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Neural circuits for auditory-motor integration

One of the goals of my lab is to elucidate the neural mechanisms underlying integration of auditory and movement-related signals by central auditory neurons. During natural hearing, subjects are often engaged in diverse types of movement. However, how auditory neurons process and integrate the movement-related signals remain poorly understood. We are investigating how auditory neurons in the inferior colliculus, a critical midbrain integration center, process sound and motion together. To understand neural circuit mechanisms, we combine *in vivo* electrophysiology with optogenetics in behaving mice. We also use fMRI techniques for brain-wide circuit mapping.

Aim

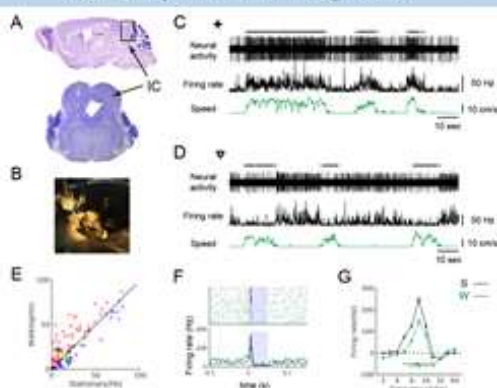
To understand neural mechanisms for auditory-motor integration

Tool

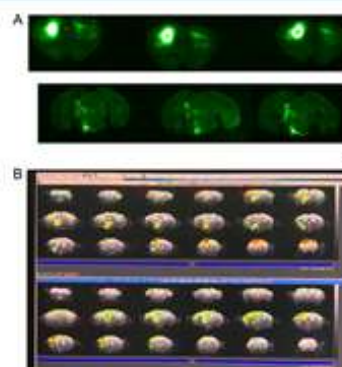
In vivo electrophysiology, optogenetics, operant behavior, fMRI

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Auditory-motor integration



Optogenetic circuit mapping



Curriculum Vitae

2020~Present : Principal Investigator, KBRI
2015~2020 : Research Fellow / IBS, Center for Neuroscience Imaging Research
2011~2015 : Associate Specialist / Dept. Physiology, UCSF, USA
2005~2011 : Postdoctoral Fellow / Dept. Physiology, UCSF, USA

Academic Credential

2004 : Ph.D. Neurobiology, Univ. of Pittsburgh, USA
1999 : M.S. Chemistry, Seoul National Univ.
1994 : B.S. Chemistry, Seoul National Univ.

Awards/Honors/Memberships

2018~Present, Review editor, Frontiers in Neural Circuits
2011 Takeda travel award, The Molecular and Cellular Cognition Society – Asia
2005 Association of Korean Neuroscientists president's excellence in research award
2015~Present, Member, Korean Society for Brain and Neural Sciences
2005~Present, Member, Association for Research in Otolaryngology
2005~Present, Member, Society for Neuroscience

Research keyword

Auditory, Behavior, Inferior colliculus, Mice, Hearing loss

Key techniques

In vivo electrophysiology, Optogenetics, Operant behavior, fMRI

Research Interests/Topics

Neural basis of auditory perception
Auditory-motor integration
Neural plasticity in hearing loss

Research Publications (Selected)

Yang Y, Lee J, and **Kim G** (2020) Integration of locomotion and auditory signals in the mouse inferior colliculus. *eLife* 9:e52228
Clause A*, **Kim G***, Sonntag M, Weisz C, Vetter D, Rubsamen R, and Kandler K (2014) The precise temporal pattern of pre-hearing spontaneous activity is necessary for tonotopic map refinement. *Neuron* 82:822–835
Kim G and Doupe A (2011) Organized representation of spectrotemporal features in songbird auditory forebrain. *Journal of Neuroscience* 31:16977–90
Kim G and Kandler K (2010) Synaptic changes underlying the strengthening of GABA/glycinergic connections in the developing lateral superior olive. *Neuroscience* 171:924–933
Kim G and Kandler K (2003) Elimination and strengthening of glycinergic/GABAergic connections during tonotopic map formation. *Nature Neuroscience* 6:282–290