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nature cell biology

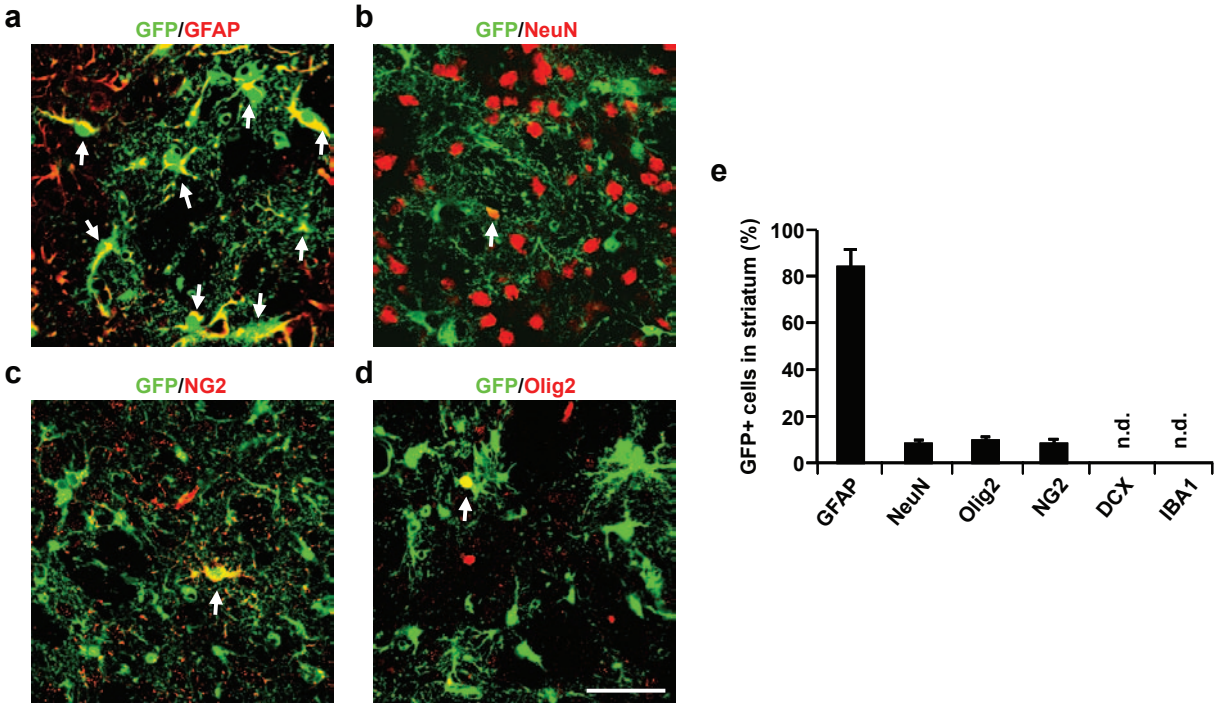

Figure S1 The *hGFAP* promoter in lentivirus drives gene expression predominantly in astrocytes. (**a-d**) Immunohistological analyses of GFP-expressing cells in striatal regions injected with *hGFAP-GFP* lentivirus. Arrows indicate co-labeled cells with the indicated markers. Scale: 20 µm. (**e**) Quantification of marker expression in GFP$^+$ cells. Data are presented as mean + s.d.. Mean is shown for n = 3 animals, scoring for each animal 250 or more GFP+ cells from 3-6 brain sections for each marker. n.d., not detected.

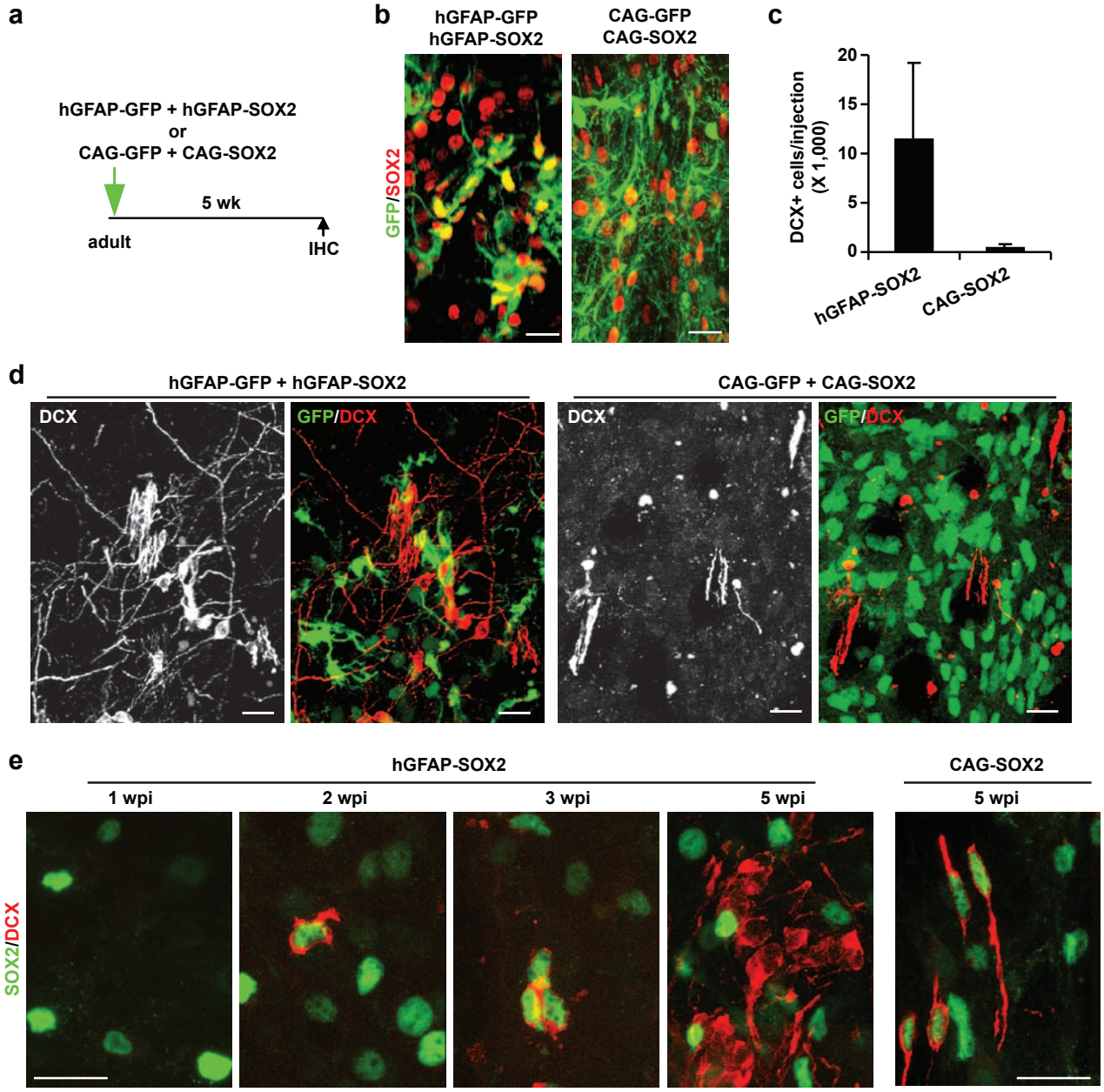

Figure S2 Continually high expression of ectopic SOX2 prohibits robust induction of iANBs. (**a**) Experimental design. Adult mice were injected with the indicated lentivirus. Gene expression was mediated by an *hGFAP* promoter or a constitutively active *CAG* promoter. Mice were analyzed 5 weeks later. (**b**) SOX2 expression in lentivirus-injected mouse brains. (**c-d**) DCX$^+$ cells with extended neuronal processes are robustly detected in regions injected with *hGFAP-SOX2* but not *CAG-SOX2* lentivirus. Data are presented as mean + s.d., $n = 4$ animals per group. (**e**) SOX2 expression in DCX$^+$ cells at the indicated weeks of post injection (wpi). The expression of SOX2 in DCX$^+$ cells is greatly reduced at later stages in mice injected with virus expressing *hGFAP*-SOX2 but not *CAG*-SOX2. DCX$^+$ cells are rarely observed from 1-3 wpi. Scales: 20 μm.

	V_0 (mV)	R_{in} (MΩ)	
Cell1	-76.70	156.10	
Cell2	-77.70	525.00	
Cell3	-77.70	80.00	
Cell4	-77.00	30.10	
Cell5	-74.70	85.50	
Cell6	-80.50	33.30	
Cell7	-80.00	26.50	
Cell8	-81.30	42.00	
Cell9	-75.40	97.20	
Cell10	-23.30	1000.00	← microglia
Cell11	-80.90	34.50	
Cell12	-81.80	22.30	
Cell13	-79.20	26.60	

Figure S3 Whole cell patch clamp parameters of traced cells in the striatum of *Cst3-CreER^{T2};Rosa-tdT* mice. With the exception of one recorded cell has electrophysiological properties similar to microglia (indicated by an arrow), the remaining cells resemble astrocytes. V_0, resting membrane potential; R_{in}, input resistance.

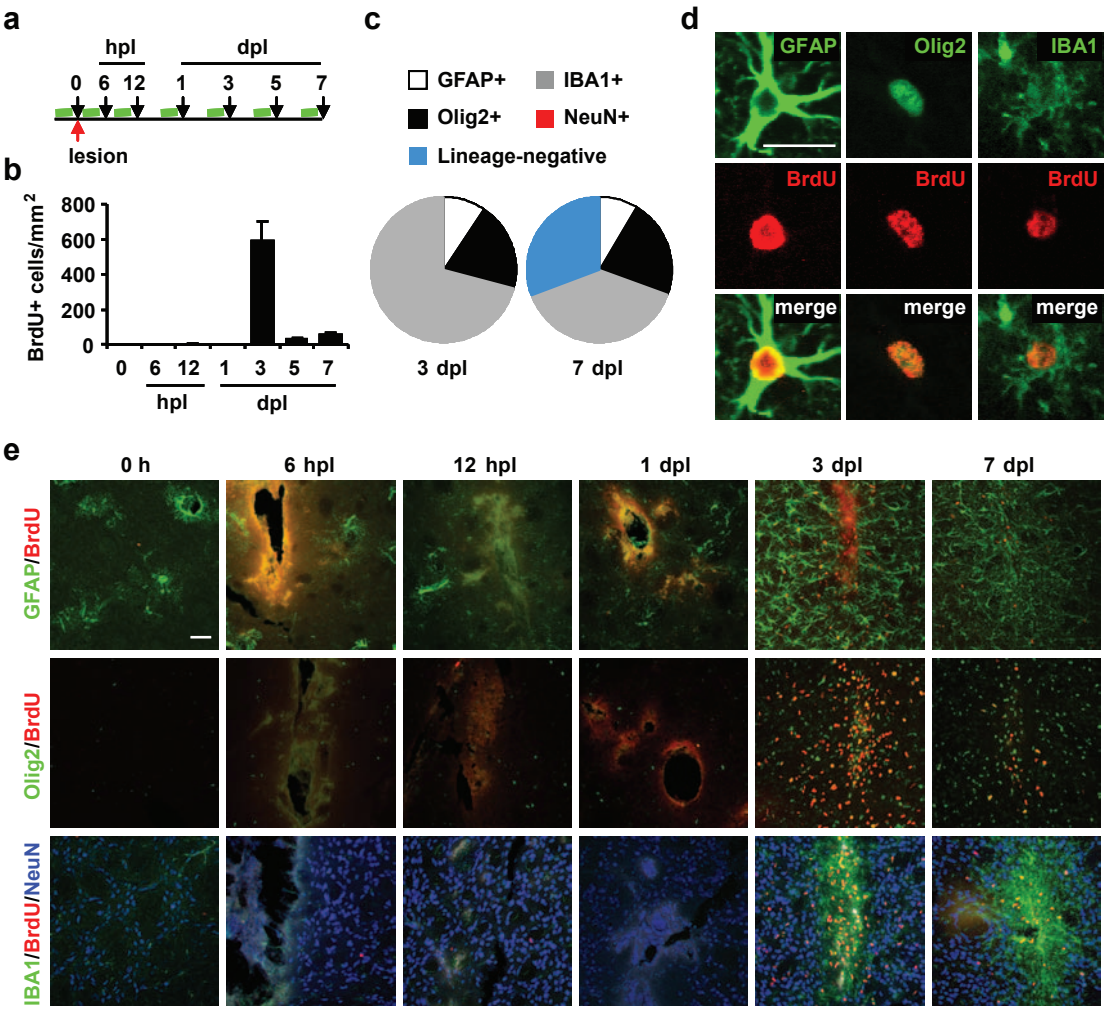

Figure S4 Proliferating cells in the adult striatum pre- and post-lesions. (**a**) Experimental design. Proliferating cells were labeled by BrdU administered with three intraperitoneal injections over a 6 h period before sacrifice. Striatal lesions were stereotactically introduced by a 30-gauge needle. hpl, hr post lesion; dpl, days post lesion. (**b**) Quantification of BrdU$^+$ cells within the striatum. Very few proliferating cells were detected in the adult striatum before 3 dpl. Data are presented as mean + s.d., $n = 4$ lesion sites at each time point. (**c**) Distribution of proliferating cells among the examined cell types at 3 and 7 dpl. (**d-e**) Representative images showing labeled cells. Scales: 20 μm (**d**) and 50 μm (**e**).

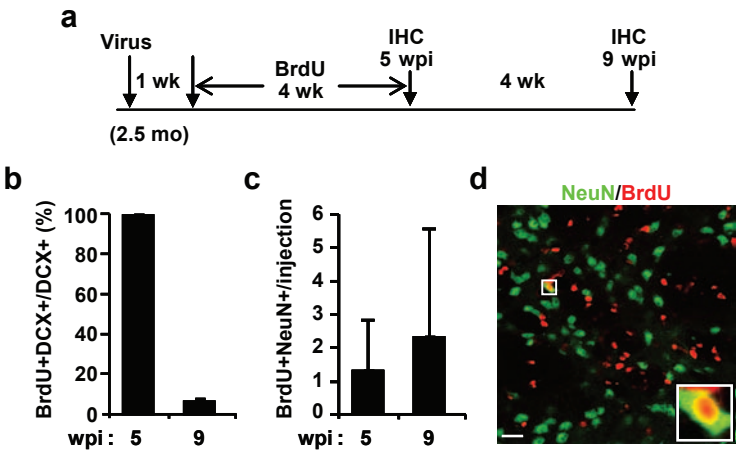

Figure S5 iANBs rarely generate mature neurons under normal conditions. (**a**) Experimental design to examine newly generated mature neurons induced by SOX2. BrdU was administered in drinking water continuously for 4 weeks. (**b-c**) Quantification of BrdU-labeled DCX$^+$ (**b**) or NeuN$^+$ (**c**) cells in infected striatal regions. Data are presented as mean + s.d., $n = 3$ animals per group. (**d**) Immunofluorescence analysis showing a single BrdU$^+$NeuN$^+$ cell. Scale: 20 μm.

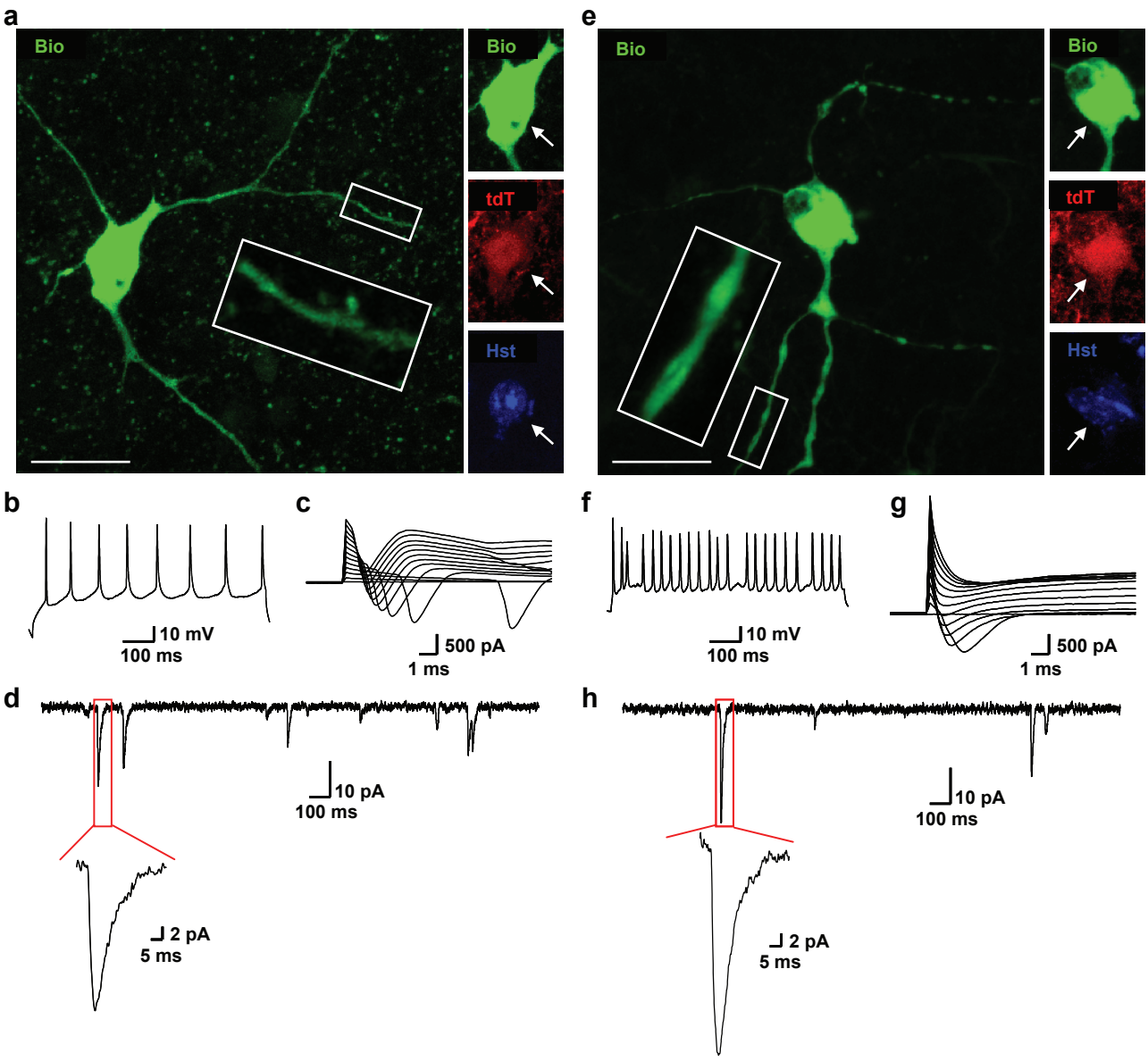

Figure S6 Confocal images (**a** and **e**) and electrophysiological properties (**b-d** and **f-h**) of additional recorded tdT$^+$ cells (indicated by arrows), which were loaded with biocytin (Bio) during recording. Enlarged views of the boxed regions show detailed dendritic morphology of the recorded cells. (**b-d**) Electrophysiology of an aspiny tdT$^+$ cells labeled in panel (**a**). (**f-h**) Electrophysiology of an aspiny tdT$^+$ cells labeled in panel (**e**). These two cells fired repetitive action potentials in response to current step (**b, f**), exhibited inward currents in response to voltage step (**c, g**), and showed depolarizing spontaneous synaptic currents at resting membrane potential (**d, h**). Scales: 20 μm.

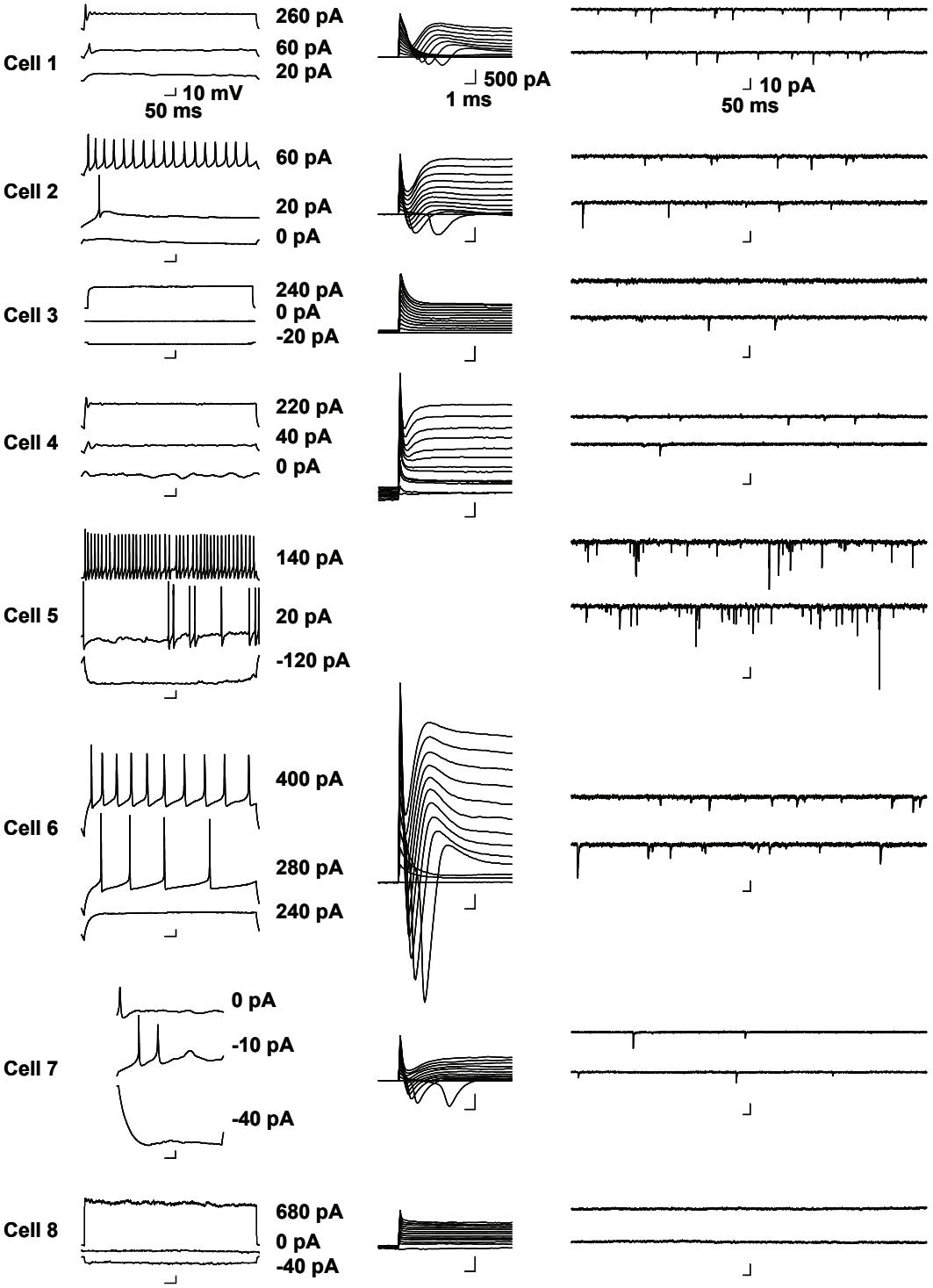

Figure S7 Electrophysiological properties of SOX2-induced neurons. Action potentials (left panels), inward currents upon depolarization (middle panels), and spontaneous synaptic currents (right panels) are shown for all 18 reprogrammed cells, which were traced in *Cst3-CreER^{T2};Rosa-tdT* mice. The three action potential traces shown were elicited by subthreshold current injection (bottom), just-suprathreshold depolarizing current injection (middle), and a more depolarizing current injection to generate the most frequent firing (top). The corresponding current injected was labeled besides the trace.

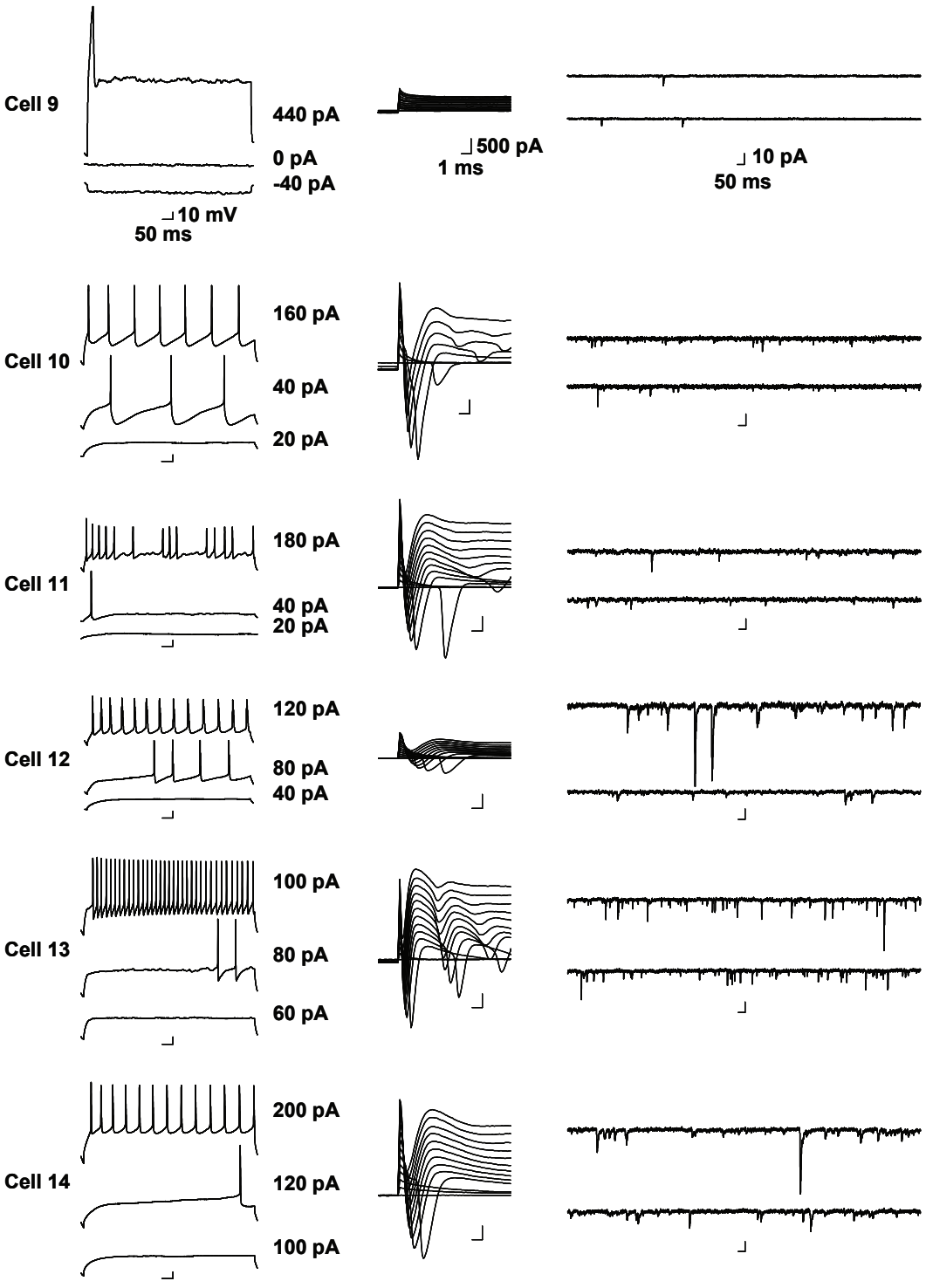

Figure S7 continued

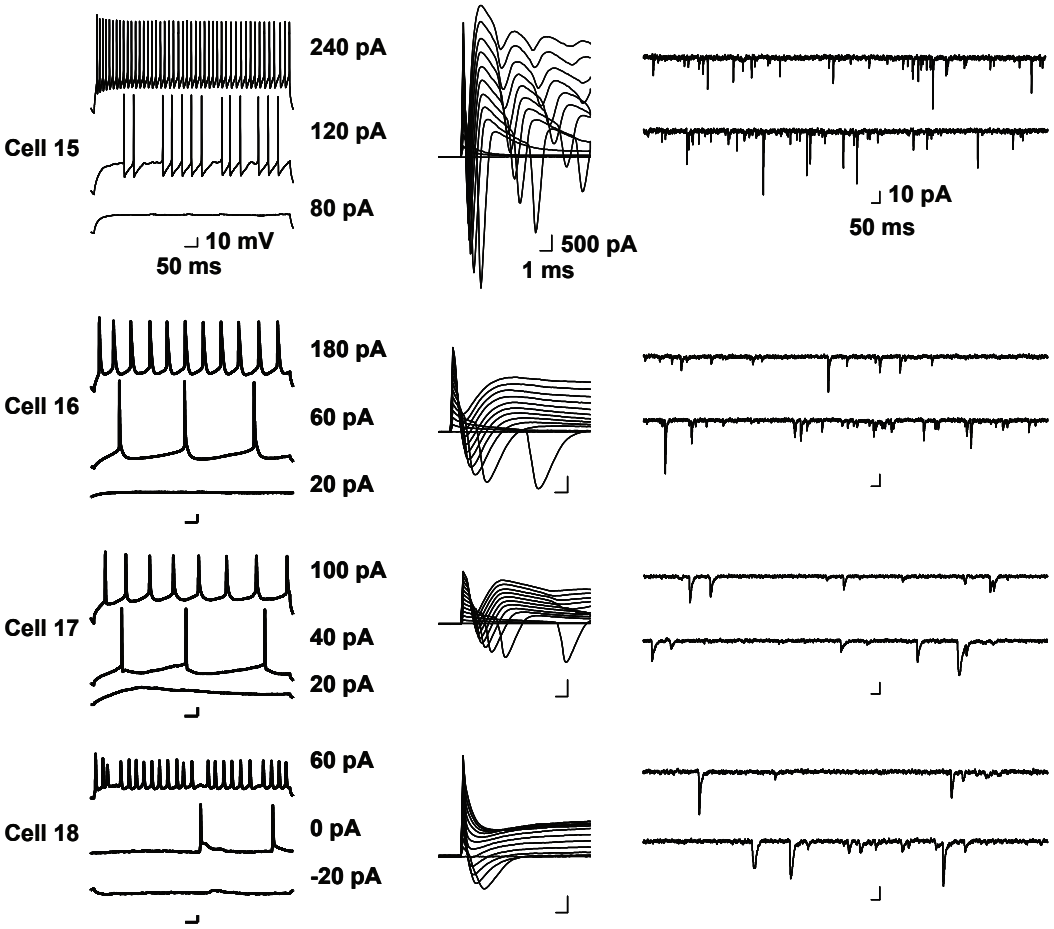

Figure S7 continued

	V_0 (mV)	R_{in} (MΩ)	C (pF)	AP freq (Hz)	AP threshold (mV)
Cell2	-70.00	443.00	10.81	22.50	-50
Cell5	-83.80	205.80	18.15	12.50	-41
Cell6	-76.10	192.50	30.62	8.75	-40
Cell7	-76.70	2114.00	8.99	16.00	-35
Cell10	-73.40	205.80	14.28	50.00	-40
Cell11	-86.00	1319.00	12.31	16.25	-38
Cell12	-70.00	560.70	17.00	16.25	-34
Cell13	-42.00	4000.00	5.72	6.00	-40
Cell14	-55.80	1887.00	15.98	15.00	-36
Cell15	-58.20	325.10	12.31	53.75	-32
Cell16	-46.20	298.20	12.31	20.00	-38
Cell17	-69.70	829.00	14.28	10.00	-37
Cell18	-77.70	525.00	3.53	28.75	-55

Figure S8 Whole cell patch clamp parameters of SOX2-induced neurons with multiple action potentials. V_0, resting membrane potential; R_{in}, input resistance; C, capacitance; AP freq, frequency of action potentials.