

Supporting Information

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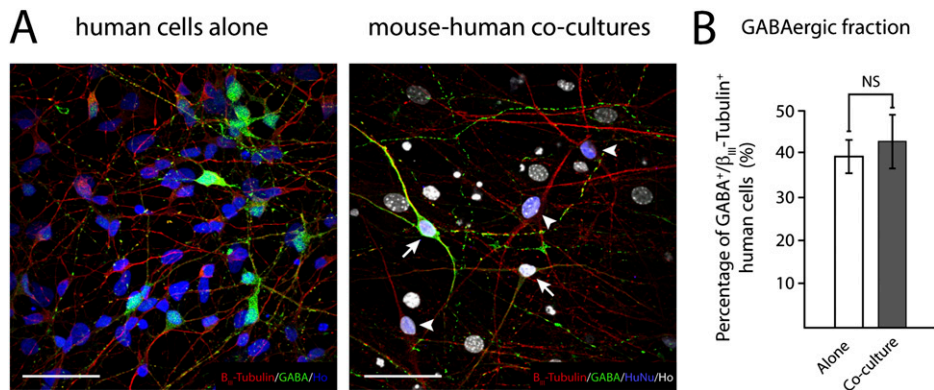


Fig. S1. hESC-derived forebrain cultures contain significant numbers of GABAergic neurons. (A) Confocal images of 6-wk-old human cultures alone (Left) and mouse-human cultures (Right) that display GABA⁺ neurons (green). Note that in cocultures, GABA⁺ cells (arrows) and GABA⁻ cells (arrowheads) express the human-specific nuclear antigen (blue). (B) Pooled data demonstrate that hESC-derived cultures are comprised of ~40% GABAergic neurons, which is not affected by coculture with mouse cortical cells.

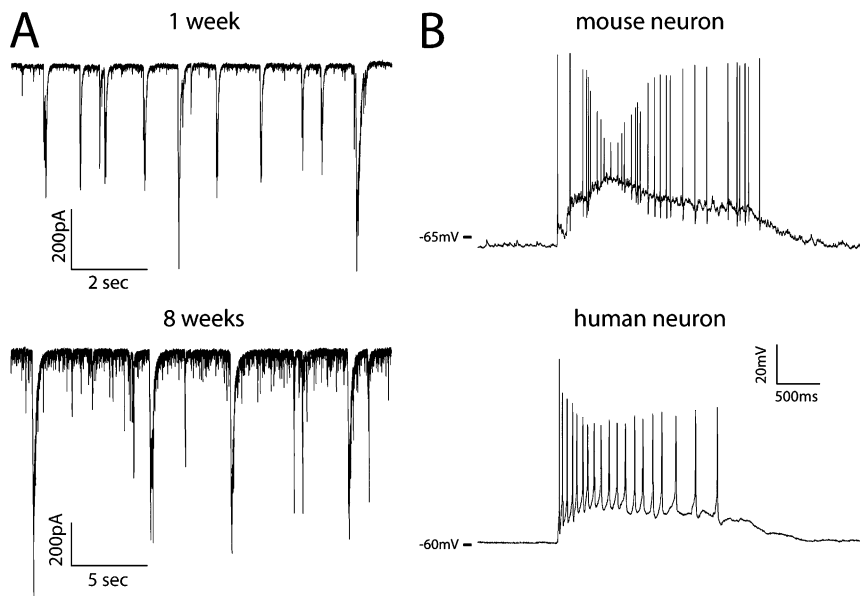


Fig. S2. Spontaneous bursting is maintained in mouse cortical networks for at least 2 mo. (A) Representative whole cell recordings (−70-mV holding potential) from mouse cortical neurons at 1 wk (upper trace) and 8 wk (lower trace) in vitro. (B) Representative traces from mouse (Upper) and human (Lower) that illustrate “superbursts” in each cell type.

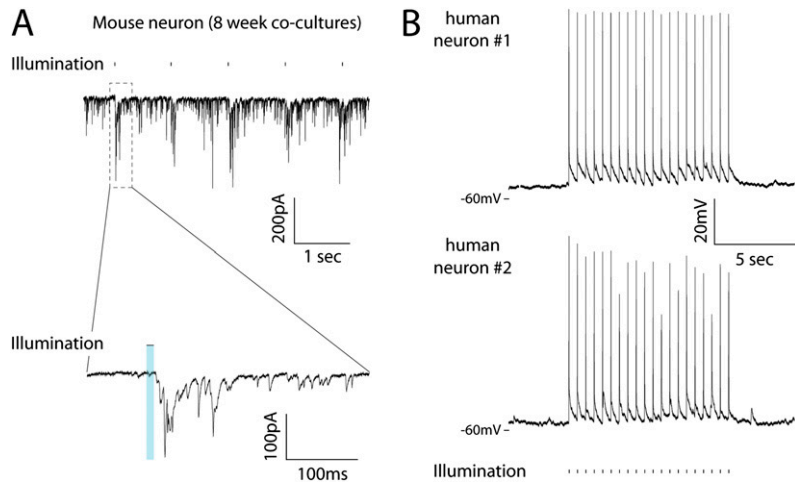


Fig. 55. Multiple postsynaptic currents are triggered in individual mouse neurons during light stimulation. (*A*) Whole-cell recording from a mouse cortical neuron during brief (10-ms) light stimulations. Lower trace reveals multicomponent, large-amplitude postsynaptic responses between ~10 and 100 ms following an individual light stimulation. (*B*) Whole-cell patch-clamp recordings from two hESC-derived neurons in coculture with mouse neurons for 8 wk illustrates simultaneous AP generation in both cells upon light stimulation.

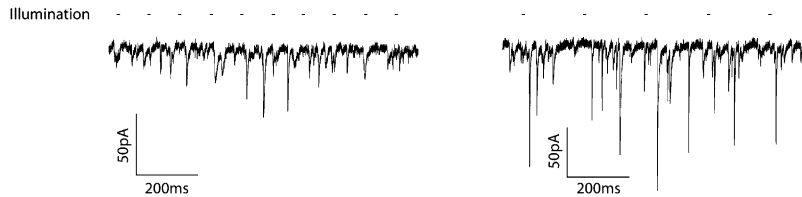


Fig. 56. Spontaneous postsynaptic currents make light-induced currents difficult to detect in some neurons. Representative traces from two different mouse cortical neurons during light stimulation after 6 wk in coculture with Chr2-expressing human neurons.

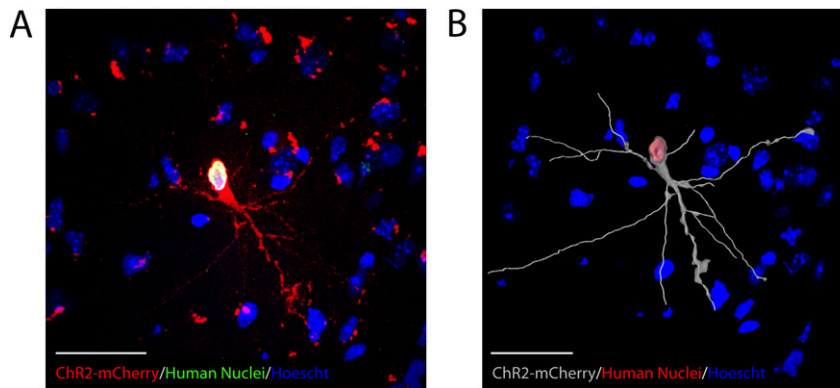


Fig. 57. Morphology of transplanted hESC-derived neurons. (*A*) Compressed confocal z-stack of a transplanted hESC-derived neuron expressing both Chr2-mCherry and the human nuclear antigen. (*B*) 3D reconstruction of the neuron in *A* demonstrating multipolar morphology. Scale bars, 50 μm.

Table S1. Basic physiological properties of hESC-derived neurons in coculture with mouse cortical cultures

	Cap (pF)	Rin (G Ω)	RMP (mV)
2 wk			
(M)	85.6 \pm 5.3	0.23 \pm 0.05	-70.9 \pm 2.4
(H)	22.6 \pm 2.4	1.5 \pm 0.1	-46.3 \pm 1.7
4 wk			
(M)	87.6 \pm 6.6	0.19 \pm 0.04	-68.4 \pm 4.9
(H)	26.9 \pm 2.5	1.1 \pm 0.1	-57.1 \pm 2.1
6 wk			
(M)	92.1 \pm 7.2	0.22 \pm 0.04	-72.3 \pm 2.9
(H)	30.9 \pm 3.1	1.0 \pm 0.2	-60.2 \pm 3.7
8 wk:			
(M)	90.1 \pm 6.3	0.19 \pm 0.03	-71.4 \pm 3.2
(H)	34.4 \pm 4.1	0.9 \pm 0.1	-61.7 \pm 4.2

H, human; M, mouse.