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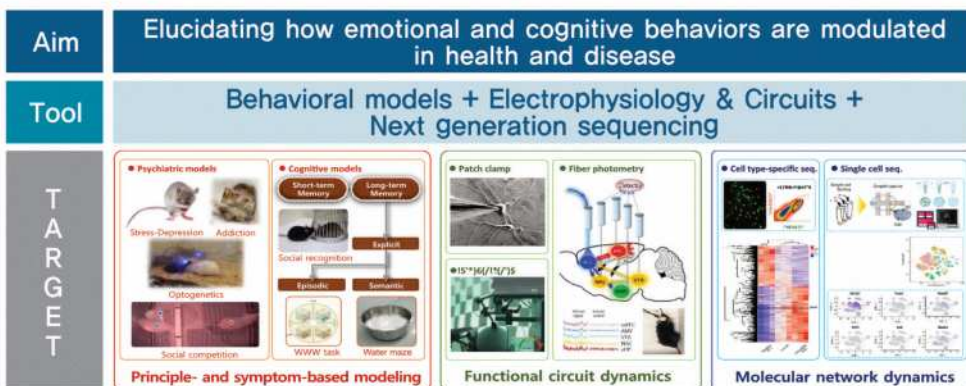
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Neural circuitry & Molecular connectome in Psychiatric disorders

Our research aims to understand how our brain network, particularly motivation circuitry, works for emotional and cognitive functions. By developing cutting-edge technological resources and monitoring the functional mesoscale connectome, our lab elucidates dynamics of the brain circuitry that is related to psychiatric/cognitive disorders. Based on the mapping of functional neural circuitry in the animal models of psychiatric/cognitive disorders, we profile transcriptome and epigenome at the levels of brain area, cell type, and single cell, which are followed by gene network analyses. The comprehensive understanding of "behavior-circuitry-molecular" mechanisms underlying emotion-cognition may shed light on the development of therapeutic tools for psychiatric/cognitive disorders.



Research keywords

Emotion, Cognition, Psychiatric disorders, Depression, Addiction, Reward circuitry, Optogenetics, Single cell/Cell-type specific transcriptome, Epigenetics, *in vivo* electrophysiology.

Curriculum Vitae

2015~Present : Principal Investigator, KBRI
 2008~2015 : Postdoctoral Fellow, Fishberg Department of Neuroscience, Icahn School of Medicine at Mount Sinai, New York, USA

Academic Credential

2008 : Ph.D., Department of Psychology, (Behavioral Neuroscience) Yale University, USA
 2002 : M.S., School of Biological Sciences, Seoul National University, Korea

2000 : B.S., School of Biological Sciences, Seoul National University, Korea

Awards/Honors/Memberships

2018 : Mol. & Cell, Biol. News Committee, KSMCB
 2018 : Planning Committee Coordinator, KSBNS
 2015~2016 : Academic Affairs Committee Coordinator, KSBNS
 2011 : Young Investigators Travel Award, NIDA
 2008~2015 : Member, Association for Psychological Science
 2002~2015 : Member, Association of Korean Neuroscientists
 2000~Present : Member, Society for Neuroscience

Key techniques

Animal models of psychiatric/cognitive disorders, Optogenetics, Fiber photometry, Virtual reality, *in vivo* / *ex vivo* recordings, FACS, Single cell/Cell-type seq, ChIP assay, Viral-mediated gene transfer.

Research Interests/Topics

- Emotional-cognitive functional control by neuro-circuitry regulation.
- Brain circuitry based studies at cell type and single cell levels on transcriptomic and epigenetic mechanisms in psychiatric/cognitive disorders.

Research Publications (selected)

- **Koo JW***, Chaudhury D*, Han MH#, Nestler EJ#. Role of Mesolimbic Brain-Derived Neurotrophic Factor in Depression. *Biol Psychiatry*, *e-pub*, 2019. (*,#contributed equally)
- Labonte B*, Jeong YH*, Engmann O, Parise E, Issler O, Nestler EJ, **Koo JW**. Gadd45b mediates depressive-like role through DNA demethylation. *Scientific Report*, 9:4615, 2019. (*,#contributed equally)
- **Koo JW**, Labonte B, Engmann O, Calipari ES, Lorsch Z, Juarez B, Friedman AK, Walsh JJ, Han MH, Nestler EJ. Essential Role of Mesolimbic Brain-Derived Neurotrophic Factor in Chronic Social Stress-Induced Depressive Behaviors. *Biol Psychiatry*, 80:469-478, 2016.
- **Koo JW**, Mazei-Robison MS, LaPlant Q, Egervari G, Braunscheidel KM, Adank DN, Ferguson D, Feng J, Sun H, Scobie KN, Damez-Werno D, Riberio E, Pe CJ, Walker D, Bagot RC, Cahill ME, Anderson SA, Labonte B, Hodes GE, Browne H, Chadwick B, Robison AJ, Vialou VF, Dias C, Lorsch Z, Mouzon E, Lobo MK, Dietz DM, Russo SJ, Neve RL, Hurd YL, Nestler EJ. Epigenetic basis of opiate suppression of Bdnf gene expression in the ventral tegmental area. *Nat Neurosci*, 18:415-422, 2015.
- **Koo JW**, Mazei-Robison MS, Chaudhury D, Juarez B, LaPlant Q, Ferguson D, Feng J, Sun H, Scobie KN, Damez-Werno D, Crumiller M, Ohnishi YN, Ohnishi YH, Mouzon E, Hodes GE, Dietz DM, Lobo MK, Neve RL, Russo SJ, Han MH, Nestler EJ. BDNF is a Negative Modulator of Morphine Action. *Science*, 338:124-128, 2012.

Patents (selected)

- **Koo JW**, Nestler EJ. A BDNF (Brain-derived neurotrophic factor) overexpressed animal model for depression disorder and a method of producing thereof. Korea Patent #10-1884650, filed Oct. 2, 2016 and issued July 18, 2018.
- Choi HK, Koh EH, Cho JH, Son JB, Koh EK, Park JH, Kim SY, Kang SY, Lee SY, Ryu HY, Kim ND, Kim SB, Lee SH, Kim DY, Lee SJ, Cho SC, Lee KS, Yoo K, Choi M, **Koo JW**, Hoe H. Pyrrolo-pyridine derivatives, preparation method thereof, and pharmaceutical composition for use in preventing or treating protein kinase related disease as an active ingredient. Korea Patent #10-1896568, filed March 23, 2018 and issued Sept. 3, 2018.