Supplemental Table 1. Primers and antibodies

	Forward primer	Reverse primer
Glul-CreER-WT	GAAGAAGGGCTACTTTGAAGACCGT	GGAAAGAAAGGGTTGGTGTGTAGAG
Glul-CreER-Mut	GAAGAAGGGCTACTTTGAAGACCGT	CATTTCCTGTTGTTCAGCTTGCACC
NG2-CreER	GAGTCATCCTTAGCGCCGTA	CACCCTGTTACGTATAGCCG
Rosa26-tdT-WT	AAGGGAGCTGCAGTGGAGTA	CCGAAAATCTGTGGGAAGTC
Rosa26-tdT-Mut	CTGTTCCTGTACGGCATGG	GGCATTAAAGCAGCGTATCC
Glul flox/flox	GGCTTTAAACCCCTTGAAAGC	GATGCCTTTGTTCAAGTGGG

Antibody	SOURCE	IDENTIFIER
chicken GFP (1:500)	ProSci	Cat# 54-195, RRID: AB_1946485
goat SOX2 (1:500)	Santa Cruz	Cat# sc-365823; RRID: AB_10842165
chicken GFAP (1:800),	Biosensis	Cat# C137350; RRID: AB_2492333
rabbit S100β (1:1000)	Abcam	Cat# ab52642, RRID: AB_882426
mouse Aldh1l1 (1:500)	Millipore	Cat# MABN495, RRID: AB_2687399
rat CD31 (1:500)	Abcam	Cat# ab36441, RRID: AB_726358
rabbit Nestin (1:1000)	Abcam	Cat# ab7659, RRID: AB_2298388
rabbit DCX (1:400)	Abcam	Cat# ab18723; RRID: AB_732011
mouse GS (1:500)	Millipore	Cat# MAB302; RRID: AB_2110656
rabbit Olig2 (1:1000)	Millipore	Cat# AB9610; RRID: AB_570666
rabbit SOX10 (1:1000)	Abcam	Cat# ab195364, RRID: AB_3697345
rabbit MYRF (1:1000)	Oasis Biofarm	Cat# OB-RB007, RRID: AB_2934255
mouse NG2 (1:500)	Millipore	Cat# MAB5384; RRID: AB_177646
rabbit PDGFRa (1:500)	Oasis Biofarm	Cat# OB-PRB011, RRID: AB_2938683
rabbit β-catenin (1:1000)	Cell Signaling Technology	Cat# 9562, RRID: AB_33114
rabbit active β-catenin (1:1000)	Cell Signaling Technology	Cat# 4270, RRID:AB_1903918
rabbit NeuN (1:500)	Thermo Scientific	Cat# MAB377, RRID: AB_2298772
rabbit GLS (1:1000)	Abcam	Cat# ab156876, RRID: AB_2721038
rabbit HO-1 (1:1000)	Cell Signaling Technology	Cat# 43966, RRID: AB_2799254
rabbit SOD2 (1:2000)	Cell Signaling Technology	Cat# 13194, RRID: AB_2750869
rabbit GPX4 (1:1000)	ABclonal	Cat# A1933, RRID: AB_2763960
rabbit GAPDH (1:5000)	Bioss	Cat# bs-10900R, RRID: AB_3661955
rabbit Vinculin (1:5000)	Bioss	Cat# bs-6640R, RRID: AB_2891350
rabbit mTOR (1:1000)	Abmart	Cat# PK80661, RRID: AB_3675904
rabbit p-mTOR (1:1000)	Abmart	Cat# T56571, RRID: AB_2936395
mouse 8-OHdG (1:500)	Santa Cruz Biotechnology	Cat# sc-393871, RRID: AB_2892631
rat BrdU (1:1000)	Accurate Chemical	Cat# OBT0030; RRID: AB_2313756
rabbit NG2 (1:500)	BBI Life Science	Cat# ab129051; RRID: AB_2877152
Alexa Fluor 488 donkey anti-mouse IgG (1:1000)	Jackson ImmunoResearch	Cat# 715-547-003, RRID: AB_2340851
Alexa Fluor 647 donkey anti-rabbit IgG (1:1000)	Jackson ImmunoResearch	Cat# 711-607-003, RRID: AB_2340626

Alexa Fluor 647 donkey anti-rat IgG (1:1000)	Jackson ImmunoResearch	Cat# 712-607-003, RRID: AB_2340697
Alexa Fluor 647 donkey anti-goat IgG (1:1000)	Jackson ImmunoResearch	Cat# 705-605-003, RRID: AB_2340436
Alexa Fluor 647 donkey anti-chicken IgG (1:1000)	Jackson ImmunoResearch	Cat# 703-606-155, RRID: AB_2340380
HRP-anti-Rabbit (1:5000)	Jackson ImmunoResearch	Cat# 711-035-152, RRID:AB_10015282

Supplementary Table 2. Cellular specificity and efficiency of *Glul*-driven Cre recombinant (%)

		S100β		Olig2		SOX10	
		Specificity	Efficiency	Specificity	Efficiency	Specificity	Efficiency
Telencephalon	mPFC	70.03 ± 3.17	65.48 ± 6.53	6.31 ± 3.72	10.44 ± 7.72	7.65 ± 1.38	32.52 ± 3.09
	SMC	76.55 ± 2.34	84.27 ± 5.21	13.30 ± 3.05	17.71 ± 2.12	14.40 ± 1.11	17.78 ± 4.59
	SSC	64.21 ± 4.31	61.94 ± 3.39	15.64 ± 4.24	39.26 ± 1.59	17.23 ± 5.07	18.09 ± 0.81
	VC	59.93 ± 3.97	68.98 ± 2.74	10.94 ± 5.14	15.03 ± 6.86	12.08 ± 6.27	11.29 ± 5.75
	AC	61.01 ± 2.62	62.12 ± 4.10	9.46 ± 1.85	4.64 ± 3.39	12.03 ± 2.99	14.79 ± 4.56
	CA1	87.13 ± 4.11	86.49 ± 5.80	4.98 ± 2.44	3.53 ± 1.65	5.33 ± 2.09	7.04 ± 2.86
	CA2	74.86 ± 2.83	77.77 ± 4.61	5.23 ± 3.03	2.47 ± 2.01	14.94 ± 3.69	12.93 ± 4.41
	CA3	79.22 ± 6.25	76.27 ± 1.67	11.40 ± 2.15	9.51 ± 4.32	13.87 ± 4.90	15.56 ± 2.31
	DG	81.28 ± 3.11	67.97 ± 9.23	7.88 ± 2.44	30.50 ± 1.35	11.24 ± 6.35	35.04 ± 5.59
	CPU	69.55 ± 4.56	58.58 ± 4.29	8.82 ± 5.24	15.80 ± 4.68	8.52 ± 7.06	18.95 ± 5.23
	NAC	66.32 ± 1.14	62.18 ± 6.70	5.96 ± 2.19	17.27 ± 3.88	9.82 ± 3.53	32.81 ± 6.57
	BLA	37.29 ± 2.52	70.20 ± 2.77	8.14 ± 2.17	11.49 ± 5.09	4.39 ± 1.03	14.93 ± 5.78
Diencephalon	LGN	43.58 ± 1.96	62.11 ± 1.66	37.64 ± 4.73	51.48 ± 3.41	21.01 ± 4.18	28.43 ± 3.93
	ZI	58.10 ± 5.30	68.85 ± 4.76	21.38 ± 5.06	30.19 ± 4.10	11.32 ± 6.75	24.72 ± 4.66
	STh	58.87 ± 4.46	74.58 ± 3.85	42.52 ± 5.03	29.14 ± 1.79	40.29 ± 3.02	37.08 ± 5.41
	SCN	54.38 ± 2.84	70.47 ± 4.44	8.21 ± 4.34	17.94 ± 5.93	2.94 ± 2.50	14.71 ± 5.28
	PVN	71.71 ± 3.78	80.27 ± 2.42	15.26 ± 2.79	27.43 ± 3.13	6.76 ± 6.18	10.12 ± 4.33
	LH	61.63 ± 4.76	78.31 ± 2.77	22.30 ± 6.19	16.17 ± 4.24	21.35 ± 2.99	22.07 ± 6.09
Midbrain	PRT	72.01 ± 3.31	68.30 ± 4.65	37.88 ± 5.68	48.09 ± 4.59	32.80 ± 3.18	41.21 ± 1.38
	SC	71.59 ± 3.55	82.99 ± 4.53	37.45 ± 4.17	29.44 ± 4.73	39.69 ± 2.72	16.82 ± 3.50
	RN	44.12 ± 2.14	48.87 ± 5.96	50.44 ± 2.28	58.89 ± 3.54	55.51 ± 4.65	42.87 ± 5.78
	SN	76.97 ± 4.39	71.78 ± 2.36	27.32 ± 5.13	36.79 ± 4.72	21.69 ± 4.47	36.64 ± 3.25
	VTA	63.38 ± 6.41	59.11 ± 3.16	36.25 ± 3.79	33.09 ± 3.75	44.05 ± 3.29	30.17 ± 2.58
Hindbrain	Pons	19.57 ± 4.12	45.45 ± 4.88	69.99 ± 5.45	45.49 ± 2.80	73.68 ± 1.99	59.83 ± 4.98
	Cerebellum	54.98 ± 4.21	41.75 ± 5.17	41.46 ± 3.48	25.70 ± 0.45	44.54 ± 3.46	32.83 ± 2.80

Supplementary Table 3. Cellular specificity and efficiency of GS immunostaining (%)

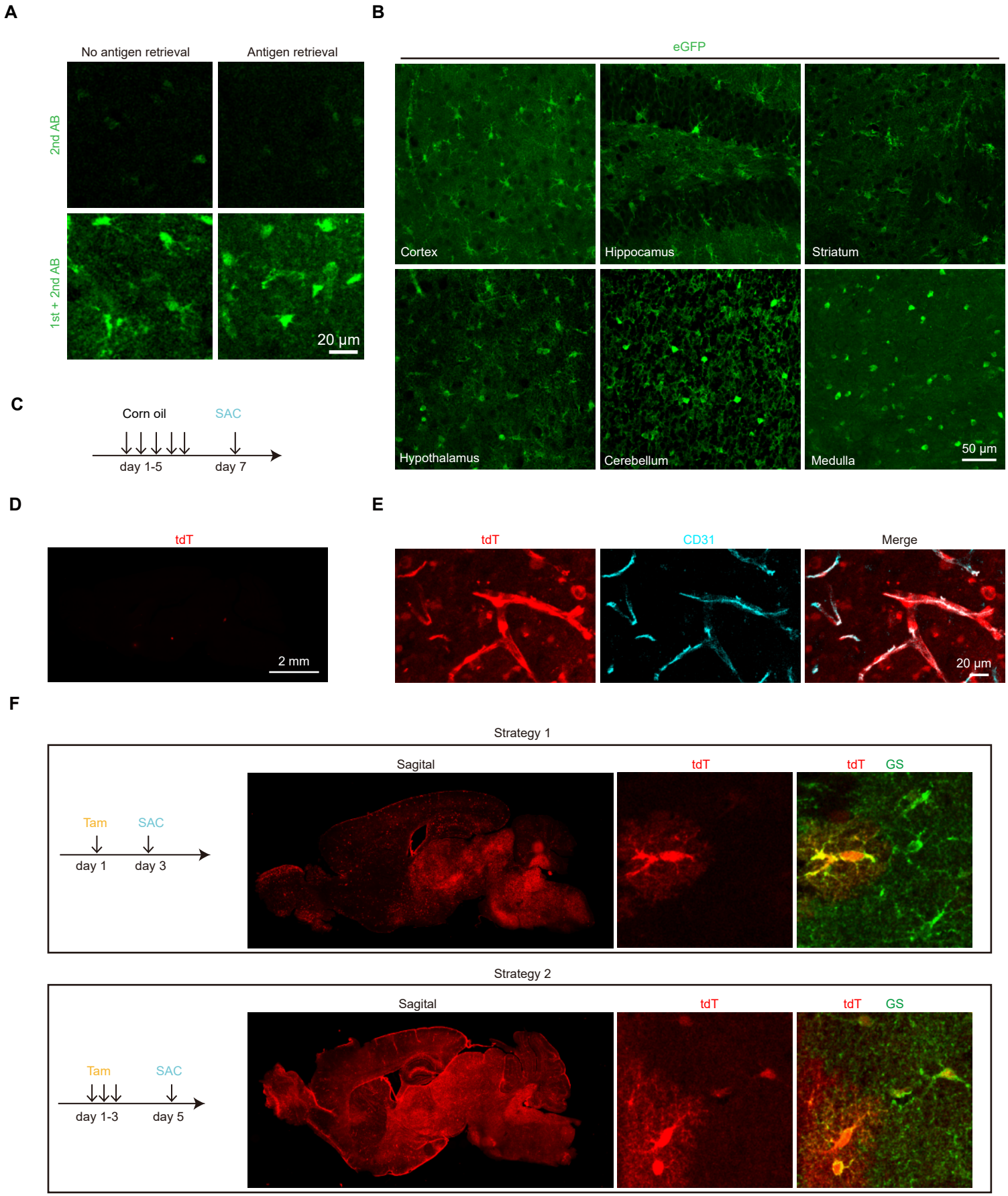
		S100β				Olig2				SOX10			
		Specificity		Efficiency		Specificity		Efficiency		Specificity		Efficiency	
Telencephalon	mPFC	53.42 ±	4.19	67.48 ±	2.68	5.28 ±	0.95	8.92 ±	1.32	6.54 ±	3.26	6.62 ±	3.09
	SMC	79.75 ±	1.58	78.70 ±	7.62	20.93 ±	4.94	24.19 ±	3.73	14.82 ±	4.62	10.27 ±	2.65
	SSC	84.78 ±	0.98	85.60 ±	3.89	18.17 ±	4.95	21.15 ±	3.86	15.56 ±	1.34	9.31 ±	1.35
	VC	79.34 ±	4.17	71.66 ±	5.97	17.84 ±	1.49	23.61 ±	4.08	19.15 ±	1.15	14.89 ±	4.31
	AC	84.76 ±	4.15	72.26 ±	2.79	18.77 ±	2.65	21.16 ±	2.12	18.97 ±	3.18	17.64 ±	1.88
	CA1	89.84 ±	3.18	81.32 ±	2.17	7.92 ±	3.73	9.02 ±	4.86	6.41 ±	4.81	8.10 ±	4.30
	CA2	81.41 ±	3.51	78.59 ±	4.25	9.89 ±	2.47	8.92 ±	2.68	9.19 ±	3.33	9.08 ±	4.87
	CA3	75.86 ±	4.61	75.54 ±	4.62	13.75 ±	1.86	12.28 ±	5.11	8.49 ±	1.96	7.97 ±	2.43
	DG	88.46 ±	1.78	79.43 ±	3.83	3.91 ±	2.82	6.95 ±	4.93	14.49 ±	4.08	14.64 ±	5.84
	CPU	61.41 ±	5.23	69.58 ±	1.89	42.46 ±	1.57	26.86 ±	2.13	37.09 ±	5.26	24.24 ±	4.68
	NAC	64.95 ±	3.63	61.39 ±	2.62	12.44 ±	2.56	3.89 ±	1.59	18.65 ±	2.95	9.84 ±	4.98
	BLA	81.89 ±	4.33	72.01 ±	1.26	15.13 ±	2.61	6.25 ±	1.21	17.48 ±	5.09	11.93 ±	2.58
Diencephalon	LGN	58.44 ±	1.65	65.73 ±	3.48	47.07 ±	1.57	49.40 ±	0.94	52.56 ±	3.92	56.65 ±	0.83
	ZI	48.39 ±	3.22	46.99 ±	3.17	45.69 ±	5.38	15.30 ±	1.75	30.94 ±	2.27	10.64 ±	3.66
	STh	65.51 ±	4.76	57.37 ±	2.41	69.12 ±	3.06	31.04 ±	2.37	62.81 ±	1.93	32.63 ±	2.98
	SCN	57.45 ±	2.33	76.88 ±	1.47	13.70 ±	3.89	15.17 ±	5.54	10.70 ±	1.67	14.36 ±	3.26
	PVN	79.93 ±	3.57	74.02 ±	2.41	5.23 ±	1.41	8.41 ±	3.05	9.93 ±	5.77	5.94 ±	5.12
	LH	81.55 ±	3.72	71.77 ±	3.19	43.20 ±	4.91	18.31 ±	3.82	53.19 ±	4.99	18.58 ±	2.26
Midbrain	PRT	68.98 ±	4.39	53.62 ±	2.90	67.07 ±	4.34	21.30 ±	3.50	53.79 ±	5.01	16.83 ±	4.75
	SC	59.87 ±	2.30	62.25 ±	4.32	64.89 ±	2.46	22.65 ±	1.72	52.36 ±	4.76	17.93 ±	1.86
	RN	39.29 ±	3.80	31.83 ±	5.31	69.30 ±	3.94	44.41 ±	5.07	78.16 ±	1.06	41.97 ±	2.76
	SN	61.26 ±	3.82	59.30 ±	1.75	52.71 ±	3.76	21.42 ±	4.77	59.90 ±	3.19	21.46 ±	3.00
	VTA	48.18 ±	4.54	63.17 ±	1.47	56.13 ±	1.04	35.63 ±	4.32	50.89 ±	2.94	32.09 ±	4.29
Hindbrain	Pons	22.39 ±	3.22	39.32 ±	0.59	71.36 ±	4.65	52.57 ±	3.88	81.18 ±	2.03	63.92 ±	2.84
	Cerebellum	53.42 ±	2.80	61.08 ±	2.57	76.40 ±	2.08	42.64 ±	4.18	77.15 ±	4.81	32.45 ±	2.79

Supplementary Table 4. Patient data

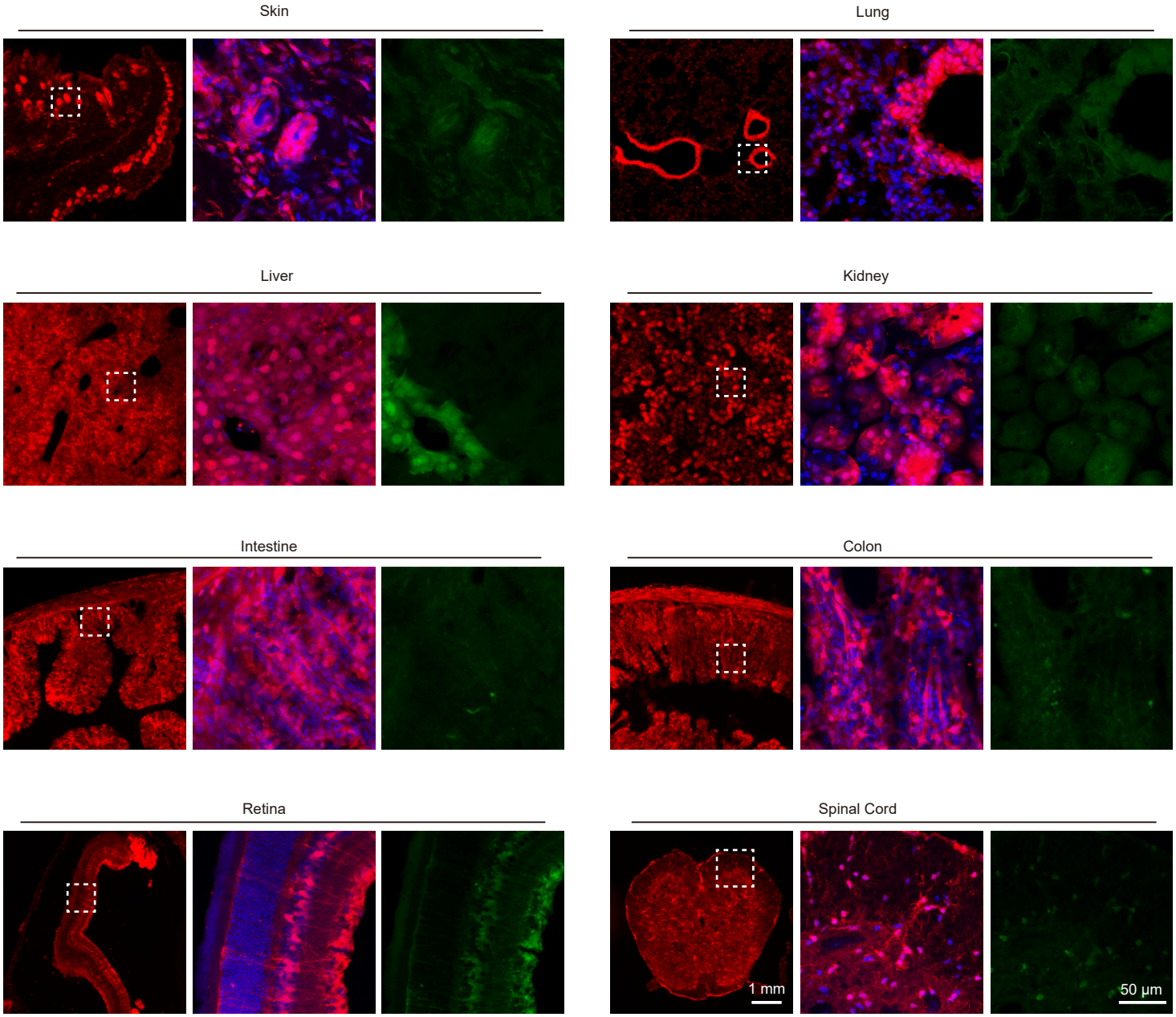
Sample ID	Sex	Age	Diagnosis of epileptic causes
TLE1	Female	37	hippocampal sclerosis
TLE2	Female	28	focal cortical dysplasia
TLE3	Male	48	focal cortical dysplasia
TLE4	Female	28	focal cortical dysplasia
TLE5	Male	32	focal cortical dysplasia
TLE6	Male	64	focal cortical dysplasia

	Immunochemistry of temporal cortex										
	GFAP	Olig2	CD34	NF	MBP	NeuN	KP1	Ki67	p53	BPAFV600E	IDH1
TLE1	+	+	−	+	+	+	+ (slight)	+(1%)	−/+	−	−
TLE2	+	+	+ (vessel)	+	+	+	+ (slight)	+(1%)	−	−	−
TLE3	+	+	+ (vessel)	−	+	+	+ (slight)	+(2%)	−	−	−
TLE4	+	+	+ (vessel)	+	+	+	+ (slight)	+(1%)	−	−	−
TLE5	+	+	+ (vessel)	+	+	+	+ (slight)	+(1%)	−	−	−
TLE6	+	+	+ (vessel)	+	+	+	+ (slight)	+(1%)	−	−	−

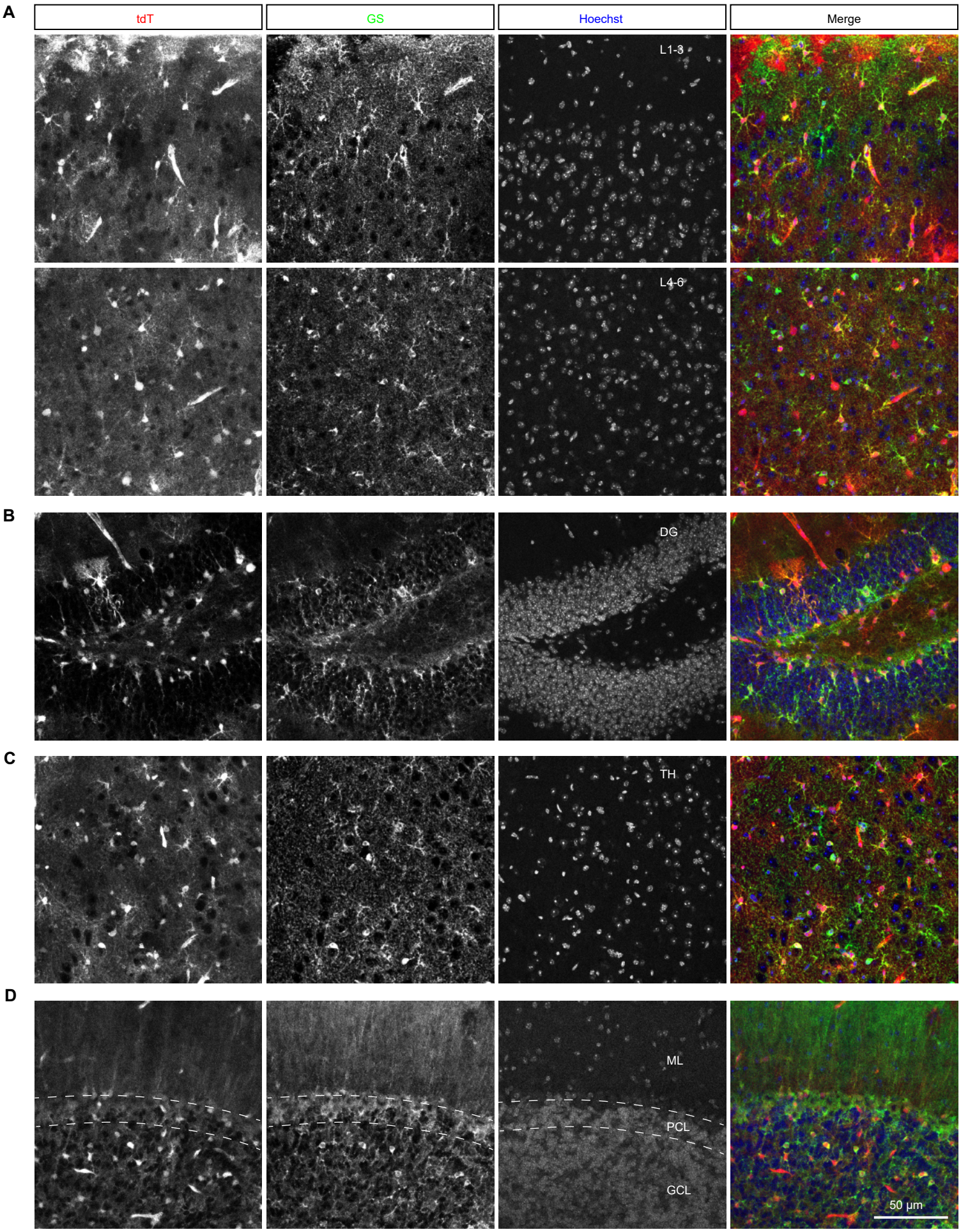
Supplementary Figure 1



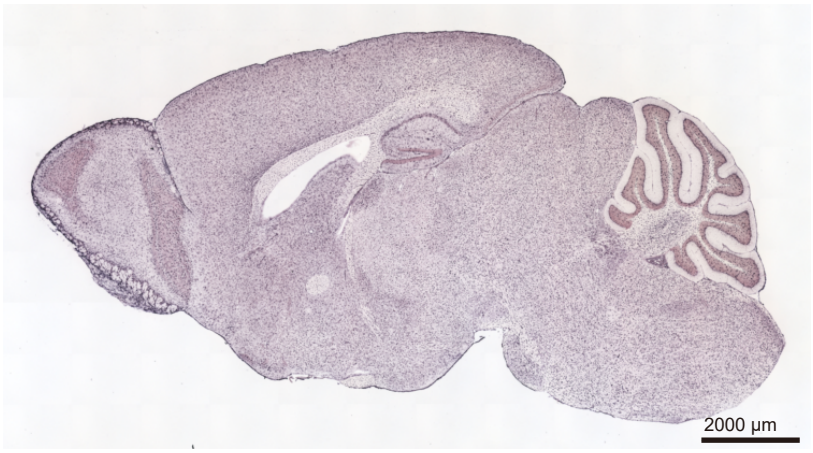
Supplementary Figure 2



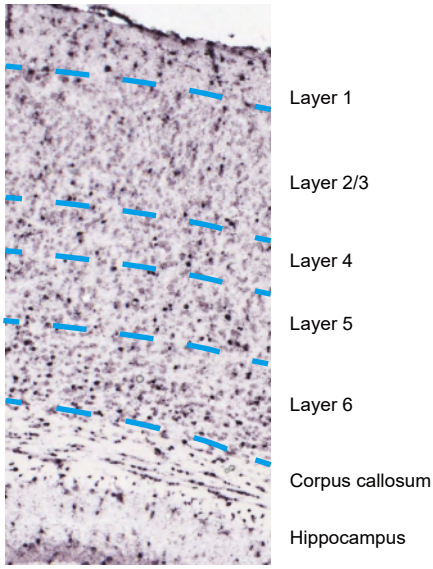
Supplementary Figure 3



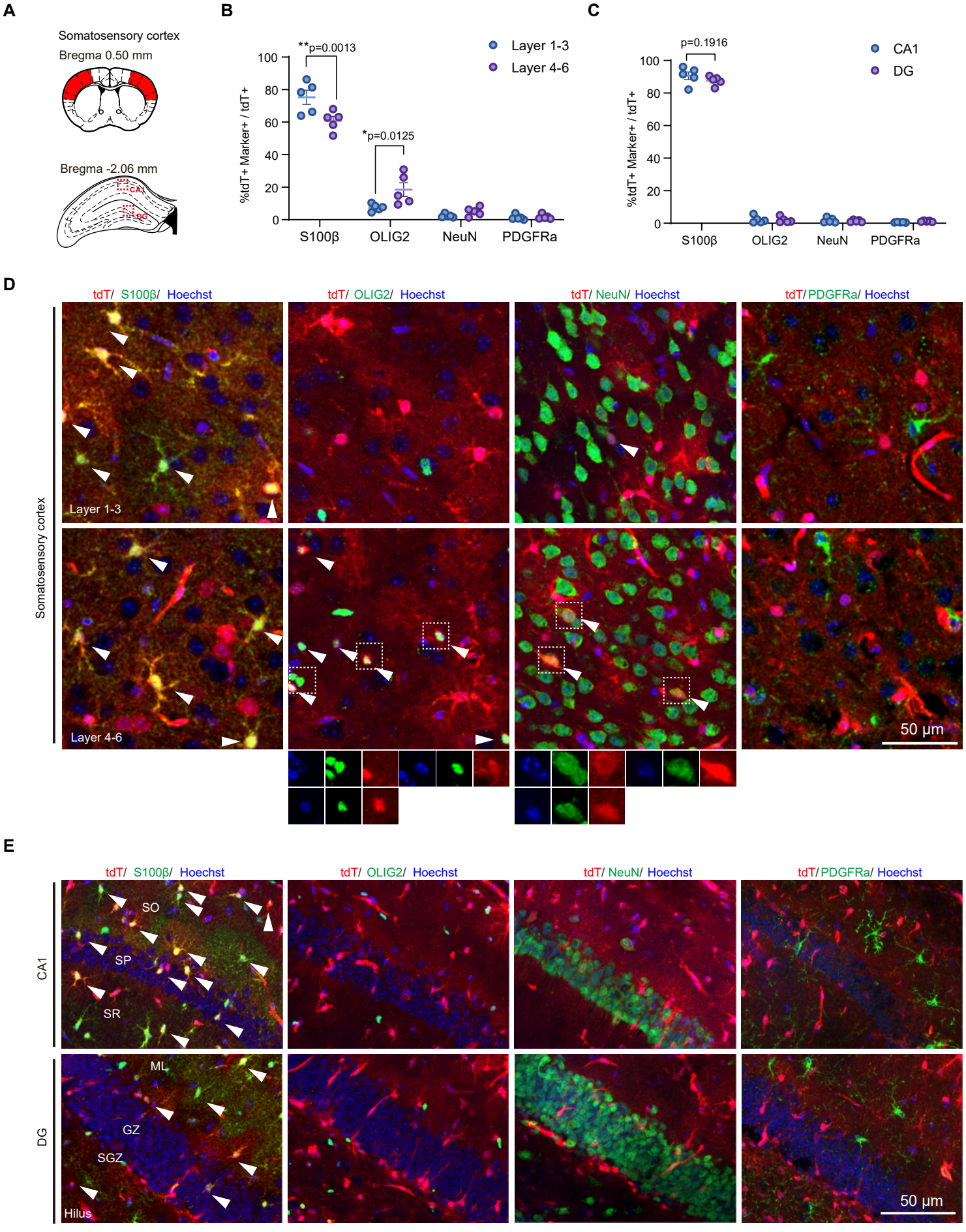
Supplementary Figure 4



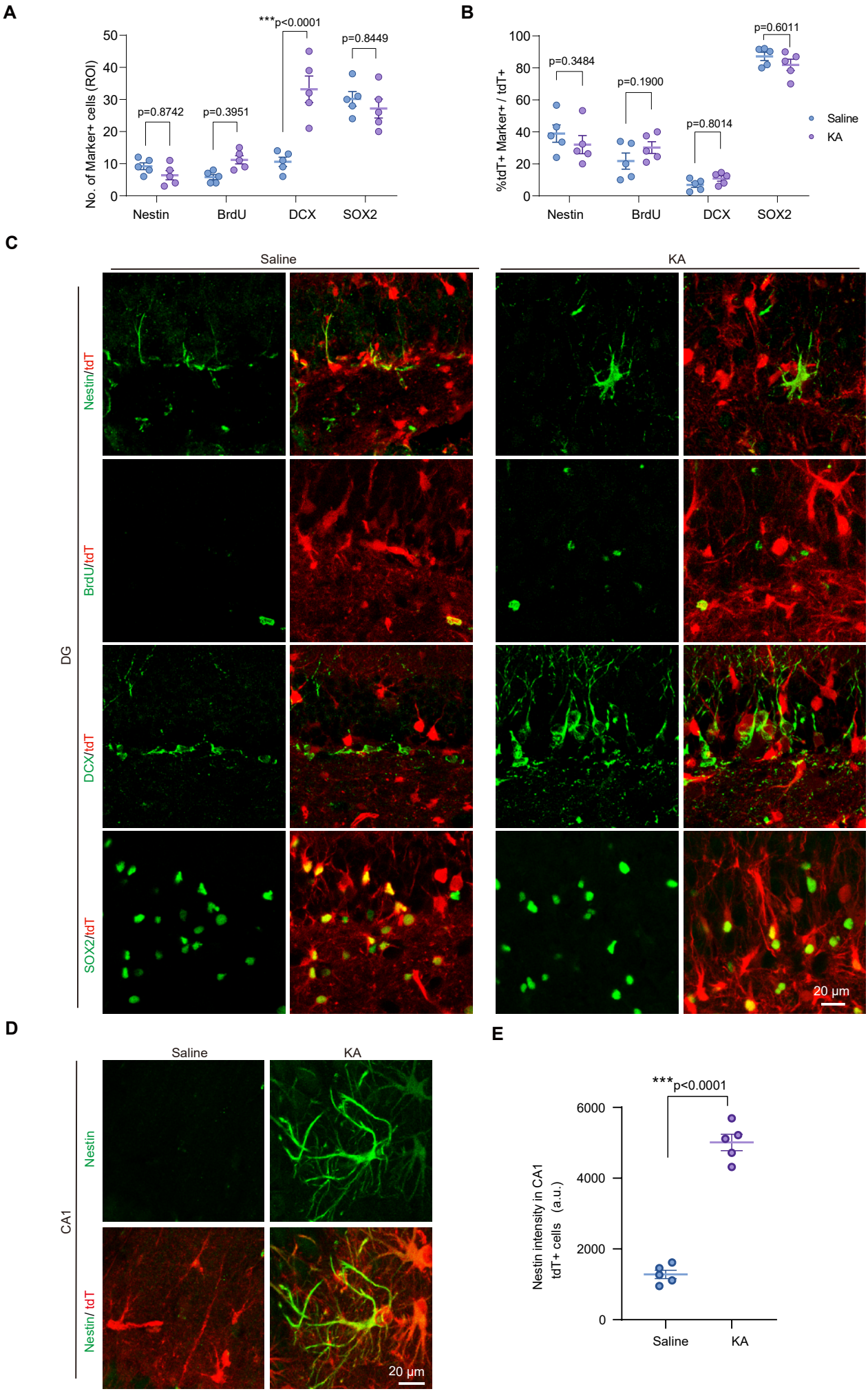
Glul mRNA (Allen Brain Atlas)



Supplementary Figure 5



Supplementary Figure 6



Supplementary Figure 7

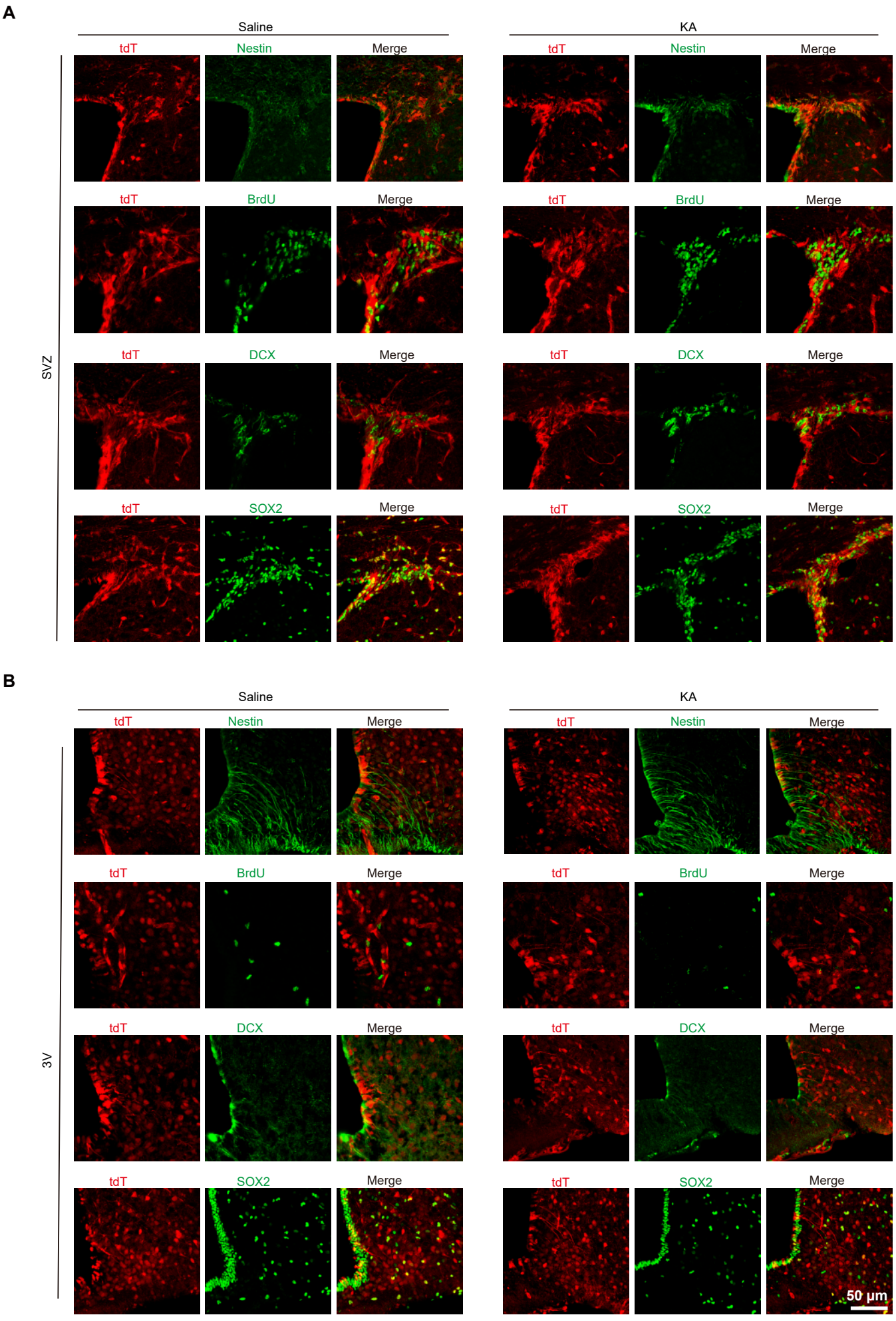
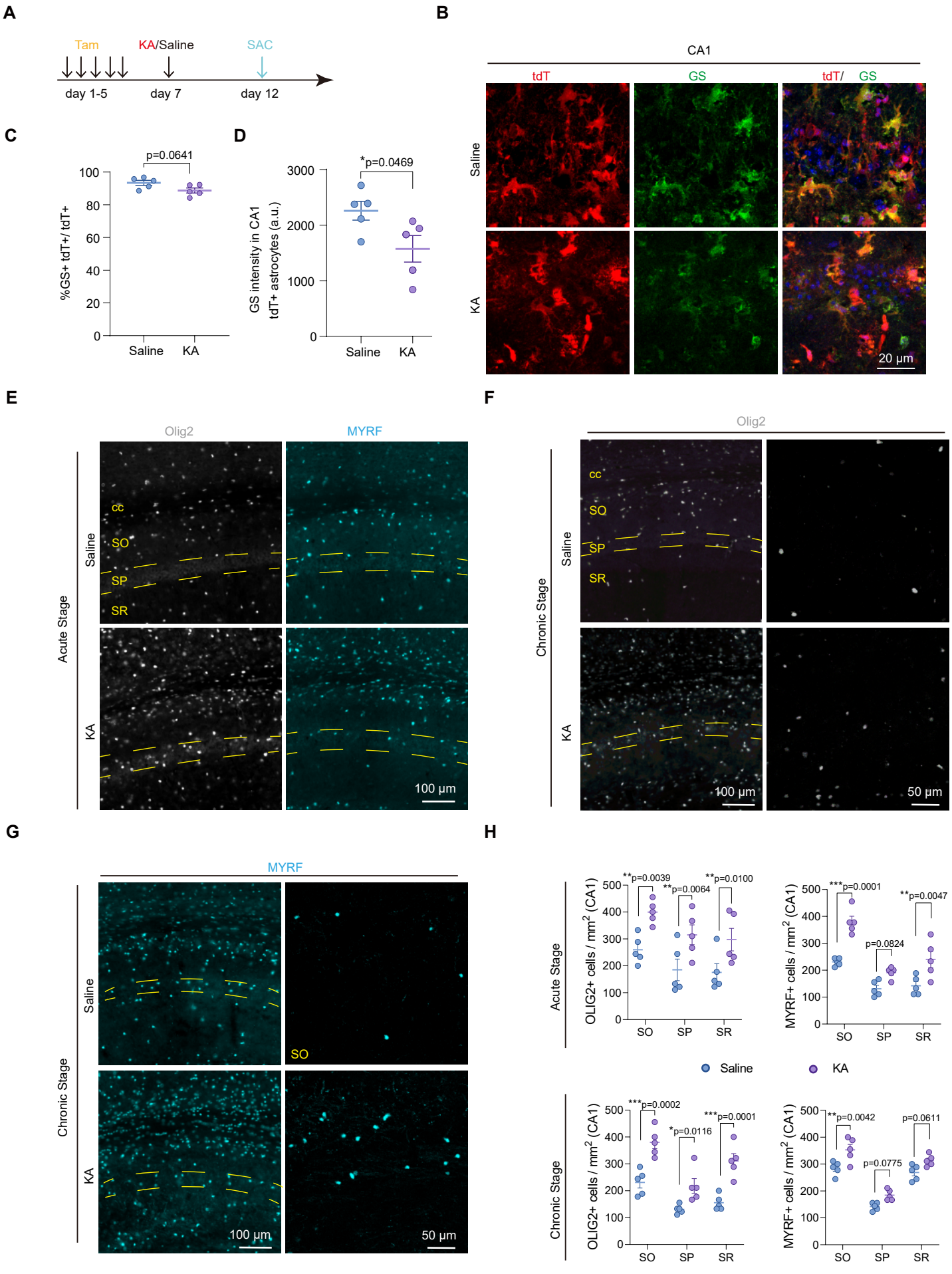


Figure S8


A
Tam
KA/Saline
SAC
day 1-5
day 7
day 12
B
CA1
tdT
GS
tdT/ GS
Saline
KA
20 µm
C
p=0.0641
%GS+ tdT+/ tdT+
Saline
KA
D
*p=0.0469
GS intensity in CA1 tdT+ astrocytes (a.u.)
Saline
KA
E
Olig2
MYRF
Acute Stage
Saline
KA
cc
SO
SP
SR
100 µm
F
Olig2
Chronic Stage
Saline
KA
cc
SO
SP
SR
100 µm
50 µm
G
MYRF
Chronic Stage
Saline
KA
SO
100 µm
50 µm
H
Acute Stage
OLIG2+ cells / mm2 (CA1)
**p=0.0039
**p=0.0064
**p=0.0100
MYRF+ cells / mm2 (CA1)
***p=0.0001
p=0.0824
**p=0.0047
SO
SP
SR
Saline
KA
Chronic Stage
OLIG2+ cells / mm2 (CA1)
***p=0.0002
*p=0.0116
***p=0.0001
MYRF+ cells / mm2 (CA1)
**p=0.0042
p=0.0775
p=0.0611

Supplementary Figure 9

