Supporting Information

Bye et al. 10.1073/pnas.1501989112

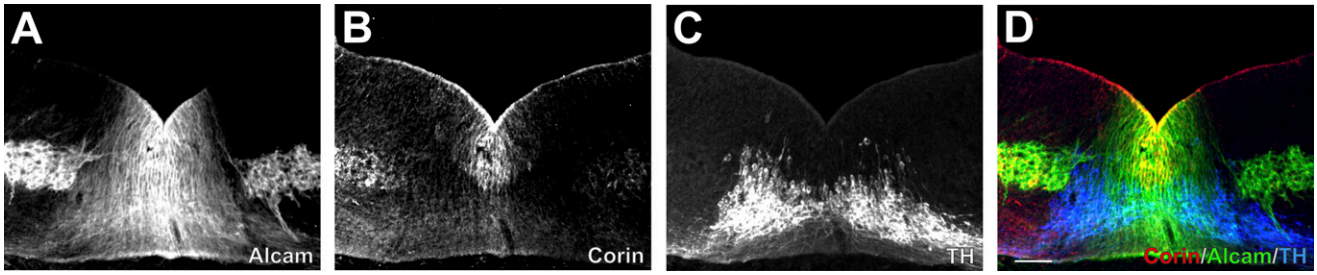


Fig. S1. Immunohistochemistry in E12.5 mouse VM shows the broad expression of (*A*) Alcam throughout the DA neurogenic zone relative to (*B*) Corin, which has a more discrete pattern of expression close to the midline. (*C*) TH is also included in the merged image in *D* for context. (Scale bar: 50 μm.)

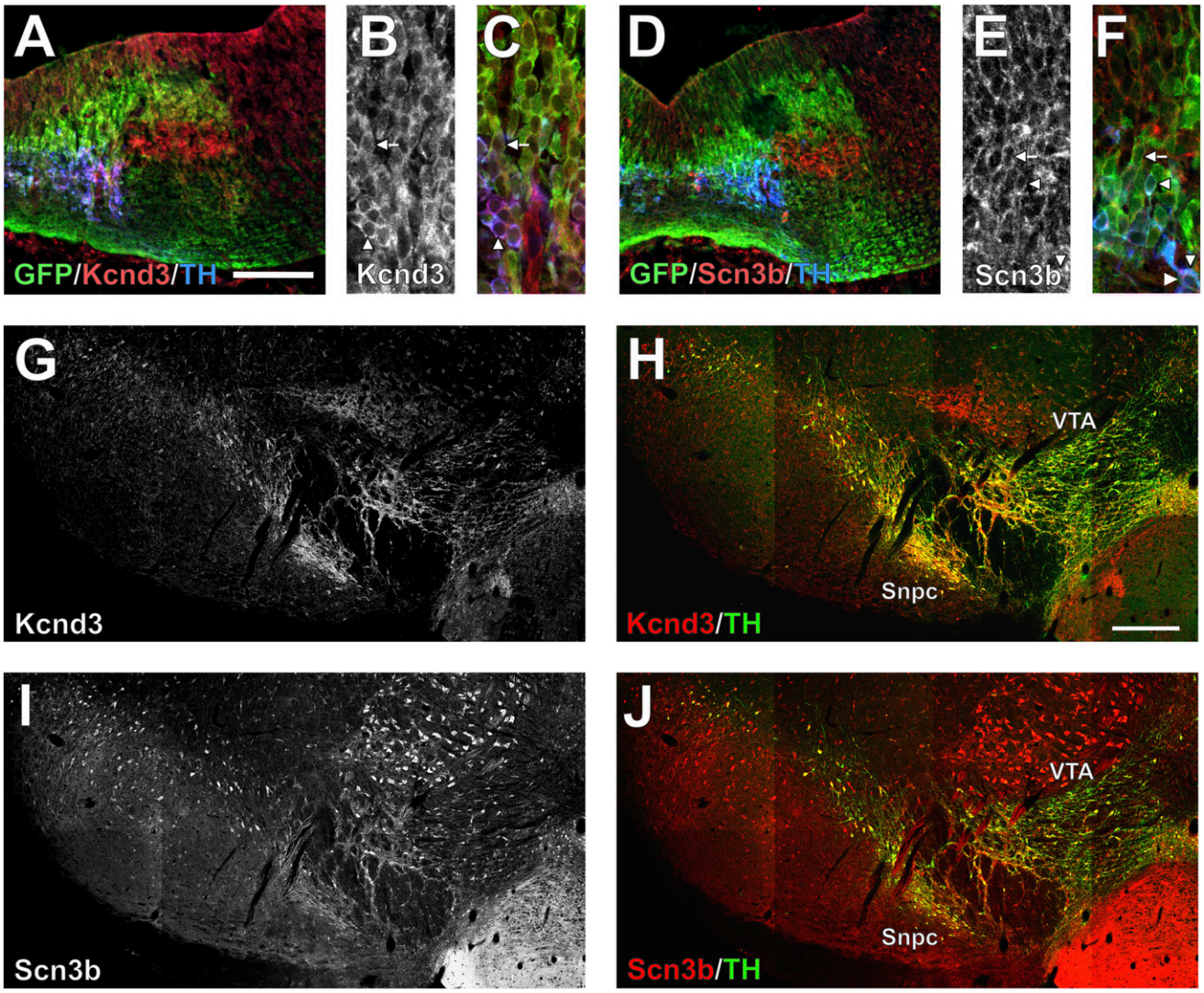


Fig. S2. Expression of transmembrane ion channel subunits in the developing and adult midbrain. Coronal section through the E12.5 *Ngn2*-GFP mouse VM shows that (*A*–*C*) Kcnd3 (red) and (*D*–*F*) Scn3b (red) were expressed in GFP^{Pos} neuroblasts in the intermediate zone (arrows in *B* and *E*) and persisted in TH^{+} (blue) neurons in the mantle zone (arrowheads in *B* and *E*). Tiled composite images of adult mouse midbrain showing immunohistochemistry for Kcnd3 and Scn3b (*G*–*J*). In the adult mouse midbrain, both Kcnd3 (*G*) and Scn3b (*I*) were expressed in TH^{+} DA neurons (green in *H* and *J*), with stronger expression in the Snpc compared with the VTA neurons. Snpc, Substantia nigra pars compacta; VTA, ventral tegmental area. (Scale bar: *A*, *D*, 100 μm; *G*–*J*, 250 μm.)

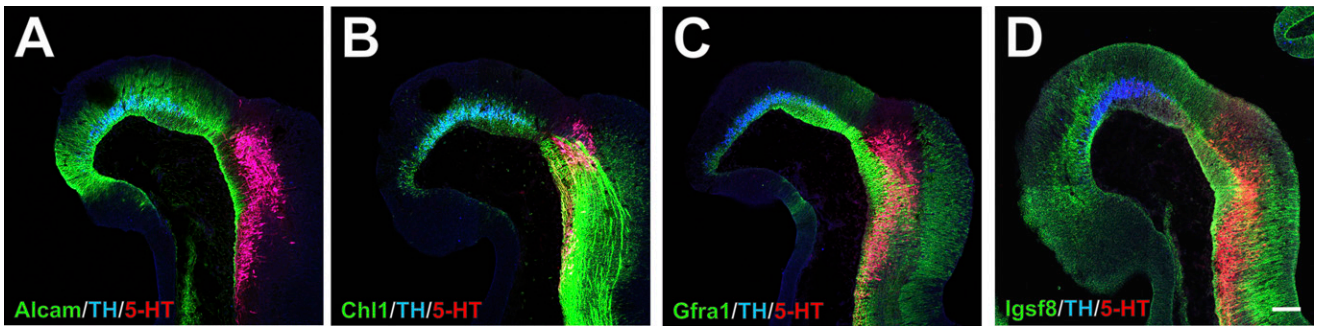
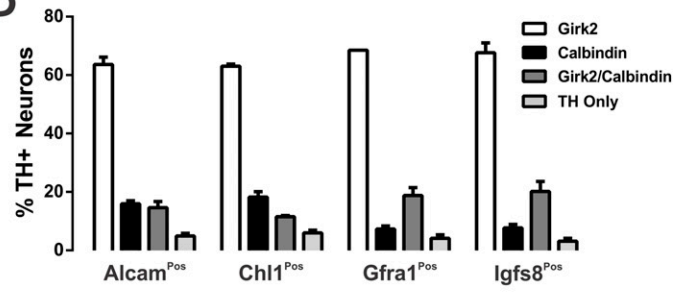
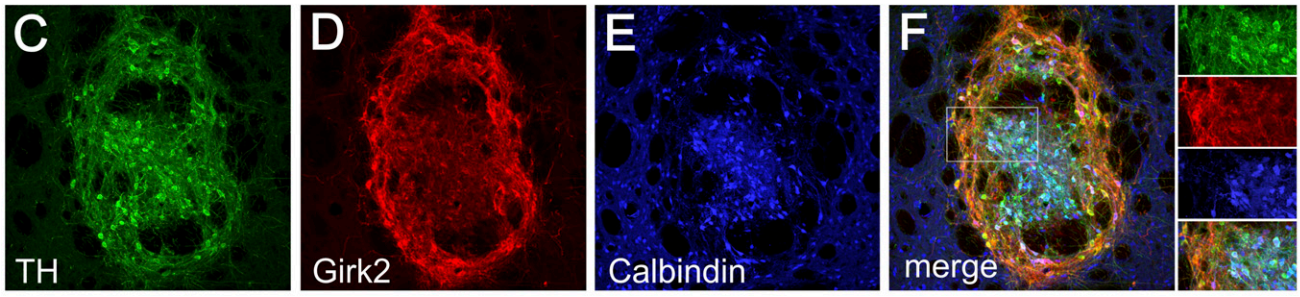


Fig. S3. Expression of transmembrane proteins in sagittal sections of the developing mouse VM. Representative images of immunohistochemistry of sagittal mouse E12.5 VM showing the serotonergic domain ($5HT^{+}$; red), dopaminergic domain (TH^{+}; blue), and transmembrane protein (*A*) Alcam, (*B*) Chl1, (*C*) Gfra1, and (*D*) Igsf8 immunoreactivity. (Scale bar: 100 μm.)

A

Transplanted Cells	Alcam	Chl1	Gfra1	Igsf8
Positive Fraction	24 000 (n=4)	39 144 (n=3)	57 750 (n=6)	57 750 (n=3)
Negative Fraction	67 500 (n=4)	93 200 (n=4)	38 940 (n=5)	38 940 (n=3)





G

	Alcam		Chl1		Gfra1		Igsf8	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Cells Grafted	24 000	67 500	39 144	93 200	57 750	38 940	57 750	38 940
TH^+ (% grafted)	1.52 ± 0.49	0.05 ± 0.01	1.10 ± 0.44	0.37 ± 0.12	0.58 ± 0.19	0.08 ± 0.01	0.73 ± 0.27	0.13 ± 0.06
$5HT^+$ (% grafted)	0.29 ± 0.09	0.26 ± 0.05	0.24 ± 0.09	0.36 ± 0.06	0.06 ± 0.01	0.51 ± 0.07	0.10 ± 0.04	0.07 ± 0.04

Fig. S4. Overview of grafting parameters and DA subtype analysis of FACS-sorted grafts. *A* shows the number of animals and the number of cells transplanted per animal in each group for histological analysis after FACS sorting of E14.5 rat VM (corresponds to data in Fig. 4). (*B*) The average (± SEM) number of TH^+/$Girk2^+$ (A9), TH^+/$Calbindin^+$ (A10), TH^+/$Girk2^+$/$Calbindin^+$, or TH^+ (TH only) neurons shown as a percentage of the total number of TH^+ neurons 4 wk after transplantation (only groups from positive cell fractions are included; many of the negative cell fraction groups had insufficient TH^+ numbers for quantification). (*C*) TH^+, (*D*) $Girk2^+$, (*E*) $Calbindin^+$, and (*F*) the merged image in a representative graft from the $Alcam^{Pos}$ group show a typical mixed composition of $Girk2^+$ and $Calbindin^+$ cell types 6 wk after transplantation. *F*, *Inset* shows a magnified region of the graft and illustrates the mixed A9 ($Girk2^+$) and A10 ($Calbindin^+$) composition, with the A9 neurons located primarily through the graft periphery and A10 neurons located in the graft center. (*G*) Table showing the number of cells grafted for each group and the average percentage (± SEM) of TH^+ or $5HT^+$ neurons as a fraction of total cells grafted 4 wk after transplantation (corresponds to data in Fig. 4).

Table S1. The full list of significantly changed genes in the *Ngn2*-GFP^{Pos} population relative to the *Lmx1a*-GFP^{Neg} reference population

UGRepAcc	Symbol	Name	Fold change	*P* value
Genes up-regulated in Ngn2-GFP–positive VM				
NM_029529	Slc35d3	Solute carrier family 35, member D3	27.64	0.00000
NM_009377	Th	Tyrosine hydroxylase	22.63	0.00002
NM_033652	Lmx1a	LIM homeobox transcription factor 1α	19.10	0.00000
NM_172870	Bnc2	Basonuclin 2	13.93	0.00000
NM_172870	4930563E18Rik	RIKEN cdna 4930563E18 gene	13.10	0.00403
NM_172815	Rspo2	R-spondin 2 homolog (*Xenopus laevis*)	11.76	0.00000
NM_001009978	Pde1a	Phosphodiesterase 1A, calmodulin-dependent	11.67	0.00011
NM_145377	Trim41	Tripartite motif-containing 41	9.62	0.00514
NM_001122756	Corin	Corin	9.12	0.00063
NM_023815	Trp53rk	Transformation-related protein 53-regulating kinase	8.91	0.02114
NM_001198808	Sfmbt2	Scm-like with four mbt domains 2	8.44	0.00236
NM_146260	Tmie	Transmembrane inner ear	8.31	0.00775
NM_175647	Dmrta1	Doublesex and mab-3-related transcription factor-like family A1	7.07	0.00033
NM_175647	A930009L07Rik	RIKEN cdna A930009L07 gene	6.96	0.00000
NM_009655	Alcam	Activated leukocyte cell adhesion molecule	6.65	0.00001
NM_001081656	Neurl1b	Neuralized homolog 1b (*Drosophila*)	6.25	0.00033
NM_025696	Sorcs3	Sortilin-related VPS10 domain containing receptor 3	6.16	0.00396
NM_001139509	Nr4a2	Nuclear receptor subfamily 4, group A, member 2	6.16	0.00000
NM_001163741	1110021J02Rik	RIKEN cdna 1110021J02 gene	6.02	0.00780
NM_001109753	Sv2b	Synaptic vesicle glycoprotein 2 b	5.88	0.00006
NM_001159317	Il1rap	IL-1 receptor accessory protein	5.83	0.00004
NM_001159317	Micalcl	MICAL C-terminal-like	5.53	0.00024
NM_001042451	Snca	Synuclein, α	5.40	0.00000
NM_001039347	Kcnd3	Potassium voltage-gated channel, Shal-related family, member 3	5.36	0.00128
NM_019626	Cbln1	Cerebellin 1 precursor protein	5.36	0.00000
NM_001080780	Ret	Ret proto-oncogene	5.16	0.00000
NM_001079847	Gpr64	G protein-coupled receptor 64	5.12	0.01411
NM_001079847	Gm2694	Predicted gene 2694	4.85	0.00013
NM_001085373	Mcc	Mutated in colorectal cancers	4.78	0.00397
NM_001085373	C130021I20Rik	Riken cdna C130021I20 gene	4.56	0.00000
NM_153509	AF529169	Cdna sequence AF529169	4.49	0.00077
NM_001099635	Myh3	Myosin, heavy polypeptide 3, skeletal muscle, embryonic	4.42	0.01942
NM_009525	Wnt5b	Wingless-related MMTV integration site 5B	4.42	0.00039
NM_001101640	Tmem207	Transmembrane protein 207	4.09	0.03664
NM_134130	Abhd3	Abhydrolase domain containing 3	3.94	0.00155
NM_013646	Rora	RAR-related orphan receptor-α	3.65	0.00289
NM_175631	Cbln4	Cerebellin 4 precursor protein	3.51	0.00007
NM_053255	Elac1	Elac homolog 1 (*Escherichia coli*)	3.48	0.02543
NM_053105	Klhl1	Kelch-like 1 (*Drosophila*)	3.40	0.00003
NM_011947	Map3k3	Mitogen-activated protein kinase kinase kinase 3	3.40	0.01820
NM_001081035	Nav3	Neuron navigator 3	3.38	0.00013
NM_026791	Fbxw9	F-box and WD-40 domain protein 9	3.38	0.03154
NM_011978	Slc27a2	Solute carrier family 27 (fatty acid transporter), member 2	3.35	0.00156
NM_018884	Pdzrn3	PDZ domain containing RING finger 3	3.30	0.00003
NM_001168684	Tmcc3	Transmembrane and coiled coil domains 3	3.27	0.00060
NM_175314	Adamts9	A disintegrin-like and metallopeptidase (reprolysin type) with thrombospondin type 1 motif, 9	3.25	0.00040
NM_029337	Ep400	E1A-binding protein p400	3.25	0.01103
NM_010637	Klf4	Kruppel-like factor 4 (gut)	3.25	0.00001
NM_178915	Tmem179	Transmembrane protein 179	3.20	0.01769
NM_001163755	Skor1	SKI family transcriptional corepressor 1	3.15	0.00017
NM_008566	Mcm5	Minichromosome maintenance-deficient 5, cell division cycle 46 (*S. cerevisiae*)	3.01	0.00817
NM_020606	Parva	Parvin, α	2.94	0.00519
NM_010279	Gfra1	Glial cell line derived neurotrophic factor family receptor-α1	2.92	0.00002
NM_144557	Myrip	Myosin VIIA and Rab interacting protein	2.92	0.00019
NM_178804	Slit2	Slit homolog 2 (*Drosophila*)	2.89	0.00026
NM_001110843	Cacna2d1	Calcium channel, voltage-dependent, α2/δ-subunit 1	2.89	0.00069
NM_138649	Syt17	Synaptotagmin XVII	2.89	0.00672
NM_007697	Chl1	Cell adhesion molecule with homology to L1CAM	2.87	0.00025
NM_001164086	Homer2	Homer homolog 2 (*Drosophila*)	2.85	0.00003

Table S1. Cont.

UGRepAcc	Symbol	Name	Fold change	*P* value
NM_010750	Mab21l1	Mab-21-like 1 (*C. elegans*)	2.83	0.00297
NM_001162904	Mdm1	Transformed mouse 3T3 cell double minute 1	2.83	0.00331
NM_011040	Pax8	Paired box gene 8	2.81	0.02377
NM_001080969	Thg1l	Trna-histidine guanylyltransferase 1-like (*S. cerevisiae*)	2.79	0.00175
NM_152895	Kdm5b	Lysine (K)-specific demethylase 5B	2.76	0.00031
NM_011074	Cdk14	Cyclin-dependent kinase 14	2.72	0.00186
NM_011074	1700093J21Rik	RIKEN cdna 1700093J21 gene	2.70	0.02035
NM_010095	Ebf2	Early B-cell factor 2	2.68	0.00007
NM_010572	Irs4	Insulin receptor substrate 4	2.66	0.00662
NM_011416	Smarca2	SWI/SNF related, matrix-associated, actin-dependent regulator of chromatin, subfamily a, member 2	2.62	0.00030
NM_001145888	Zfat	Zinc finger and AT hook domain containing	2.62	0.00821
NM_001190703	Dlk1	δ-Like 1 homolog (*Drosophila*)	2.60	0.00487
NM_001190703	1700013G23Rik	RIKEN cdna 1700013G23 gene	2.60	0.02167
NM_031998	Tsga14	Testis-specific gene A14	2.58	0.01648
NM_207677	Dedd2	Death effector domain-containing DNA-binding protein 2	2.58	0.03270
NM_207677	2700029L08Rik	RIKEN cdna 2700029L08 gene	2.58	0.00034
NM_201518	Flrt2	Fibronectin leucine-rich transmembrane protein 2	2.56	0.00015
NM_001163610	Nhsl2	NHS-like 2	2.56	0.01881
NM_008102	Gch1	GTP cyclohydrolase 1	2.54	0.00002
NM_080419	Igsf8	Ig superfamily, member 8	2.52	0.00391
NM_010878	Nck1	Noncatalytic region of tyrosine kinase adaptor protein 1	2.50	0.00630
NM_001113545	Lima1	LIM domain and actin-binding 1	2.48	0.00657
NM_020287	Insm2	Insulinoma-associated 2	2.48	0.01472
NM_013790	Abcc5	ATP-binding cassette, subfamily C (CFTR/MRP), member 5	2.46	0.00307
NM_001101488	Gsg1l	GSG1-like	2.46	0.01013
NM_007701	Vsx2	Visual system homeobox 2	2.46	0.01828
NM_080728	Myh7	Myosin, heavy polypeptide 7, cardiac muscle, β	2.44	0.00498
NM_001163640	Chn2	Chimerin (chimaerin) 2	2.44	0.01999
NM_016886	Gria3	Glutamate receptor, ionotropic, AMPA3 (α3)	2.44	0.00011
NM_018741	Igfbpl1	Insulin-like growth factor-binding protein-like 1	2.42	0.00116
NM_001024955	Pik3r1	Phosphatidylinositol 3-kinase, regulatory subunit, polypeptide 1 (p85α)	2.42	0.01385
NM_172260	Cep68	Centrosomal protein 68	2.42	0.01286
NM_001145820	Gpd2	Glycerol phosphate dehydrogenase 2, mitochondrial	2.42	0.00043
NM_009829	Ccnd2	Cyclin D2	2.41	0.00468
NM_001142411	Zfp937	Zinc finger protein 937	2.41	0.04674
NM_001077403	Nrp2	Neuropilin 2	2.39	0.00006
NM_001077403	5930412G12Rik	RIKEN cdna 5930412G12 gene	2.39	0.02531
NM_013873	Sult4a1	Sulfotransferase family 4A, member 1	2.39	0.00191
NM_001122758	Pcdh7	Protocadherin 7	2.33	0.00345
NM_001039371	Slc22a15	Solute carrier family 22 (organic anion/cation transporter), member 15	2.33	0.00240
NM_001081280	Nlrc3	NLR family, CARD domain containing 3	2.33	0.00227
NM_001164620	Ccdc157	Coiled-coil domain containing 157	2.33	0.00164
NM_001083917	Scn3b	Sodium channel, voltage-gated, type III, β	2.30	0.00501
NM_001029850	Magi1	Membrane associated guanylate kinase, WW and PDZ domain containing 1	2.26	0.00016
NM_009640	Angpt1	Angiopoietin 1	2.26	0.02225
NM_001033253	Plekhg1	Pleckstrin homology domain containing, family G (with rhogef domain) member 1	2.26	0.00444
NM_001252572	Cttn	Cortactin	2.24	0.02811
NM_172592	Srek1	Splicing regulatory glutamine/lysine-rich protein 1	2.24	0.00135
NM_016801	Stx1a	Syntaxin 1A (brain)	2.24	0.00158
NM_173437	Nav1	Neuron navigator 1	2.21	0.00649
NM_011855	Odz1	Odd Oz/ten-m homolog 1 (*Drosophila*)	2.21	0.01258
NM_001114541	Fam113a	Family with sequence similarity 113, member A	2.21	0.00120
NM_013813	Epb4.1l3	Erythrocyte protein band 4.1-like 3	2.19	0.00270
NM_053144	Pcdhb19	Protocadherin β19	2.19	0.03557
NM_027782	Kctd6	Potassium channel tetramerisation domain containing 6	2.18	0.00029
NM_177271	Samd5	Sterile α-motif domain containing 5	2.18	0.00007
NM_010725	Lmx1b	LIM homeobox transcription factor 1β	2.16	0.00070

Table S1. Cont.

UGRepAcc	Symbol	Name	Fold change	*P* value
NM_026623	Nudt21	Nudix (nucleoside diphosphate-linked moiety X)-type motif 21	2.14	0.04953
NM_173016	Vat1l	Vesicle amine transport protein 1 homolog-like (*T. californica*)	2.14	0.00049
NM_001033172	Rab11fip2	RAB11 family-interacting protein 2 (class I)	2.14	0.01292
NM_011636	Plscr1	Phospholipid scramblase 1	2.13	0.00020
NM_145129	Chrna3	Cholinergic receptor, nicotinic, α-polypeptide 3	2.11	0.00340
NM_001163348	Ntng1	Netrin G1	2.09	0.00020
NM_080853	Slc17a6	Solute carrier family 17 (sodium-dependent inorganic phosphate cotransporter), member 6	2.09	0.00256
NM_177753	Sox21	SRY-box containing gene 21	2.09	0.00706
NM_080288	Elmo1	Engulfment and cell motility 1, ced-12 homolog (*C. elegans*)	2.08	0.00059
NM_007792	Csrp2	Cysteine and glycine-rich protein 2	2.08	0.02040
NM_172665	Pdk1	Pyruvate dehydrogenase kinase, isoenzyme 1	2.06	0.01696
NM_139228	Rhbdl3	Rhomboid, veinlet-like 3 (*Drosophila*)	2.06	0.02957
NM_001244891	Celf1	CUGBP, Elav-like family member 1	2.06	0.00896
NM_008651	Mybl1	Myeloblastosis oncogene-like 1	2.06	0.02371
NM_178873	Adck2	Aarf domain containing kinase 2	2.05	0.00070
NM_001025559	Sox6	SRY-box containing gene 6	2.05	0.00144
NM_001198811	Frem1	Fras1 related extracellular matrix protein 1	2.03	0.00394
NM_010860	Myl6	Myosin, light polypeptide 6, alkali, smooth muscle and nonmuscle	2.03	0.02281
NM_008847	Pip5k1a	Phosphatidylinositol-4-phosphate 5-kinase, type 1α	2.03	0.00220
NM_001042607	Ryk	Receptor-like tyrosine kinase	2.03	0.01915
NM_007930	Enc1	Ectodermal-neural cortex 1	2.03	0.02363
NM_008259	Foxa1	Forkhead box A1	2.03	0.00077
NM_001037877	Tcf25	Transcription factor 25 (basic helix–loop–helix)	2.03	0.01133
NM_178118	Dixdc1	DIX domain containing 1	2.02	0.00576
NM_172523	Slc18a2	Solute carrier family 18 (vesicular monoamine), member 2	2.02	0.00133
NM_001166661	Ccdc85a	Coiled-coil domain containing 85A	2.02	0.00015
NM_153168	Lars2	Leucyl-trna synthetase, mitochondrial	2.02	0.01478
NM_139272	Galnt2	UDP-*N*-acetyl-α-D-galactosamine:polypeptide *N*-acetylgalactosaminyltransferase 2	2.02	0.01662
Genes down-regulated in Ngn2-GFP–positive VM				
NM_008219	Hbb-bh1	Hemoglobin Z, β-like embryonic chain	−270.18	0.00005
NM_010405	Hba-x	Hemoglobin X, α-like embryonic chain in Hba complex	−87.09	0.00014
NM_133245	Ahsp	α-Hemoglobin stabilizing protein	−68.07	0.00000
NM_019467	Aif1	Allograft inflammatory factor 1	−56.15	0.00899
NM_008221	Hbb-y	Hemoglobin Y, β-like embryonic chain	−52.79	0.00001
NM_001037859	Csf1r	Colony stimulating factor 1 receptor	−52.79	0.00003
NM_172621	Clic5	Chloride intracellular channel 5	−40.63	0.00005
NM_010745	Ly86	Lymphocyte antigen 86	−38.50	0.00002
NM_010686	Laptm5	Lysosomal-associated protein transmembrane 5	−38.20	0.00000
NM_011403	Slc4a1	Solute carrier family 4 (anion exchanger), member 1	−33.26	0.00000
NM_021281	Ctss	Cathepsin S	−32.75	0.00007
NM_016956	Hbb-b2	Hemoglobin, β-adult minor chain	−29.18	0.00003
NM_009777	C1qb	Complement component 1, q subcomponent, β-polypeptide	−26.81	0.00001
NM_153111	Fev	FEV (ETS oncogene family)	−25.20	0.00003
NM_001142952	Fam46c	Family with sequence similarity 46, member C	−23.70	0.00042
NM_009707	Arhgap6	Rho gtpase activating protein 6	−22.80	0.00000
NM_007651	Cd53	CD53 antigen	−20.16	0.00060
NM_011662	Tyrobp	TYRO protein tyrosine kinase-binding protein	−19.40	0.00000
NM_011662	Six3os1	Six3 opposite strand transcript 1	−17.41	0.00077
NM_173391	Tph2	Tryptophan hydroxylase 2	−15.16	0.00187
NM_029767	Rps9	Ribosomal protein S9	−14.04	0.00000
NM_024435	Nts	Neurotensin	−13.61	0.00000
NM_024435	Pisd-ps3	Phosphatidylserine decarboxylase, pseudogene 3	−12.90	0.00002
NM_030143	Ddit4l	DNA-damage-inducible transcript 4-like	−12.22	0.00007
NM_001001796	Prrxl1	Paired related homeobox protein-like 1	−10.97	0.00001
NM_001077632	Nkx2-2	NK2 transcription factor related, locus 2 (*Drosophila*)	−10.24	0.00000
NM_026358	4930583H14Rik	RIKEN cdna 4930583H14 gene	−9.55	0.00067
NM_001136072	Meis2	Meis homeobox 2	−9.48	0.00000
NM_010484	Slc6a4	Solute carrier family 6 (neurotransmitter transporter, serotonin), member 4	−9.33	0.00001

Table S1. Cont.

UGRepAcc	Symbol	Name	Fold change	*P* value
NM_011381	Six3	Sine oculis-related homeobox 3 homolog (*Drosophila*)	−8.77	0.00000
NM_009317	Tal2	T-cell acute lymphocytic leukemia 2	−8.38	0.00047
NM_029770	Unc5b	Unc-5 homolog B (*C. elegans*)	−8.00	0.00000
NM_001033415	Shisa3	Shisa homolog 3 (*Xenopus laevis*)	−7.64	0.00001
NM_001042613	Sepp1	Selenoprotein P, plasma, 1	−6.91	0.00326
NM_030707	Fcrls	Fc receptor-like S, scavenger receptor	−6.50	0.01040
NM_001029841	Sla	Src-like adaptor	−5.79	0.00044
NM_010821	Mpeg1	Macrophage-expressed gene 1	−5.20	0.00943
NM_009801	Car2	Carbonic anhydrase 2	−5.12	0.00000
NM_007739	Col8a1	Collagen, type VIII, α1	−5.04	0.00002
NM_009123	Nkx1-2	NK1 transcription factor related, locus 2 (*Drosophila*)	−5.04	0.00023
NM_001103177	Ablim1	Actin-binding LIM protein 1	−5.00	0.00483
NM_001005477	Barhl2	Barh-like 2 (*Drosophila*)	−4.92	0.00077
NM_021459	Isl1	ISL1 transcription factor, LIM/homeodomain	−4.49	0.00691
NM_001252530	Slco2b1	Solute carrier organic anion transporter family, member 2b1	−4.39	0.00039
NM_001025305	Tfap2b	Transcription factor AP-2β	−4.35	0.00199
NM_001244198	Pax6	Paired box gene 6	−4.22	0.00009
NM_001163154	Etv1	Ets variant gene 1	−4.19	0.00018
NM_007901	S1pr1	Sphingosine-1-phosphate receptor 1	−4.16	0.00036
NM_008888	Phox2b	Paired-like homeobox 2b	−4.09	0.00627
NM_009447	Tuba4a	Tubulin, α4A	−3.94	0.00196
NM_146247	Mettl22	Methyltransferase-like 22	−3.82	0.00047
NM_026101	Herc4	Hect domain and RLD 4	−3.82	0.00794
NM_010518	Igfbp5	Insulin-like growth factor-binding protein 5	−3.51	0.00007
NM_001163847	Tbc1d24	TBC1 domain family, member 24	−3.51	0.00084
NM_001002239	Rpl17	Ribosomal protein L17	−3.46	0.00860
NM_008090	Gata2	GATA-binding protein 2	−3.43	0.00002
NM_001135149	Slc39a8	Solute carrier family 39 (metal ion transporter), member 8	−3.35	0.01495
NM_133982	Rpp25	Ribonuclease P 25 subunit (human)	−3.25	0.00091
NM_133982	2900060N12Rik	RIKEN cdna 2900060N12 gene	−3.25	0.00017
NM_018805	Hs3st3b1	Heparan sulfate (glucosamine) 3-O-sulfotransferase 3B1	−3.22	0.00016
NM_016798	Pdlim3	PDZ and LIM domain 3	−3.20	0.00032
NM_009712	Arsb	Arylsulfatase B	−3.17	0.00121
NM_012038	Vsnl1	Visinin-like 1	−3.17	0.01836
NM_007998	Fech	Ferrochelatase	−3.15	0.00013
NM_001136061	Ednrb	Endothelin receptor type B	−3.15	0.00460
NM_007564	Zfp36l1	Zinc finger protein 36, C3H type-like 1	−3.15	0.00496
NM_008091	Gata3	GATA-binding protein 3	−3.15	0.00001
NM_025831	1300014I06Rik	RIKEN cdna 1300014I06 gene	−3.08	0.00151
NM_023794	Etv5	Ets variant gene 5	−3.03	0.00107
NM_026280	Mxra7	Matrix remodeling-associated 7	−3.01	0.00049
NM_028263	Fgfbp3	Fibroblast growth factor-binding protein 3	−2.96	0.00011
NM_001253719	Fstl5	Follistatin-like 5	−2.92	0.00132
NM_001039546	Myo6	Myosin VI	−2.89	0.00049
NM_011153	Ppp1r17	Protein phosphatase 1, regulatory subunit 17	−2.87	0.01408
NM_021427	Fam181b	Family with sequence similarity 181, member B	−2.85	0.00067
NM_016669	Crym	Crystallin, μ	−2.83	0.00148
NM_016669	Gm8350	Predicted gene 8350	−2.79	0.00003
NM_008077	Gad1	Glutamate decarboxylase 1	−2.74	0.00430
NM_001081286	Fat1	FAT tumor suppressor homolog 1 (*Drosophila*)	−2.70	0.00426
NM_009233	Sox1	SRY box-containing gene 1	−2.68	0.01455
NM_023396	Rprm	Reprimo, TP53-dependent G2 arrest mediator candidate	−2.58	0.01090
NM_010441	Hmga2	High mobility group AT-hook 2	−2.58	0.00010
NM_009735	B2m	β-2 Microglobulin	−2.58	0.00532
NM_177290	Itgb8	Integrin-β8	−2.56	0.00108
NM_008212	Hadh	Hydroxyacyl-coa dehydrogenase	−2.50	0.01765
NM_008498	Lhx1	LIM homeobox protein 1	−2.50	0.00148
NM_010833	Msn	Moesin	−2.48	0.00072
NM_008716	Notch3	Notch gene homolog 3 (*Drosophila*)	−2.41	0.02479
NM_001159516	Qk	Quaking	−2.41	0.00091
NM_001171147	Yap1	Yes-associated protein 1	−2.39	0.01832
NM_001033298	Plk1s1	Polo-like kinase 1 substrate 1	−2.39	0.00035

Table S1. Cont.

UGRepAcc	Symbol	Name	Fold change	*P* value
NM_148938	Slc1a3	Solute carrier family 1 (glial high-affinity glutamate transporter), member 3	−2.37	0.00363
NM_019502	Fxc1	Fractured callus-expressed transcript 1	−2.37	0.01579
NM_010344	Gsr	Glutathione reductase	−2.33	0.00026
NM_001012325	Zfp708	Zinc finger protein 708	−2.33	0.01614
NM_010288	Gja1	Gap junction protein, α1	−2.30	0.00933
NM_021272	Fabp7	Fatty acid-binding protein 7, brain	−2.28	0.00709
NM_025912	2010011I20Rik	RIKEN cdna 2010011I20 gene	−2.28	0.00086
NM_001164528	Ildr2	Ig-like domain containing receptor 2	−2.26	0.01170
NM_009144	Sfrp2	Secreted frizzled-related protein 2	−2.26	0.00042
NM_009255	Serpine2	Serine (or cysteine) peptidase inhibitor, clade E, member 2	−2.24	0.00250
NM_009255	Emx2os	Empty spiracles homolog 2 (*Drosophila*) opposite strand	−2.18	0.00508
NM_010422	Hexb	Hexosaminidase B	−2.14	0.00338
NM_007722	Cxcr7	Chemokine (C-X-C motif) receptor 7	−2.13	0.01266
NM_025994	Efhd2	EF hand domain containing 2	−2.13	0.00421
NM_029648	D19Ertd737e	DNA segment, Chr 19, ERATO Doi 737, expressed	−2.11	0.00538
NM_011274	C80913	Expressed sequence C80913	−2.11	0.00266
NM_144841	Otx2	Orthodenticle homolog 2 (*Drosophila*)	−2.08	0.00445

The inclusion criteria for significantly changed genes included a present call in two of three arrays for at least one of two groups, average pairwise comparisons fold change greater than two, seven of nine direct pairwise comparisons in the same direction, and a P value < 0.05. Fold change, GCOS fold change; Name, UniGene Name; Symbol, UniGene Symbol; UGRepACC, UniGene representative accession number.

Table S2. The list of *Ngn2*-GFP^{Pos} up-regulated genes encoding for membrane proteins and their known or predicted location on the membrane

UGRepAcc	Symbol	Name	Fold change	*P* value	Membrane location
NM_001122756	Corin	Corin	9.12	0.00063	EX
NM_009655	Alcam	Activated leukocyte cell adhesion molecule	6.65	0.00001	EX
NM_001159317	Il1rap	IL-1 receptor accessory protein	5.83	0.00004	EX
NM_001039347	Kcnd3	Potassium voltage-gated channel, Shal-related family, member 3	5.36	0.00128	EX
NM_001080780	Ret	Ret proto-oncogene	5.16	0.00000	EX
NM_001079847	Gpr64	G protein-coupled receptor 64	5.12	0.01411	EX
NM_010279	Gfra1	Glial cell line-derived neurotrophic factor family receptor α1	2.92	0.00002	EX
NM_001110843	Cacna2d1	Calcium channel, voltage-dependent, α2/δ-subunit 1	2.89	0.00069	EX
NM_007697	Chl1	Cell adhesion molecule with homology to L1CAM	2.87	0.00025	EX
NM_001190703	Dlk1	δ-Like 1 homolog (*Drosophila*)	2.60	0.00487	EX
NM_080419	Igsf8	Ig superfamily, member 8	2.52	0.00391	EX
NM_001077403	Nrp2	Neuropilin 2	2.39	0.00006	EX
NM_001122758	Pcdh7	Protocadherin 7	2.33	0.00345	EX
NM_001083917	Scn3b	Sodium channel, voltage-gated, type III, β	2.30	0.00501	EX
NM_053144	Pcdhb19	Protocadherin β19	2.19	0.03557	EX
NM_001163348	Ntng1	Netrin G1	2.09	0.00020	EX
NM_001198811	Frem1	Fras1-related extracellular matrix protein 1	2.03	0.00394	EX
NM_001042607	Ryk	Receptor-like tyrosine kinase	2.03	0.01915	EX
NM_146260	Tmie	Transmembrane inner ear	8.31	0.00775	PM
NM_020606	Parva	Parvin, α	2.94	0.00519	PM
NM_001164086	Homer2	Homer homolog 2 (*Drosophila*)	2.85	0.00003	PM
NM_010572	Irs4	Insulin receptor substrate 4	2.66	0.00662	PM
NM_016886	Gria3	Glutamate receptor, ionotropic, AMPA3 (α3)	2.44	0.00011	PM
NM_001029850	Magi1	Membrane-associated guanylate kinase, WW and PDZ domain containing 1	2.26	0.00016	PM
NM_011855	Odz1	Odd Oz/ten-m homolog 1 (*Drosophila*)	2.21	0.01258	PM
NM_011636	Plscr1	Phospholipid scramblase 1	2.13	0.00020	PM
NM_145129	Chrna3	Cholinergic receptor, nicotinic, α-polypeptide 3	2.11	0.00340	PM
NM_080288	Elmo1	Engulfment and cell motility 1, ced-12 homolog (*C. elegans*)	2.08	0.00059	PM
NM_008847	Pip5k1a	Phosphatidylinositol-4-phosphate 5-kinase, type 1α	2.03	0.00220	PM
NM_178118	Dixdc1	DIX domain containing 1	2.02	0.00576	PM
NM_029529	Slc35d3	Solute carrier family 35, member D3	27.64	0.00000	M
NM_023815	Trp53rk	Transformation-related protein 53-regulating kinase	8.91	0.02114	M
NM_025696	Sorcs3	Sortilin-related VPS10 domain-containing receptor 3	6.16	0.00396	M
NM_001163741	1110021J02Rik	RIKEN cdna 1110021J02 gene	6.02	0.00780	M
NM_001109753	Sv2b	Synaptic vesicle glycoprotein 2 b	5.88	0.00006	M
NM_001042451	Snca	Synuclein, α	5.40	0.00000	M
NM_153509	AF529169	Cdna sequence AF529169	4.49	0.00077	M
NM_001101640	Tmem207	Transmembrane protein 207	4.09	0.03664	M
NM_134130	Abhd3	Abhydrolase domain-containing 3	3.94	0.00155	M
NM_011978	Slc27a2	Solute carrier family 27 (fatty acid transporter), member 2	3.35	0.00156	M
NM_001168684	Tmcc3	Transmembrane and coiled coil domains 3	3.27	0.00060	M
NM_178915	Tmem179	Transmembrane protein 179	3.20	0.01769	M
NM_138649	Syt17	Synaptotagmin XVII	2.89	0.00672	M
NM_011074	Cdk14	Cyclin-dependent kinase 14	2.72	0.00186	M
NM_201518	Flrt2	Fibronectin leucine-rich transmembrane protein 2	2.56	0.00015	M
NM_010878	Nck1	Noncatalytic region of tyrosine kinase adaptor protein 1	2.50	0.00630	M
NM_001113545	Lima1	LIM domain and actin binding 1	2.48	0.00657	M
NM_013790	Abcc5	ATP-binding cassette, subfamily C (CFTR/MRP), member 5	2.46	0.00307	M
NM_001163640	Chn2	Chimerin (chimaerin) 2	2.44	0.01999	M
NM_001145820	Gpd2	Glycerol phosphate dehydrogenase 2, mitochondrial	2.42	0.00043	M
NM_001039371	Slc22a15	Solute carrier family 22 (organic anion/cation transporter), member 15	2.33	0.00240	M
NM_016801	Stx1a	Syntaxin 1A (brain)	2.24	0.00158	M
NM_013813	Epb4.1l3	Erythrocyte protein band 4.1-like 3	2.19	0.00270	M
NM_027782	Kctd6	Potassium channel tetramerisation domain containing 6	2.18	0.00029	M
NM_080853	Slc17a6	Solute carrier family 17 (sodium-dependent inorganic phosphate cotransporter), member 6	2.09	0.00256	M
NM_139228	Rhbdl3	Rhomboid, veinlet-like 3 (*Drosophila*)	2.06	0.02957	M

Table S2. Cont.

UGRepAcc	Symbol	Name	Fold change	*P* value	Membrane location
NM_178873	Adck2	Aarf domain containing kinase 2	2.05	0.00070	M
NM_172523	Slc18a2	Solute carrier family 18 (vesicular monoamine), member 2	2.02	0.00133	M
NM_139272	Galnt2	UDP-*N*-acetyl-α-D-galactosamine:polypeptide *N*-acetylgalactosaminyltransferase 2	2.02	0.01662	M

Genes encoding for proteins expressed on the cell body and containing extracellular sequences are indicated by EX, genes encoding for proteins located on the plasma membrane but either not expressed on the cell body or expressed without an extracellular sequence are indicated by PM, and genes encoding for proteins located on internal membranes are indicated by M. Fold change, GCOS fold change; Name, UniGene Name; Symbol, UniGene Symbol; UGRepACC, UniGene representative accession number.