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Supplemental Data

Dynamics of Fast and Slow Inhibition from Cerebellar Golgi Cells Allow Flexible Control of Synaptic Integration

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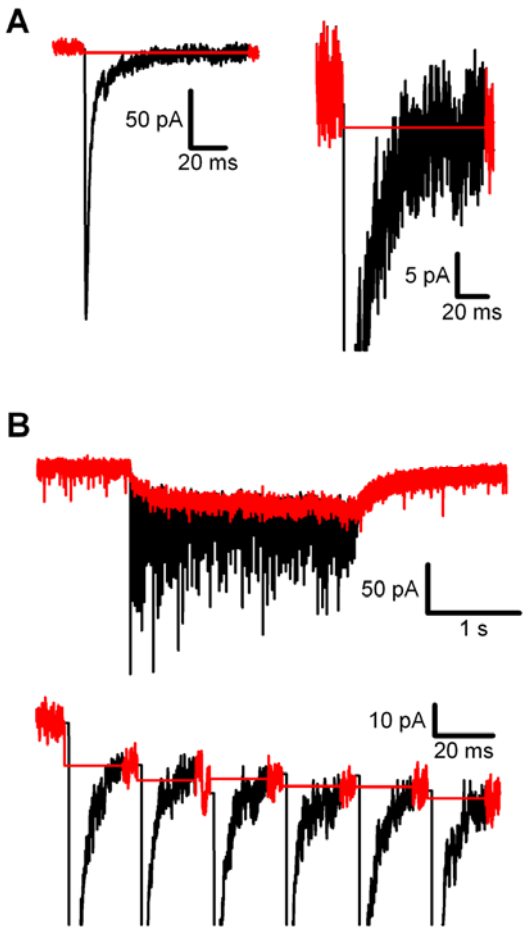

Figure S1. *Estimation of the slow IPSC during trains.* The slow IPSC was estimated by blanking the fast component, and making the region between two successive stimuli equal to the average of the last 5 ms of that interval. (A) Representative IPSC recorded

in a granule cell (black) overlayed with an estimate of the slow component (red). An expanded view of the event is shown on the right. (B) Depiction of the slow IPSC during trains. The total IPSC (black) for a 40 Hz train of stimuli is shown overlayed with the estimate of the slow component (red). These traces are integrated to determine charge transfer during the total IPSC and slow IPSC. A filtered version of this slow IPSC trace is shown overlayed with the total trains in **Fig. 1** and **Fig. 4**. An expanded view of the first six events in the train is shown below.

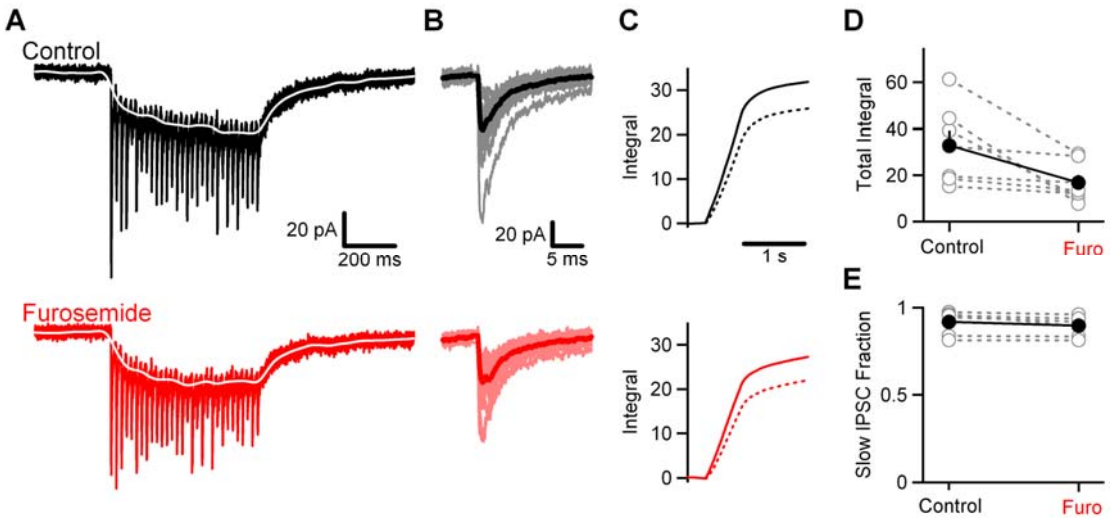

Figure S2. *Blockade of α_6-containing $GABA_A$ receptors does not selectively block the slow IPSC.* (A) Representative recording of the total IPSC recorded in a granule cell evoked by a train of 30 stimuli delivered at 50 Hz (*upper, black trace)* along with the slow IPSC (*upper, white trace*) in control conditions (10 μM NBQX, 5 μM CPP, 2 μM CGP 55845) and in the presence of 100 μM furosemide (*lower, red, white traces*). (B) Fast IPSCs from the trains in (A) are shown superimposed and baseline subtracted, for control conditions (*upper, grey, traces)* and furosemide (*lower, light red traces)*. The average fast IPSC for control (*upper, black trace*) and furosemide (*lower, dark red trace*) are superimposed on the individual events in each condition. (C) Normalized integral of the total IPSC (solid line) and slow IPSC (dotted line) in control conditions (*upper, black traces)* and in furosemide (*lower, red traces*). (D) Summary plot of the effect of furosemide on the total integral of the IPSC (n=7 cells, *grey traces*) along with the average ±SEM (*black trace*). (E) Summary plot of the effect of furosemide on the fraction of the IPSC carried by the slow component (n=7 cells, *grey traces*) along with the average ±SEM (*black trace*).

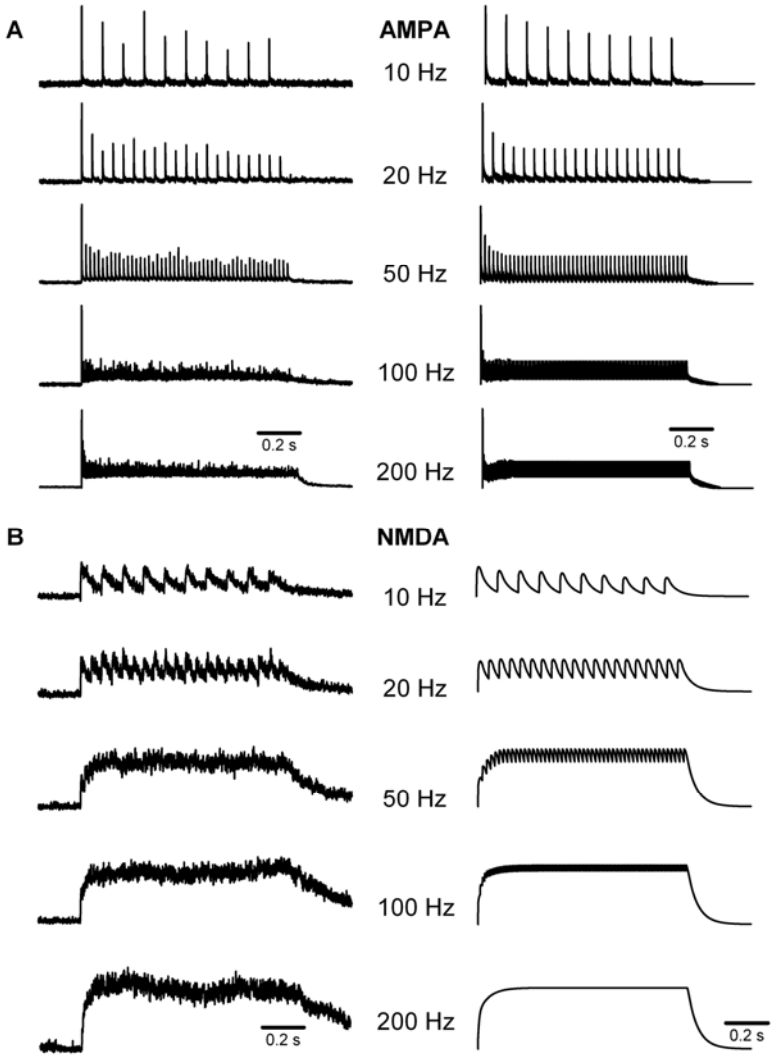

Figure S3. *Dynamic clamp conductances from AMPA and NMDA components of EPSC trains at the mossy fiber → granule synapse***.** (A, *left*) Representative one second trains of AMPA EPSCs evoked in a granule cell by extracellular mossy fiber stimulation at 10 – 200 Hz. Responses are shown normalized to the first EPSC. NMDA receptors were blocked by R-CPP (5 μM) and $GABA_A$ receptors were blocked with bicuculline (20 μM). Recordings were made at -60 mV. (A, *right*) Dynamic clamp conductances are shown for the corresponding frequencies. Conductances were generated by convolving a single event and amplitudes were estimated from exponential fits of EPSC depression observed in voltage clamp trains, and were check by integrating the entire train to determine total charge. (B, *left*) NMDA component of EPSC trains at the mossy fiber → granule cell synapse. Representative NMDA EPSCs evoked by extracellular mossy fiber stimulation trains at 10 – 200 Hz, shown normalized to the first EPSC. AMPA receptors were blocked by NBQX (10 μM) and $GABA_A$ receptors were blocked with bicuculline (20 μM). Recordings were made at -30 mV. (B, *right*) Dynamic clamp conductances are shown for the corresponding frequencies. Conductances were generated by convolving a single event and were check by integrating and comparing total charge.