SUPPLEMENTARY TABELS

INSULT LEVELS/PRESSURE TRANSDUCER READOUT (Well PSI)

(Each Table Represents Different Neuron Culture Experiments Done on Different Days)

Table 1: Insult Details for Figure 3 Experiments.

	N=1	N=2	N=3
~38% Biaxial Stretch	2.6 PSI	2.5 PSI	2.8 PSI
~54% Biaxial Stretch	4.1 PSI	4.1 PSI	4.0 PSI

Table 2: Insult Details for Figures 4-6 Experiments.

	N=1 (GFAP)		N=2 (GFAP)		N=1 (NFL)		N=2 (NFL)		N=1 (Tau)		N=2 (Tau)	
~54 Biaxial Strain (Single Insult)	4.3 PSI		4.3 PSI		4.1 PSI		4.1 PSI		4.1 PSI		4.2 PSI	
~54 Biaxial Strain (Dual Insult)	**T0**	**T1h**	**T0**	**T1h**	**T0**	**T1h**	**T0**	**T1h**	**T0**	**T1h**	**T0**	**T1h**
	4.2 PSI	3.8 PSI	4.2 PSI	4.2 PSI	4.1 PSI	4.1 PSI	4.1 PSI	4.0 PSI	3.9 PSI	4.2 PSI	4.1 PSI	4.1 PSI

Yellow = Post-fix Permeabilization with Triton-X100 ***T0=time zero (first injury); T1h=time after first injury (second injury)***

Table 3: Insult Details for Figure 7 Experiments.

	N=1		N=2		N=3	
~54 Biaxial Strain (Single Insult)	4.1 PSI		4.1 PSI		4.1 PSI	
~54 Biaxial Strain (Dual Insult) 1h Between Injuries	**T0** 4.2 PSI	**T1h** 4.1 PSI	**T0** 4.2 PSI	**T1h** 4.2 PSI	**T0** 4.1 PSI	**T1h** 4.1 PSI
~54 Biaxial Strain (Dual Insult) 4h Between Injuries	**T0** 4.1 PSI	**T4h** 4.2 PSI	**T0** 4.2 PSI	**T4h** 4.1 PSI	**T0** 4.1 PSI	**T4h** 4.1 PSI
~54 Biaxial Strain (Dual Insult) 8h Between Injuries	**T0** 4.1 PSI	**T8h** 4.1 PSI	**T0** 4.1 PSI	**T8h** 4.2 PSI	**T0** 4.0 PSI	**T8h** 4.1 PSI

Table 4: Insult Details for Figure 8 Experiments (Neurobasal/B27 vs. BrainPhys/SM1).

	N=1	N=2	N=3	N=4
~54% Biaxial Strain (Neurobasal)	4.4 PSI	4.2 PSI	4.2 PSI	4.1 PSI
~54% Biaxial Strain (BrainPhys)	4.3 PSI	4.3 PSI	4.2 PSI	4.1 PSI

Table 5: Insult Details for Figure 9 Experiments (30MOI).

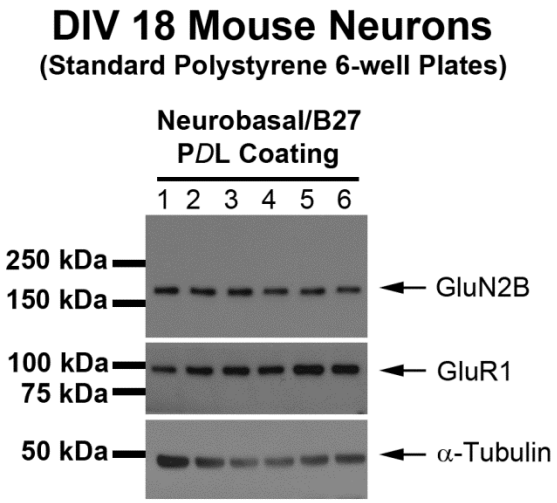
	N=1	N=2	N=3	N=4
~54% Biaxial Strain (30 MOI – Control vector)	4.1 PSI	4.2 PSI	4.2 PSI	4.1 PSI
~54% Biaxial Strain (30 MOI – RBM5 Vector)	4.2 PSI	4.2 PSI	4.1 PSI	4.1 PSI

(Tables Continued)

Table 6: Insult Details for Figure 9 Experiments (60 MOI).

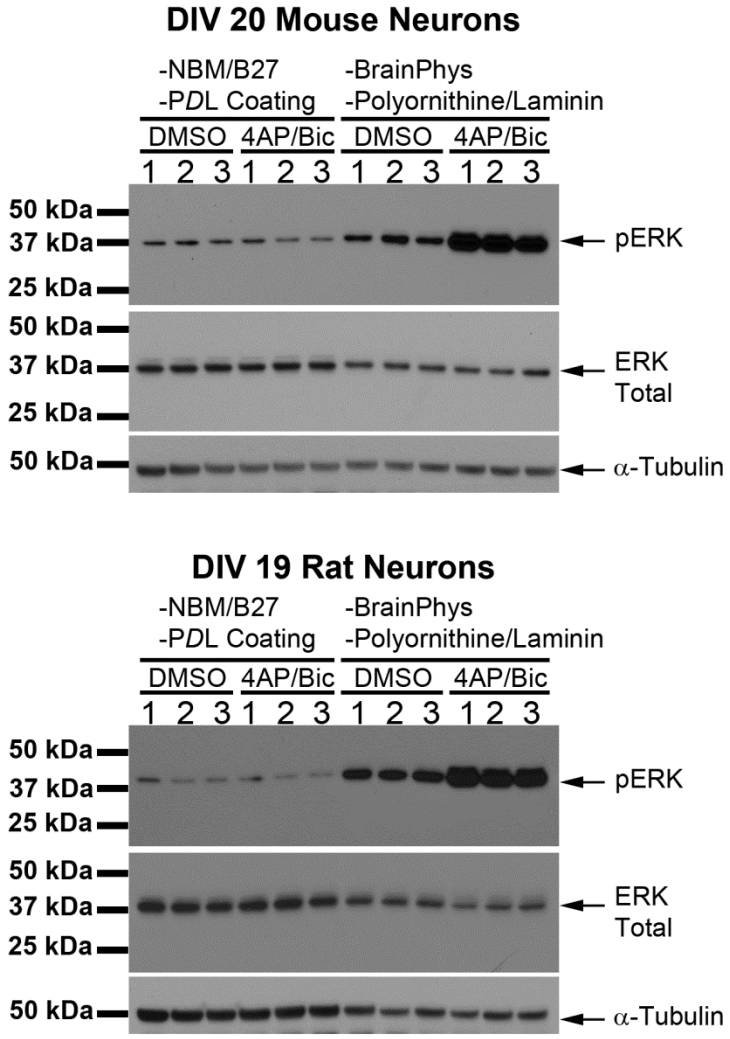
	N=1	N=2	N=3	N=4
~54% Biaxial Strain (60 MOI – Control vector)	4.1 PSI	4.0 PSI	4.1 PSI	4.1 PSI
~54% Biaxial Strain (60 MOI – RBM5 Vector)	4.0 PSI	3.9 PSI	4.0 PSI	4.1 PSI

Supplementary Fig. 1



Supplementray Fig. 1: Detection of GluN2B and GluR1 in aged DIV18 Primary Cortical Neurons Maintained in Neurobasal®/B27. Primary mouse neurons were grown on a standard polystyrene 6-well plate. Cells were given ½ media exchange every 3d. Cells were washed with PBS and harvested in RIPA buffer (+Phosphatase inhibitors+Protease Inhibitors +EDTA). Homogenates were analyzed by Western blot for GluN2B and GluR1; Cell Signaling Technology (Danvers, MA, USA): Rabbit Monoclonal Anti-NMDAR2B (Cat# 4212) and Rabbit Monoclonal Anti-GluR1 (Cat# 13185).

Supplementary Fig. 2



Supplementary Fig. 2: BrainPhys®/SM1 Increases Synaptic Response (Activation) to Treatment with 4AP/Bicuculline in Aged CNS Cultures. Mouse and rat primary cortical neurons were prepared as described in methods. Cells maintained in Neurobasal®/B27 were grown on P*D*L coated plates. Cells maintained in BrainPhys®/SM1were grown on Laminin/Poly-L-ornithine coated plates (as recommeded by the vendor STEMCELL Technologies Inc.). On the final day of experimentation, cells were treated 15min with vehicle (water/DMSO) or 1mM 4-AP/25µM bicuculline (i.e. a potassium channel blocker and $GABA_A$ antagonist). Cells were then immediately washed with ice cold PBS and harvested in RIPA buffer (+Phosphatase inhibitors+Protease Inhibitors +EDTA). Homogenates were analyzed by Western blot for pERK and ERK total levels. Synaptic activation induced by 4-AP/Bic treatment is well established to increase pERK levels in cultured neurons, and is associated with stimulation of synaptic-localized NMDARs.