Reconstructed postsynaptic excitatory and inhibitory conductance profiles of respiratory interneurons in rat brainstem *in situ* reveal network organization of respiratory CPG

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The pre-Bötzinger Complex (pre-BötC) and the Bötzinger complex (BötC) are the essential core components of the mammalian brainstem respiratory central pattern generator (CPG), in which pre-inspiratory/inspiratory, early-inspiratory, post-inspiratory and augmenting-expiratory interneuron populations are functionally interacting to generate a normal three-phase pattern of respiratory neural activity. However, functional connectivity and synaptic interactions among these interneuron populations remain largely unknown. We obtained the membrane potential trajectories of pre-BötC and BötC respiratory interneurons by current-clamp recordings with sharp-electrodes in arterially perfused juvenile rat brainstem–spinal cord preparations *in situ*, and the dynamical changes of phasic excitatory and inhibitory conductances of these neurons by using the analytical techniques we developed that allow retrieval of postsynaptic excitatory and inhibitory conductances at high temporal resolution. The reconstructed excitatory and inhibitory synaptic conductance profiles are consistent with the local microcircuit organization of the respiratory CPG we previously proposed to account for the rhythmic alternation of inspiratory and expiratory phasic activity.