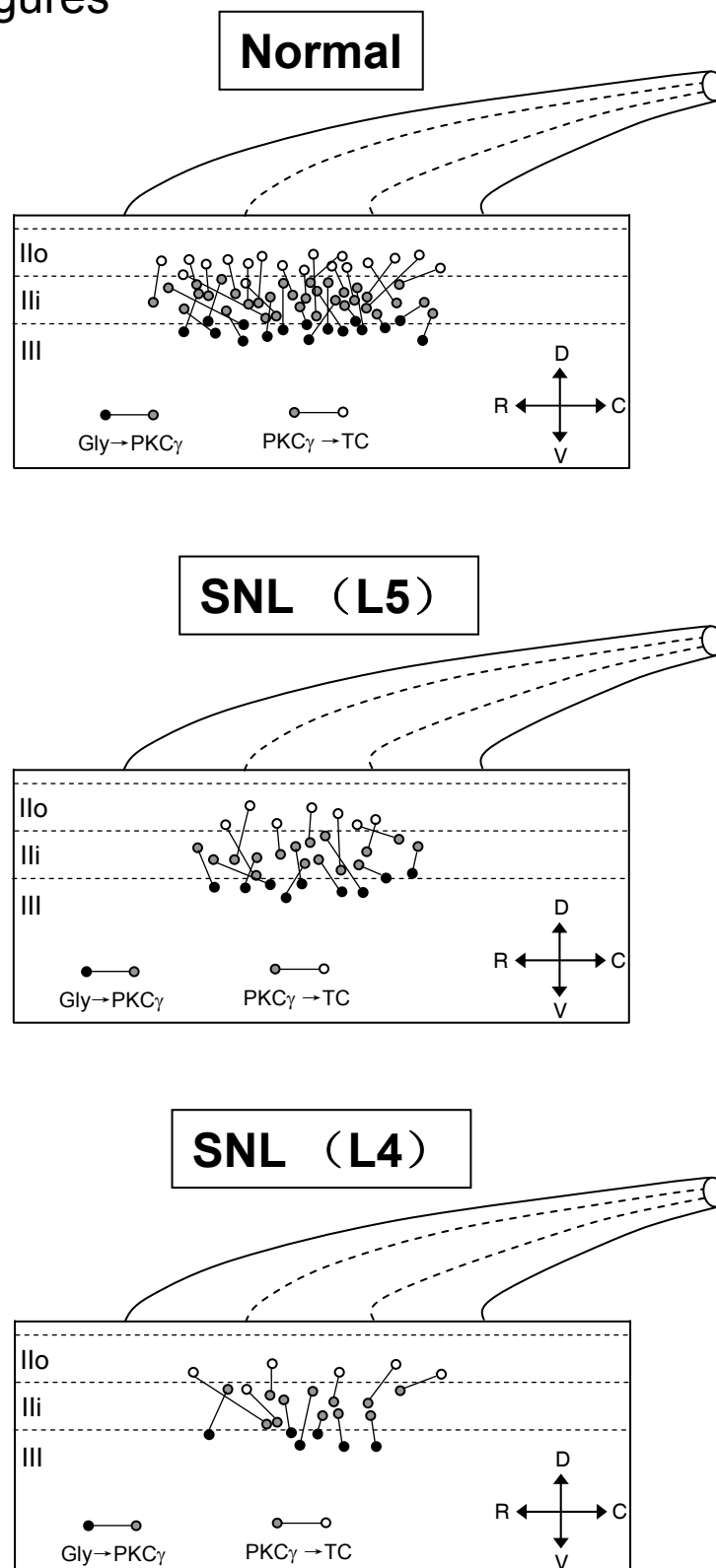
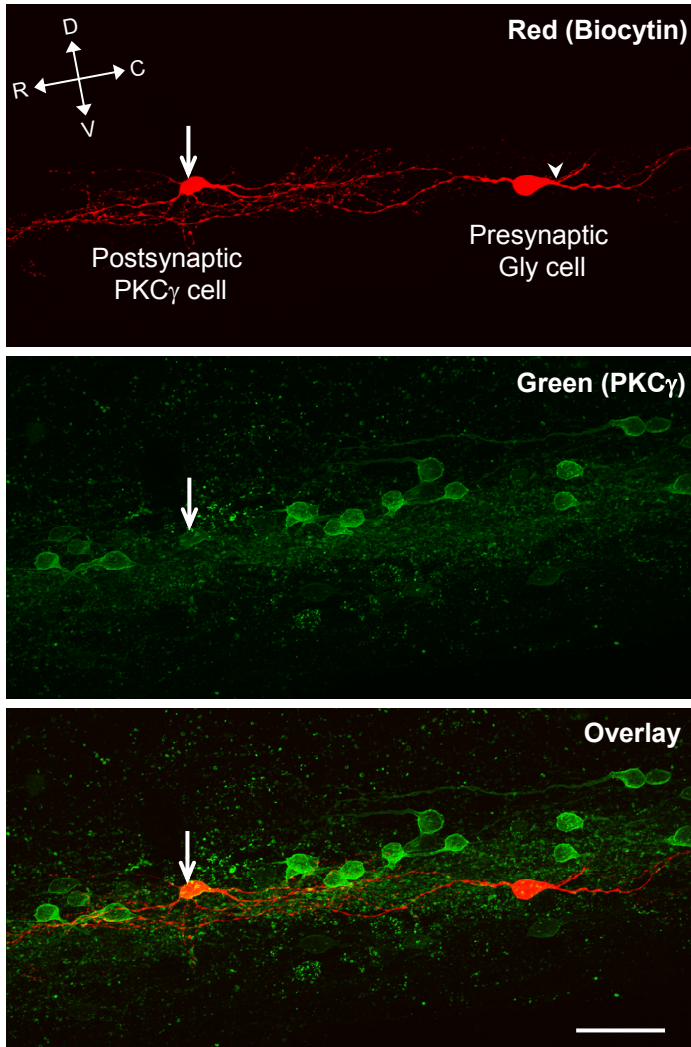


## Supplemental Figures

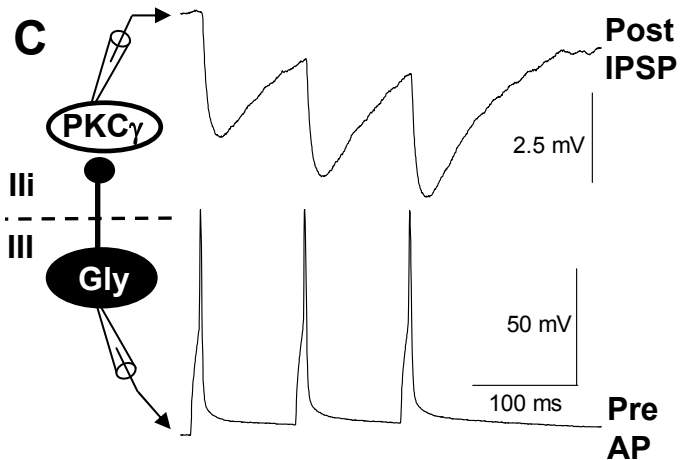
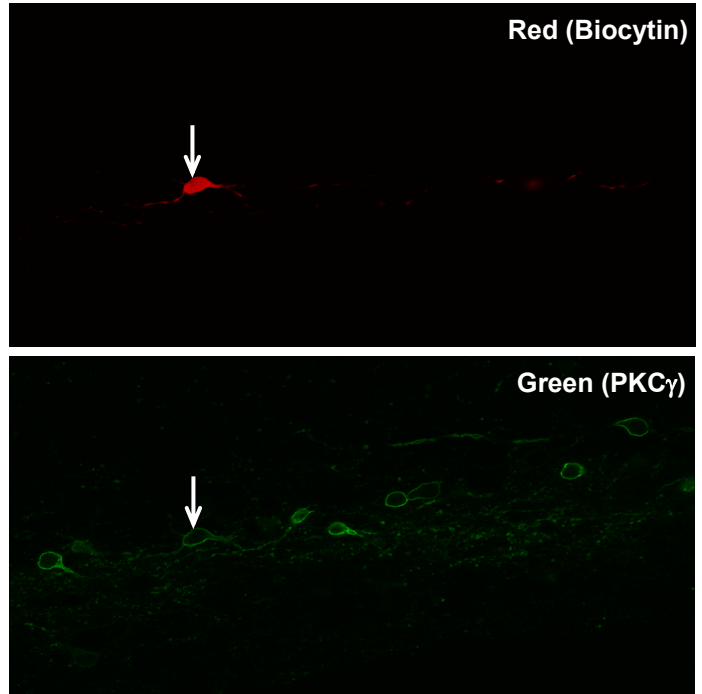


**Figure S1. The relative positions of the recorded neuronal pairs in L4 and L5 slices.** C, Caudal; D, dorsal; R, rostral; V, ventral. Gly: glycinergic cell; PKC $\gamma$ : PKC $\gamma$  positive cell; TC: transient central cell.

## A 30 $\mu\text{m}$ thick optical stacks

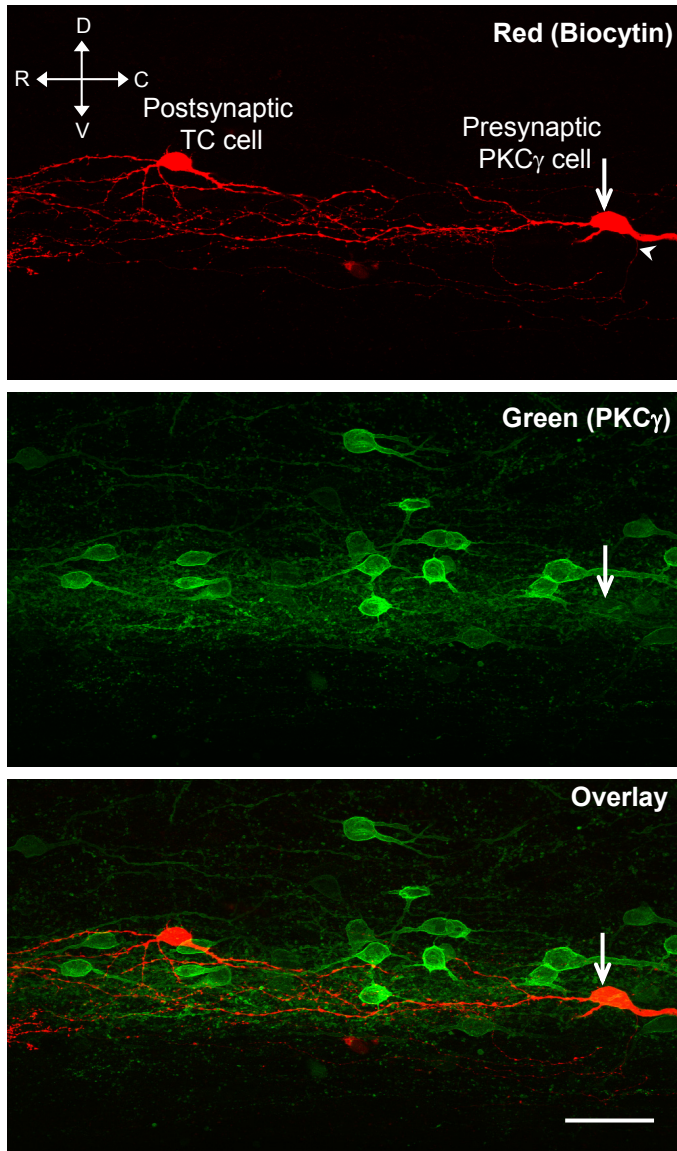


## B 1 $\mu\text{m}$ thick optical stacks

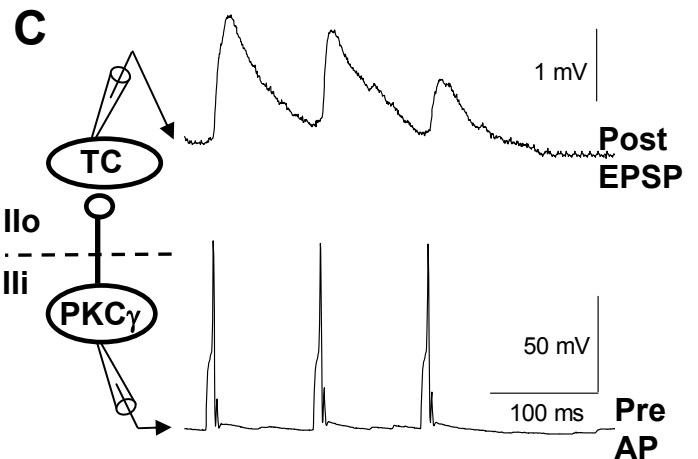
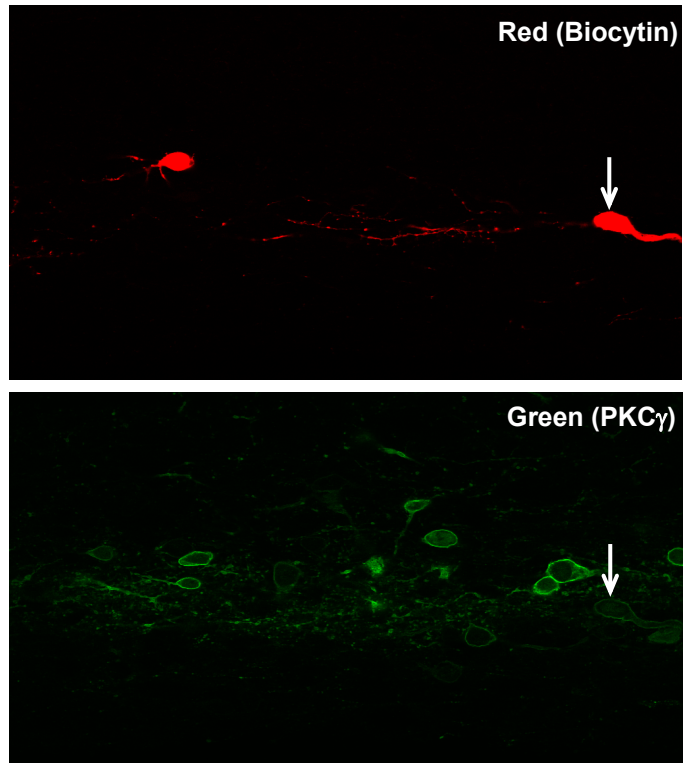


**Figure S2. An example of monosynaptic inhibitory connection between Gly and PKC $\gamma$ <sup>+</sup> neurons sampled from naïve rats. (A)** 30  $\mu\text{m}$  thick optical stack image of morphology and location of the recorded neuronal pair. Arrows indicate the presynaptic PKC $\gamma$ <sup>+</sup> cell, arrowhead indicates putative axon. **(B)** 1  $\mu\text{m}$  thick optical stacks of the recorded PKC $\gamma$ <sup>+</sup> cell. Scale bar, 100  $\mu\text{m}$ . **(C)** Bottom trace recorded from the presynaptic Gly neuron shows action potentials (APs) initiated by three successive depolarizing pulses. Top trace recorded from the postsynaptic PKC $\gamma$ <sup>+</sup> neuron shows evoked unitary IPSPs which display short-term potentiation.

### A 30 $\mu\text{m}$ thick optical stacks

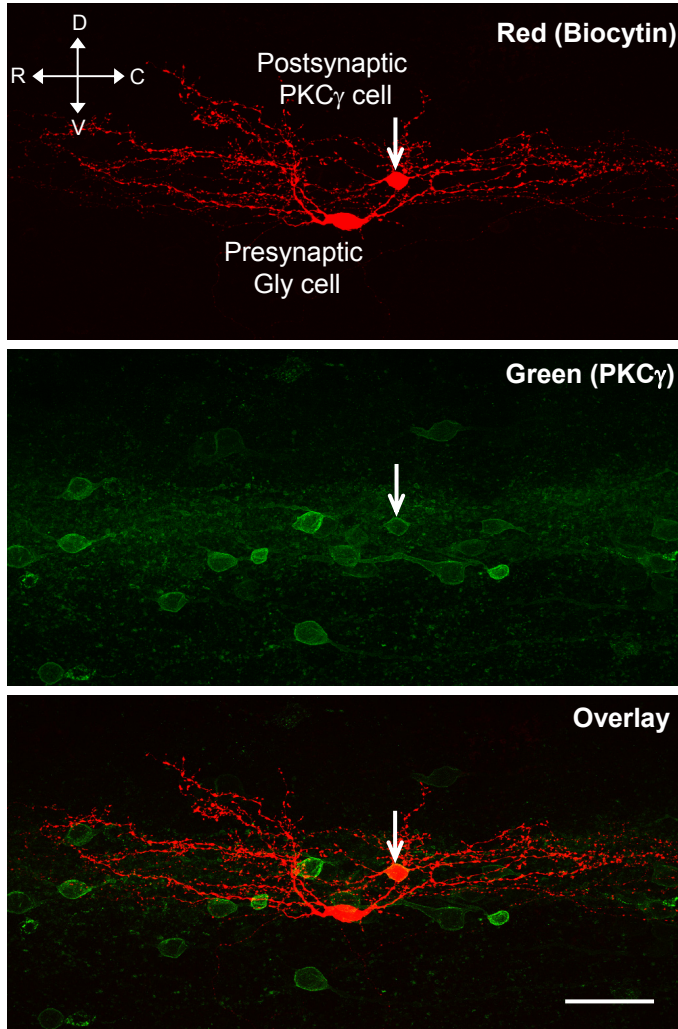


### B 1 $\mu\text{m}$ thick optical stacks

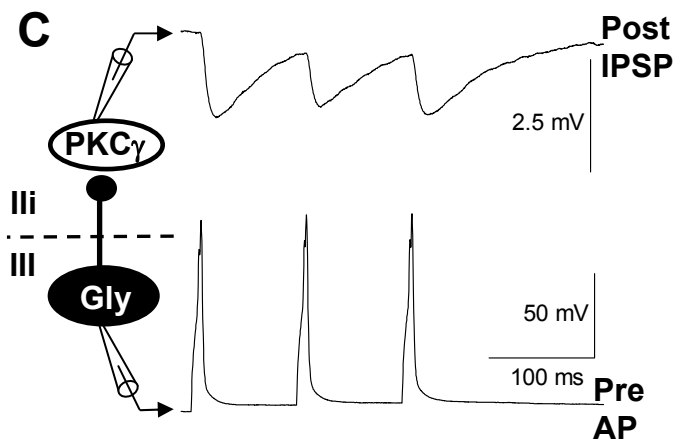
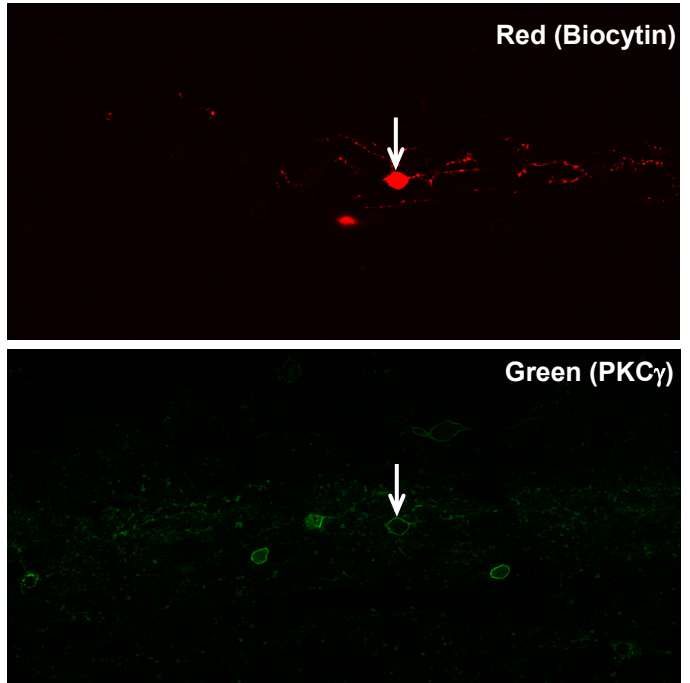


**Figure S3. An example of a monosynaptic excitatory connection between  $\text{PKC}\gamma^+$  and transient central (TC) neurons sampled from naïve rats. (A)** 30  $\mu\text{m}$  thick optical stack image of morphology and location of the recorded neuronal pair. Arrows indicate the presynaptic  $\text{PKC}\gamma^+$  positive cell, arrowhead indicates putative axon. **(B)** 1  $\mu\text{m}$  thick optical stacks of the recorded  $\text{PKC}\gamma^+$  cell. Scale bar, 100  $\mu\text{m}$ . **(C)** Bottom trace recorded from the presynaptic  $\text{PKC}\gamma^+$  neuron shows APs initiated by three successive depolarizing pulses. Top trace recorded from the postsynaptic TC neuron shows evoked unitary EPSPs which display short-term depression.

## A 30 $\mu\text{m}$ thick optical stacks



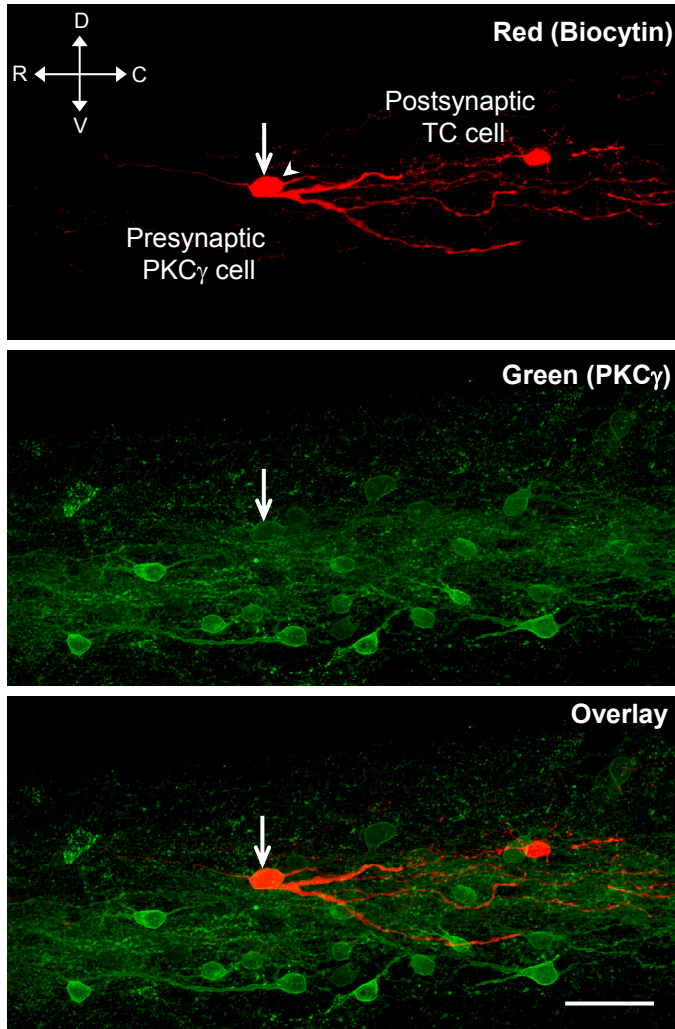
## B 1 $\mu\text{m}$ thick optical stacks



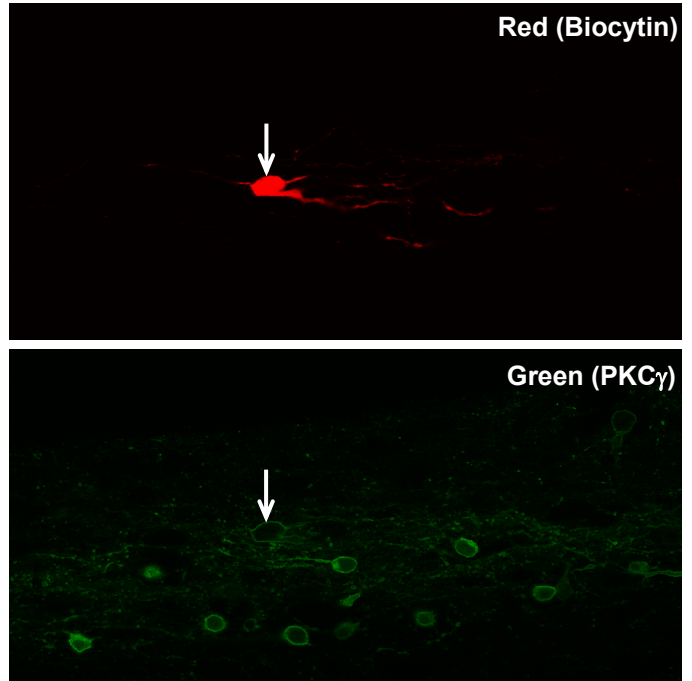
**Figure S4. An example of a monosynaptic inhibitory connection between Gly and PKC $\gamma$ <sup>+</sup> neurons sampled from SNL rats. (A)** 30  $\mu\text{m}$  thick optical stack image of morphology and location of the recorded neuronal pair. Arrows indicate the presynaptic PKC $\gamma$ <sup>+</sup> positive cell. **(B)** 1  $\mu\text{m}$  thick optical stacks of the recorded PKC $\gamma$ <sup>+</sup> cell. Scale bar, 100  $\mu\text{m}$ . **(C)** Bottom trace recorded from the presynaptic Gly neuron shows APs initiated by three successive depolarizing pulses. Top trace recorded from the postsynaptic PKC $\gamma$ <sup>+</sup> neuron shows evoked unitary IPSPs which display short-term depression.



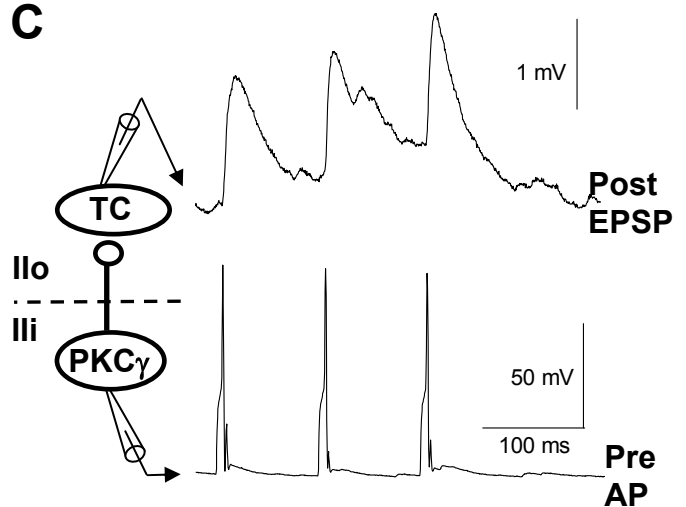
### A 30 $\mu\text{m}$ thick optical stacks



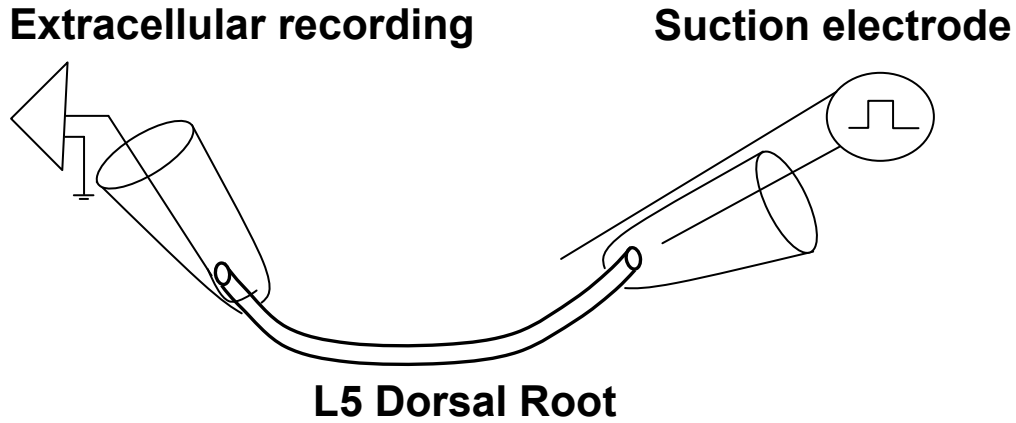
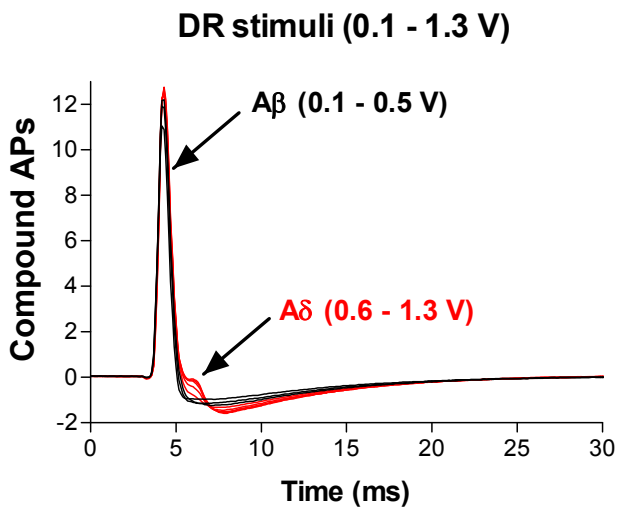
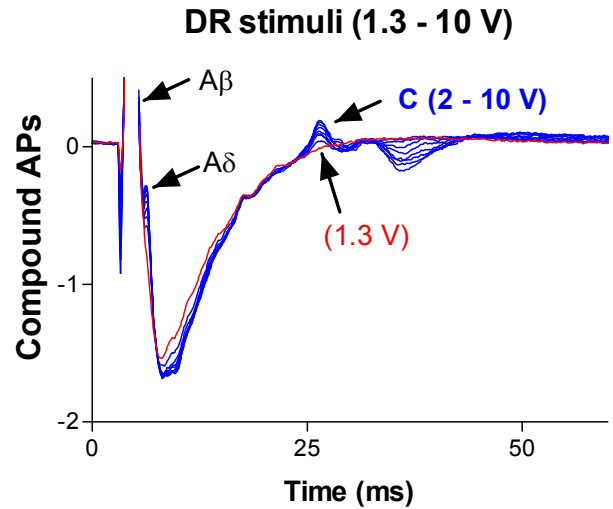
### B 1 $\mu\text{m}$ thick optical stacks



### C



**Figure S5. An example of a monosynaptic excitatory connection between PKC $\gamma$ <sup>+</sup> and transient central (TC) neurons sampled from SNL rats. (A)** 30  $\mu\text{m}$  thick optical stack image of morphology and location of the recorded neuronal pair. Arrows indicate the presynaptic PKC $\gamma$ <sup>+</sup> positive cell, arrowhead indicates putative axon. **(B)** 1  $\mu\text{m}$  thick optical stacks of the recorded PKC $\gamma$ <sup>+</sup> cell. Scale bar, 100  $\mu\text{m}$ . **(C)** Bottom trace recorded from the presynaptic PKC $\gamma$ <sup>+</sup> neuron shows APs initiated by three successive depolarizing pulses. Top trace recorded from the postsynaptic TC neuron shows evoked unitary EPSPs displaying short-term potentiation.

**A****B****C**

**Figure S6. Dorsal root compound AP recordings to determine the response thresholds for the activation of A $\beta$ , A $\delta$  and C fibers.** (A) Schematic of the experimental setup for recording compound APs from the L5 dorsal root (DR) under our recording conditions. A suction electrode was placed at one end to stimulate dorsal root and another at the opposite end to record extracellular compound APs. (B-C) Representative compound APs recorded from the DR at different stimulus intensities. The stimulus intensities for activation of A $\beta$ , A $\delta$  and C fibers were determined at the range of 0.1-0.5 V, 0.6-1.3 V and 2-10 V, respectively.

**Supplementary Table 1. Comparison of electrophysiological features between naïve and SNL rats**

Cell type	Normal (L5)			SNL (L4)			SNL (L5)		
	Gly	PKC $\gamma$	TC	Gly	PKC $\gamma$	TC	Gly	PKC $\gamma$	TC
RMPs (-mV)	50.7 $\pm$ 3.1 (16)	60.2 $\pm$ 2.7 (34)	61.3 $\pm$ 4.7 (16)	49.9 $\pm$ 4.2 (6)	60.7 $\pm$ 2.7 (12)	60.5 $\pm$ 3.6 (6)	50.2 $\pm$ 2.7 (9)	60.5 $\pm$ 3.9 (16)	61.4 $\pm$ 4.4 (7)
AP pattern	tonic	transient	transient	tonic	transient	transient	tonic	transient	transient
AP frequency (Hz)	8.5 $\pm$ 2.2 (16)	17.3 $\pm$ 5.3* (34)	4.2 $\pm$ 1.6 (16)	8.3 $\pm$ 3.4 (6)	16.1 $\pm$ 5.2* (12)	4.6 $\pm$ 2.9 (6)	8.7 $\pm$ 3.7 (9)	21.6 $\pm$ 6.7* (16)	5.1 $\pm$ 3.1 (7)

Gly: glycinergic cell; PKC $\gamma$ : PKC $\gamma$  positive cell; TC: transient central cell; RMPs: resting membrane potentials; AP pattern: action potential discharge patterns to prolonged (1000 ms) depolarizing pulses; AP frequency: action potential discharge frequency to prolonged (1000 ms) depolarizing pulses; Tonic pattern: at moderately superthreshold depolarizations, Gly cells uniformly discharged tonically (repetitively at relatively regular intervals); Transient pattern: TC and PKC $\gamma$  neurons were equally consistent in exhibiting a burst of impulses followed by silence during maintained depolarization, but the latter with higher frequency (\* $P < 0.01$ , compared with TC cells). Results were reported as mean  $\pm$  SEM ( $n$ ).