A, and Deschamps J. (1996) The Polycomb-group homolog Bmi-1 is a regulator of murine Hox gene expression. *Mech Dev* 58:153-164.
- van der Lugt NM, Domen J, Linders K, van Roon M, Robanus-Maandag E, te Riele H, van der Valk M, Deschamps J, Sofroniew M, van Lohuizen M, et al. (1994) Posterior transformation, neurological abnormalities, and severe hematopoietic defects in mice with a targeted deletion of the bmi-1 proto-oncogene. *Genes Dev* 8:757-769.
- van der Stoop P, Boutsma EA, Hulsman D, Noback S, Heimerikx M, Kerkhoven RM, Voncken JW, Wessels LF, and van Lohuizen M. (2008) Ubiquitin E3 ligase Ring1b/Rnf2 of Polycomb repressive complex 1 contributes to stable maintenance of mouse embryonic stem cells. *PLoS ONE* 3:e2235.
- Venables JP. (2006) Unbalanced alternative splicing and its significance in cancer. *Bioessays* 28:378-386.



- Voncken JW, Niessen H, Neufeld B, Rennefahrt U, Dahlmans V, Kubben N, Holzer B, Ludwig S, and Rapp UR. (2005) MAPKAP kinase 3pK phosphorylates and regulates chromatin association of the Polycomb group protein Bmi-1. *J Biol Chem* 280:5178-5187.
- Voncken JW, Roelen BA, Roefs M, de Vries S, Verhoeven E, Marino S, Deschamps J, and van Lohuizen M. (2003) Rnf2 (Ring1b) deficiency causes gastrulation arrest and cell cycle inhibition. *Proc Natl Acad Sci U S A* 100:2468-2473.
- Voncken JW, Schweizer D, Aagaard L, Sattler L, Jantsch MF, and van Lohuizen M. (1999) Chromatin-association of the Polycomb group protein BMI-1 is cell cycle-regulated and correlates with its phosphorylation status. *J Cell Sci* 112:4627-4639.
- Wakamatsu Y, Watanabe Y, Nakamura H, and Kondoh H. (1997) Regulation of the neural crest cell fate by N-myc: promotion of ventral migration and neuronal differentiation. *Development* 124:1953-1962.
- Wang H, Wang L, Erdjument-Bromage H, Vidal M, Tempst P, Jones RS, and Zhang Y. (2004) Role of histone H2A ubiquitination in Polycomb silencing. *Nature* 431:873-878.
- Whitcomb SJ, Basu A, Allis CD, and Bernstein E. (2007) Polycomb Group proteins: an evolutionary perspective. *Trends Genet* 23:494-502.

Wilson SI and Edlund T. (2001) Neural induction: toward a unifying mechanism. *Nat Neurosci* 4 Suppl:1161-1168.

Wilson SI, Rydstrom A, Trimborn T, Willert K, Nusse R, Jessell TM, and Edlund T. (2001) The status of Wnt signalling regulates neural and epidermal fates in the chick embryo. *Nature* 411:325-330.

Wilson SI, Graziano E, Harland R, Jessell TM, and Edlund T. (2000) An early requirement for FGF signalling in the acquisition of neural cell fate in the chick embryo. *Curr Biol* 10:421-429.

Woda JM, Pastagia J, Mercola M, and Artinger KB. (2003) Dlx proteins position the neural plate border and determine adjacent cell fates. *Development* 130:331-342.

Xu Q and Wilkinson D. (1998) In situ hybridisation of mRNA with hapten labeled probes. In *Situ Hybridisation: A Practical Approach*. Oxford: Oxford University Press, 87-106.

Yamaki M, Isono K, Takada Y, Abe K, Akasaka T, Tanzawa H, and Koseki H. (2002) The mouse *Edr2* (*Mph2*) gene has two forms of mRNA encoding 90- and 36-kDa polypeptides. *Gene* 288:103-110.

Yang L, Zhang H, Hu G, Wang H, Abate-Shen C, and Shen MM. (1998) An early phase of embryonic Dlx5 expression defines the rostral boundary of the neural plate. *J Neurosci* 18:8322-8330.

Yu JK, Meulemans D, McKeown SJ, and Bronner-Fraser M. (2008) Insights from the amphioxus genome on the origin of vertebrate neural crest. *Genome Res* 18:1127-1132.