Cortically Projecting Basal Forebrain Parvalbumin Positive Neurons Alter the Scale-Free Properties of Auditory Steady-State Responses

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Submitter Jee Hyun Choi

Affiliation Center for Neuroscience, Korea Institute of Science and Technology

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Presentation Abstract Summary Recently, cortically projecting basal forebrain parvalbumin positive neurons (BF-PV neurons) have been identified as a subcortical generator of cortical gamma band oscillations (GBO, 30 - 80 Hz, typically ~40 Hz) having a critical role in increase of sensory gain. However, their roles in coordination of cortical microstates over time have remained largely unidentified. To explore this, we investigated the temporal structures of ongoing oscillation under auditory steady state stimuli in three different conditions: unperturbed v. advance perturbation v. anti-phasic perturbation of BF-PV neurons to the sound. The power showed “scale-free” nature of the responses. The temporal structures were characterized by self-affinity parameter using detrended fluctuation analysis. We found advanced perturbation markedly increased the auditory responses however decreased the self-affinity, while anti-phasic perturbation diminished the response but did not alter the self-affinity. Together, our results suggest BF-PV neurons not only regulate the sensory gain but also coordinate the microstate sequence.

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Co-author Information

* Presenting Author

First Name	Last Name	Affiliation	E-mail
Jee Hyun *	Choi *	Center for Neuroscience, Korea Institute of Science and Technology	jeechoi@kist.re.kr

Eunjin	Hwang	Center for Neuroscience, Korea Institute of Science and Technology	beyondquasar@gmail.com

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