Curriculum Vitae

Kyung Ah Han, Ph.D

Current Address / Affilation

Research professor in the Department of Brain Science, Daegu Gyeongbuk Institute of Science and Technology (DGIST), Techno Jungang-daero, Hyeonpung-Eup, Dalseong-Gun, Daegu 42988, South Korea
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Education

2008. 03 – 2015. 02	Ph.D., Dept. of Systems Biology, Yonsei University, Seoul, Korea (Advisor: Dr. Kwang Chul Chung)

Professional Experience

2020. 03 –	Research professor, Dept. of Brain Science, DGIST, Daegu, Korea (Advisor: Dr. Jaewon Ko and Dr. Ji Won Um)
2017. 06 – 2020. 02	Research Fellow, Dept. of Brain & Cognitive Sciences, DGIST, Daegu, Korea (Advisor: Dr. Jaewon Ko and Dr. Ji Won Um)
2017. 02 - 2017. 05	Postdoctoral Researcher, Dept. of Brain & Cognitive Sciences, DGIST, Daegu, Korea (Advisor: Dr. Jaewon Ko and Dr. Ji Won Um)
2015. 09 – 2017. 01	Postdoctoral Researcher, Dept. of Physiology, Yonsei University College of Medicine, Seoul, Korea (Advisor: Jaewon Ko and Dr. Ji Won Um)
2015. 03 – 2015. 08	Postdoctoral Researcher, Dept. of Systems Biology, Yonsei University, Seoul, Korea (Advisor: Dr. Kwang Chul Chung)

Fellowship

2021. 03 – 2026. 02	Sejong Science Fellowship, National Research Foundation of Korea (NRF) Title: Roles of signaling complexes underlying tyrosine phosphorylation signaling in controlling presynaptic assembly and behavior
2018. 06 – 2020. 05	Research Fellow, National Research Foundation of Korea (NRF) Title: Investigation of synaptic homeostasis mechanism mediated by excitatory synaptic adhesion molecules
2017. 06 – 2018. 05	Research Fellow, National Research Foundation of Korea (NRF) Title: Investigation of presynaptic mechanisms underlying tyrosine phosphorylation signaling pathways at active zone

Patent

- Method for producing anxiety-like animal model Inventors:

Ko J, Um JW, **Han KA**, Yoon TH Code number: 10-2019-0039739 (domestic)

Teaching Assistantship

- Department of Systems Biology, Yonsei University, Seoul, Korea (2008-2012)

Served as an experimental teaching assistant for undergraduate biology classes

- Department of Physiology, Yonsei University College of Medicine, Seoul, Korea (2016)

Served as an experimental teaching assistant for undergraduate Physiology class

Technical Skills

Molecular Biology and Biochemistry

Preparation of DNA and RNA, Cloning (overexpression, KD shRNA, guideRNA constructs), Site-directed mutagenesis, RT-PCR, Real-time PCR, Purification of recombinant proteins, Cell line and cultured neuron transfection, Western blot, DNA-PAGE, Protein interaction test methods (*in vitro* pull down, *in vitro* co-IP, *in vivo* co-IP, Surface binding assay, Y2H, LC-Mass sample preparation), Protein post translational modification analysis (phosphorylation, dephosphorylation, neddylation, ubiquitination, acetylation), Organelle and Subcellular isolation, Cell viability assay, Luciferase reporter assay, Surface biotinylation assay, Immunostaining (cell line, cultured neuron, brain tissue), Sholl analysis, Cultured neuron calcium imaging, ELISA, Microglia phagocytosis measurement, RNAscope, PRM (Parallel Reaction Monitoring) sample preparation, Virus preparation (lentivirus, adeno-associated virus (overexpression resuce, knock-down, Cre recombinase, retrograde tracing, DREADDs etc))

Imaging

Confocal microscopy, Fluorescent microscopy, SIM(Structured Illumination Microscopy)

Cell system

Cultured primary neurons (hippocampal cultured neuron, thalamic neuron, dopaminergic neuron), Cultured primary non-neuronal cells (microglia, astrocyte, oligodendrocyte), Cell lines (human dopaminergic neuroblastoma SH-SY5Y, murine blastoma N2a, human embryonic kidney 293 [HEK293], human epithelium HeLa, African green monkey fibroblast-like kidney COS-7, murine

microglial cell line BV2)

Animal

Maintained and generated transgenic mouse line, Brain dissection, Perfusion, Bran slice preparation, Stereotaxic injection, Intraperitoneal injection, Neural circuit tracing

Behavioral analyses

Open field test, Y maze test, 3-chamber test, Elevated plus maze test, Morris water maze test, Prepulse inhibition (PPI), LABORAS, Novel object recognition test, Object location test, Tube test, Light/dark box test, Rotarod performance test

FACS (fluorescence activated cell sorting)

Data Analysis and software programs

Image J, Multi Gauge v2.0, GraphPad Prism 8, Metamorph, Microsoft Office (Word, Excel, Power Point), EndNote, Photoshop, Illustrator

Publication List

20. Han KA*, Yoon TH*, Kim J, Lee JS, Lee JY, Jang G, Um JW, Kim JK and Ko J. (2024) Specification of neural circuit architecture shaped by context-dependent patterned LAR-RPTP microexons. ***Nat. Commun.*** 15: 1624 (*co-first authors)

19. Han KA and Ko J. (2023) Orchestration of synaptic functions by WAVE regulatory complex-mediated actin reorganization. ***Exp. Mol. Med.*** 55: 1065-1075

18. Chehadeh SE*, Han KA*, Kim D*, Jang G*, Bakhtiari S, Lim D, Kim HY, Kim J, Kim H, Wynn J, Chung WK, Vitiello G, Cutcutache I, Page M, Gecz J, Harper K, Han AR, Kim HM, Wessels M, Bayat A, Jaen AF, Selicorni A, Maitz S, Brouwer AD, Silfhout AV, Armstrong M, Symonds J, Kury S, Insidor B, Cogne B, Nizon M, Feber C, Muller J, Torti E, Grange DK, Willems M, Kruer MC, Ko J, Piton A and Um JW. (2022) SLITRK2 variants associated with neurodevelopmental disorders impair excitatory synaptic function and cognition in mice. ***Nat. Commun.*** 13(1): 4112 (***co-first authors**)

17. Lie E, Yeo Y, Lee EJ, Shin W, Kim K, Han KA, Yang E, Choi TY, Bae M, Lee S, Um SM, Choi SY, Kim H, Ko J and Kim E. (2021) SALM4 negatively regulates NMDA receptor function and fear memory consolidation. ***Commun. Biol.*** 4: 1138

16. **Han KA***, Yoon TH*, Shin J*, Um JW and Ko J. (2020) Differentially altered social dominance- and cooperative-like behaviors in Shank2- and Shank3-mutant mice. ***Mol. Autism*** 11(1): 87 (*co-first authors)

15. **Han KA***, Kim YJ*, Yoon TH, Kim H, Bae S, Um JW, Choi SY and Ko J. (2020) LAR-RPTPs Directly Interact with Neurexins to Coordinate Bidirectional Assembly of Molecular Machineries. ***J. Neurosci.*** 40(44): 8438-8462 (*co-first authors)

14. Um JW, **Han KA**, Choi SY and Ko J. (2020) Protocol for Quantitative Analysis of Synaptic Vesicle Clustering in Axons of Cultured Neurons. ***STAR Protoc.*** 1(2): 100095

13. **Han KA***, Lee HY*, Lim D*, Shin J, Yoon TH, Liu X, Um JW, Choi SY and Ko J. (2020) Receptor protein tyrosine phosphatase delta is not essential for synapse maintenance or synaptic transmission at hippocampal synapses. ***Mol. Brain*** 13(1): 94 (*co-first authors)

12. **Han KA**, Lee HY, Lim D, Shin J, Yoon TH, Lee C, Rhee JS, Liu X, Um JW, Choi SY and Ko J. (2020) PTPσ Controls Presynaptic Organization of Neurotransmitter Release Machinery at Excitatory Synapses. ***iScience*** 23(6): 101203

11. **Han KA***, Kim J*, Kim H*, Kim D, Lim D, Ko J, Um J. (2019) Slitrk2 controls excitatory synapse development via PDZ-mediated protein interactions. ***Sci. Rep.*** 9: 17094 (*co-first authors)

10. **Han KA**, Um JW, Ko J. (2019) Intracellular protein complexes involved in synapse assembly in presynaptic neurons. ***Adv. Protein. Chem. Struct. Biol.*** 116: 347-373

9. **Han KA**, Ko JS, Pramanik G, Kim JY, Tabuchi K, Um JW and Ko J. (2018) PTPσ drives excitatory presynaptic assembly via various extracellular and intracellular mechanisms. ***J. Neurosci.*** 38: 6700–6721. [Highlighted in the “This Week in The Journal” and selected as a “Featured Article”]

8. Kim JA, Kim D, Won SY, **Han KA**, Park D, Cho E, Yun N, An HJ, Um JW, Kim E, Lee JO, Ko J and Kim HM. (2017) Structural Insights into Modulation of Neurexin-Neuroligin *Trans*-synaptic Adhesion by MDGA1/Neuroligin-2 Complex. ***Neuron*** 94(6):1121-1131. [Selected as an “Issue Highlight” and introduced in a Preview “A triad of crystals sheds light on MDGA interference with neuroligation]

7. **Han KA**, Yoo L, Sung JY, Chung SA, Um JW, Kim H, Seol W and Chung KC. (2017) Leucine-Rich Repeat Kinase 2 (LRRK2) Stimulates IL-1β-Mediated Inflammatory Signaling through Phosphorylation of RCAN1. ***Front. Cell. Neurosci.*** 11:125

6. **Han KA**, Shin WH, Jung S, Seol W, Seo H, Ko C and Chung KC. (2017) Leucine-rich repeat kinase 2 exacerbates neuronal cytotoxicity through phosphorylation of histone deacetylase 3 and histone deacetylation. ***Hum. Mol. Genet.*** 26(1):1-18

5. Kang H, **Han KA**, Won SY, Kim HM, Lee YH, Ko J and Um JW. (2016) Slitrk Missense Mutations Associated with Neuropsychiatric Disorders Distinctively Impair Slitrk Trafficking and Synapse Formation. ***Front. Mol. Neurosci.*** 9:104

4. **Han KA**, Woo D, Kim S, Choii G, Jeon S, Won SY, Kim HM, Heo WD, Um JW and Ko J. (2016) Neurotrophin-3 regulates synapse development by modulating TrkC-PTPσ synaptic adhesion and intracellular signaling pathways. ***J. Neurosci.*** 36(17):4816-4831

3. **Han KA**, Jeon S, Um JW and Ko J. (2016) Emergent Synapse Organizers; LAR-RPTPs and their companions. ***Int. Rev. Cell. Mol. Biol.*** 324:39-65

2. **Han KA**, Kang HS, Lee JW, Yoo L, Im E, Hong A, Lee YJ, Shin WH and Chung KC. (2014) Histone deacetylase 3 promotes RCAN1 stability and nuclear translocation. ***PLoS One*** 9(8):e105416

1. Um JW*, **Han KA***, Im E, Oh Y, Lee K and Chung KC. (2012) Neddylation positively regulates the ubiquitin E3 ligase activity of parkin. ***J. Neurosci. Res.*** 90(5):1030-1042 (***co-first authors**) [selected as a special interest to the drug development sector and listed on Global Medical Discovery Series]