

## CURRICULUM VITAE

**Won Chan Oh, Ph.D.**

### CONTACT

Department of Pharmacology, Mail Stop 8303  
University of Colorado School of Medicine, Anschutz Medical Campus  
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### EDUCATION

2006            **B.S.** in Biology, Dongguk University, Seoul, Korea  
2008            **M.S.** in Life Science (Developmental Genetics), Gwangju Institute of Science and Technology (GIST), Gwangju, Korea  
2013            **Ph.D.** in Cellular and Developmental Biology (Cellular Neurobiology), University of California, Davis, CA

### PROFESSIONAL APPOINTMENTS / EMPLOYMENT

2006 - 2008    **Research Assistant / M.S. Student** with Drs. Joohong Ahnn and Do Han Kim  
Department of Life Science, GIST, Gwangju, Korea  
2008 - 2013    **Research Assistant / Ph.D. Student** with Dr. Karen Zito  
Cellular and Developmental Biology Graduate Group, University of California, Davis, CA  
2014 - 2018    **Postdoctoral Fellow** with Dr. Hyung-Bae Kwon  
Max Planck Florida Institute for Neuroscience (MPFI), Jupiter, FL  
2018 - Present   **Assistant Professor**  
Department of Pharmacology, University of Colorado School of Medicine (SOM), Aurora, CO

### TEACHING EXPERIENCE

2010 - 2013    Teaching Assistant for Neurobiology, University of California, Davis, CA  
(Winter Quarter 2010, Winter Quarter 2013, Fall Quarter 2013)  
2013            Teaching and Research Assistant for 2013 CSHL Course on Imaging Structure and Function in the Nervous System, Cold Spring Harbor Laboratory (CSHL), NY  
2016 - 2018    Teaching and Research Assistant for MPFI Courses on Neuroimaging Techniques, Max Planck Florida Institute for Neuroscience, FL  
2018 - Present   Participation in Frontiers in Pharmacology (PHCL 7600), Univ. of Colorado SOM, CO  
2021            Participation in Developmental Neurobiology (NRSC 7615), Univ. of Colorado SOM, CO  
2022 - Present   Participation in Principles of Pharmacology (Course Director, PHCL 7620), Univ. of Colorado SOM, CO  
2023 - Present   Participation in Cellular and Molecular Neurobiology (NRSC 7600), Univ. of Colorado SOM, CO

### AWARDS, HONORS, FELLOWSHIPS

1999 - 2005    **Academic Scholarships**, Dongguk University, Seoul, Korea  
2004            **Summer Research Travel Fellowship** (Univ. of Toronto, McGill Univ.), Dongguk University  
2005            **Exemplary Achievement Scholarship**, Dongguk University  
2006            **Best Undergraduate Thesis Award**, Dongguk University  
*Magna cum laude*, Dongguk University

- 2006 - 2008      **Government Research Fellowship**, Ministry of Science and Technology, GIST, Korea
- 2012              **KUSCO-KSEA Graduate Student Scholarship**, Korea-U.S. Science Cooperation Center (KUSCO) and Korean-American Scientists and Engineers Association (KSEA), USA
- 2012              **US-Korea Conference (UKC) Travel Award**, KUSCO, USA (*Invited Speaker*)
- 2013              **Gordon Research Conference (GRC) Travel Award** (*Invited Speaker*), Excitatory Synapses and Brain Function, Switzerland
- 2017              **MPFI Postdoctoral Travel Fellowship**, Max Planck Florida Institute for Neuroscience, Jupiter, FL
- 2019              **GRC Travel Award** (*Invited Speaker*), Dendrites: Molecules, Structure and Function, CA
- 2020              **NARSAD Young Investigator Award**, Brain and Behavior Research Foundation
- 2020              **CO-Pilot Grant Award**, CCTSI (Colorado Clinical and Translational Sciences Institute)
- 2020              **Fay/Frank Seed Grant Award**, Brain Research Foundation
- 2022              **Faculty Award for Excellence in Research**, Department of Pharmacology, University of Colorado SOM
- 2022              **Research Collaboration Award for the CU Anschutz Research Award Program**, University of Colorado SOM
- 2022              **Junior Faculty Award for Outstanding Research**, Association of Korean Neuroscientists in America
- 2023              **Travel Award** (*Invited Speaker*), Sunposium (Neural Circuits Research Conference), MPFI, FL
- 2023              **AB Nexus Grant Award**, CU Anschutz Medical Campus and CU Boulder, University of Colorado

## **PUBLICATIONS**

### Research Articles

1. Cho, J.H., Song, H.O., Singaravelu, G., Sung, H., **OH, W.C.**, Kwon, S., Kim do, H., and Ahnn, J. (2009) Pleiotropic roles of calumenin (calu-1), a calcium-binding ER luminal protein, in *Caenorhabditis elegans*. *FEBS Lett* 583:3050-3056.
2. **OH, W.C.\***, Song, H.O.\*, Cho, J.H.\*, and Park, B.J. (2011) ANK repeat-domain of SHN-1 is indispensable for *in vivo* SHN-1 function in *C. elegans*. *Mol Cells* 31:79-84. *\*co-first*
3. Woods, G.F., **OH, W.C.**, Boudewyn, L.C., Mikula, S.K., and Zito, K. (2012) Loss of PSD-95 Enrichment is not a Prerequisite for Spine Retraction. *J Neurosci* 31:12129-12138.
4. Hamilton, A.M., **OH, W.C.**, Vega-Ramirez, H., Patrick, G.N., and Zito, K. (2012) Activity-dependent growth of new dendritic spines is regulated by the proteasome. *Neuron* 74:1023-1030.
5. **OH, W.C.**, Hill, T.C., and Zito, K. (2013) Synapse-specific and size-dependent mechanisms of spine structural plasticity accompanying synaptic weakening. *PNAS* Jan 22;110(4):E305-12
6. **OH, W.C.**, Parajuli, L.K., and Zito, K. (2015) Heterosynaptic structural plasticity on local dendritic segments of hippocampal CA1 neurons. *Cell Reports* 10:162-169. [F1000 Prime Recommended]
7. Villa, K.L., Berry, K.P., Subramanian, J., Cha, J.W., **OH, W.C.**, Kwon, H.-B., Kubota, Y., So, P.T.C. and Nedivi, E. (2016) Inhibitory synapses are repeatedly assembled and removed at persistent sites *in vivo*. *Neuron* 89:1-14.
8. Kim, T.\*, **OH, W.C.\***, Choi, J.H., and Kwon, H.-B. (2016) Emergence of functional subnetworks in layer 2/3 cortex induced by sequential spikes *in vivo*. *PNAS* 113:E1372-81. *\*co-first*
9. **OH, W.C.**, Lutz, S., Castillo, P.E., and Kwon, H.-B. (2016) De novo synaptogenesis induced by GABA in the developing mouse cortex. *Science* 353, 1037-1040.  
[Jansen, L. (2017) Making Connections With GABA. Current Literature In Basic Science, Epilepsy Currents]  
[Lewis, S. (2016) Neuronal development: Signalling synaptogenesis. Research Highlight, Nature Reviews Neuroscience]
10. Lee, D., Creed, M., Jung, K., Stefanelli, T., Wendler, D.J., **OH, W.C.**, Mignocchi, N.L., Lüscher, C., and Kwon, H.-B. (2017) Temporally precise labeling and control of neuromodulatory circuits in mammalian brain. *Nat. Methods* 14:495-503
11. Sigler, A.\*, **OH, W.C.\***, Imig, C.\*, Altas, B., Kawabe, H., Cooper, B. H., Kwon, H.-B., Lee, J.-S., Brose, N. (2017) Formation and maintenance of functional spines in the absence of presynaptic glutamate release. *Neuron* 94:304-311. *\*co-first* [F1000 Prime Recommended]

12. Sutton, L.P., Orlandi, C., Song, C., **OH, W.C.**, Muntean, B., Xie, K., Filippini, A., Xie, X., Satterfield, R., Yaeger, J.D. W., Renner, K.J., Young, S.M., Xu, B., Kwon, H.-B., and Martemyanov, K.A. (2018) Orphan receptor GPR158 controls stress-induced depression. *eLife* 7:e33273
13. Kim, J.\*, Lee, S.\*, Jung, K.\*, **OH, W.C.**, Kim, N., Son, S., Jo, Y., Kwon, H.-B., and Heo, W. D. (2019) Intensiometric biosensors visualize the activity of multiple small GTPases *in vivo*. *Nat Commun*. 10(1):211.
14. Parajuli, L.K., Urakubo, H., Takahashi-Nakazato, A., Ogelman, R., Iwasaki, H., Koike, M., Kwon, H.-B., Ishii, S., **OH, W.C.**, Fukazawa, Y., Okabe, S. (2020) Geometry and the organizational principle of spine synapses along a dendrite. *eNeuro* 0248-20.2020
15. **OH, W.C.** #, Rodríguez, G., Aseda, D., Jung, K., Hwang, I.-W., Ogelman, R., Bolton, M., and Kwon, H.-B.# (2021) Dysregulation of mesoprefrontal dopamine circuit mediates early life stress-induced excitatory/inhibitory synaptic imbalance in the prefrontal cortex. *Cell Reports* 35(5):109074 #Corresponding authors
16. Dong, C., Ly, C., Dunlap, L.E., Vargas, M.V., Sun, J., Hwang, I.-W., Azinfar, A., **OH, W.C.**, Wetsel, W.C., Olson, D.E., and Tian, L. (2021) Psychedelic-Inspired Drug Discovery Using an Engineered Biosensor. *Cell* 184(10):2779-2792.e18
17. Jang, J., **OH, W.C.**, and Zito, K. (2021) Induction of input-specific spine shrinkage by two-photon glutamate uncaging. *STAR Protoc*. 2(4):100996
18. Kim, J., Kim, S., Kim, H., Hwang, I.-W., Bae, S., Karki, S., Ogelman, R., Kim, D., Eun, J., Bang, G., Kim, J.-Y., Kajander, T., Um, J.W., **OH, W.C.** #, and Ko, J.# (2022) MDGA1 negatively regulates amyloid precursor protein-mediated synapse inhibition in the hippocampus. *PNAS* 119 (4) e2115326119 #Corresponding authors
19. Kleinjan, M., Buchta, W., Ogelman, R., Hwang, I.-W., Kuwajima, M., Hubbard, D., Kareemo, D., Prikhodko, O., Olah, S., Gomez Wulschner, L. E., Abraham, W., Franco, S., Harris, K. , **OH, W.C.** #, and Kennedy, M.J.# (2022) Dually-innervated dendritic spines develop in the absence of synaptic input and resist structural plasticity through tonic inhibitory crosstalk. *Neuron* 2023 Feb 1;111(3):362-371.e6 #Corresponding authors
20. Swenson, K.S., Gomez Wulschner, L. E., Hoelscher, V.M., Folts, L., Korth, K.M., **OH, W.C.**, Bates, E., A. (2023) Fetal cannabidiol (CBD) exposure alters thermal pain sensitivity, cognition, and prefrontal cortex excitability. / *In Press, Molecular Psychiatry* /

#### Review Articles and Book Chapters

1. Hill, T.C., **OH, W.C.**, and Zito, K. (2009) Optical Manipulation of Neural Activity: Recent Advances for Applications using Two-Photon Microscopy, In: Thompson S, Blanpied T, (ed), *The Change We Need: New Frontiers in Live-Cell Imaging*, Washington, DC: Society for Neuroscience, pp.51-60.
2. **OH, W.C.** #, Smith, K.R.# (2019) Activity-dependent development of GABAergic synapses. *Brain Research* 1707:18-26 #Corresponding authors
3. Stein, I. S., Hill, T.C. **OH, W.C.**, Parajuli, L.K. and Zito, K. (2019) Two-Photon Glutamate Uncaging to Study Structural and Functional Plasticity of Dendritic Spines. *NeuroMethods Multiphoton Microscopy* 148: 65-85
4. Ogelman, R., Hwang, I., **OH, W.C.** (2020) Cloaked caged glutamate eliminates off-target GABA-A receptor antagonism and opens a new door in neuroscience. *Lab Anim* 49, 177-179
5. Lee, D., Creed, M., Jung, K., Stefanelli, T., Wendler, D.J., **OH, W.C.**, Mignocchi, N.L., Lüscher, C., and Kwon, H.-B. (2021) Shining light on neuromodulator function with iTango, a new reporting system of ligand-receptor interactions. *Research Square Preprint* <https://doi.org/10.21203/rs.3.rs-334367/v1>
6. Kim, J., Gomez Wulschner, L.E., **OH, W.C.**, Ko, J. (2022) Trans-synaptic signaling mechanisms orchestrated by synaptic cell adhesion molecules. *BioEssays (selected for cover)*, 2022 Sep 11:e2200134

#### Submitted / In revision

1. Ogelman, R., Gomez Wulschner, L. E., Hoelscher, V., Hwang, I.-W., **OH, W.C.** (2023) Serotonin modulates excitatory synapse maturation in the prefrontal cortex / *In Revision, Nat Commun* /

#### **RESEARCH SUPPORT (On-going)**

1. **BrightFocus Foundation Alzheimer's Disease Research Program**, Co-I: OH, 01/01/2023 - 12/31/2025  
The BrightFocus Foundation  
Title: Co-activation of selective nicotinic acetylcholine receptors improves hippocampal inhibitory activity and oscillations in Alzheimer's disease

2. **AB Nexus Research Collaboration Grant**, Co-PI: OH, 6/01/2023 - 05/31/2024  
CU Anschutz Medical Campus and CU Boulder  
Title: Prefrontal mechanisms underlying the enduring impact of early life adversity
3. **R01 EY031461**, Co-I: OH, 05/01/2020 - 04/30/2024  
NIH / NEI  
Title: Engineered multi-therapeutic agents delivery system towards retinal ganglion cell axon regeneration
4. **R01 MH124778**, PI: OH, 12/01/2020 - 10/31/2025  
NIH / NIMH  
Title: Serotonergic modulation of excitatory synapse formation and maturation during development
5. **R21 MH126073**, PI: OH, 4/01/2021 - 04/31/2024 (*NCE*)  
NIH / NIMH  
Title: Dissecting neural circuits underlying early life stress-induced PFC dysfunction
6. **R21 NS133681**, PI: OH, 7/01/2023 - 06/31/2025 (*To be paid; 10 percentile, 27 impact score*)  
NIH / NINDS-NIMH  
Title: A new approach to understanding cognitive disabilities in Down syndrome

### **Completed**

1. **2020 CSU/CU-Pilot Collaboration Grant**, Co-PI: OH, 05/01/2020 - 04/30/2021  
CCTSI (Colorado Clinical and Translational Sciences Institute)  
Title: Beta amyloid-induced hippocampal network dysfunction via selective inhibition of nicotinic acetylcholine receptors in interneurons
2. **2020 NARSAD Young Investigator Grant**, PI: OH, 01/15/2020 - 01/14/2022  
Brain & Behavior Research Foundation  
Title: Dissecting neural circuits underlying early life stress-induced autism-like social deficits
3. **2020 Fay/Frank Seed Grant**, PI: OH, 07/01/2020 - 05/31/2022  
Brain Research Foundation  
Title: Role of inhibitory synapses in shaping excitatory circuits
4. **2021 Crnic Blumenthal Grant**, PI: OH, 9/01/2021 - 08/31/2022  
The Linda Crnic Institute for Down Syndrome  
Title: Dissecting the impact of serotonin dysfunction on the Dp16 mouse model of DS

### **RESEARCH TRAINING RECORD**

#### **Trainees**

Roberto Ogelman (Neuroscience PhD Program, 2019-present), *F31 NRSA Fellow (2022 - present)*

Luis Gomez Wulschner (Neuroscience PhD Program, 2021-present), *Blumenthal Fellow & T32 Pharm Trainee (2021-2023)*

Victoria Chang (Neuroscience PhD Program, 2023-present)

Victoria Hoelscher (Post-bac researcher, 2021 - April 2023)

In-Wook Hwang (Post-bac researcher, Oct 2019 - June 2022)

#### **Thesis & Comprehensive Exam Committees**

Susana Restrepo (Pharmacology PhD program, Aoto lab; member, 2016-2021)

Alexandra Huffman (Pharmacology PhD program, Dell'Acqua lab; member, 2020-2021)

Sarah Zych (Medical Scientist Training Program, Ford lab; member, 2017-2022)

Joshua Garcia (Pharmacology PhD program, Smith lab; member, 2017-2022)

Hannah Actor-Engel (Neuroscience PhD program, Kennedy lab; member, 2018-2023)

Jonathan Tullis (Pharmacology PhD program, Bayer lab; member, 2018-2023)

Tyler P Martinez (Pharmacology PhD program, Dell'Acqua lab; member, 2015-present)

Katie Hahm (Neuroscience PhD program, Dell'Acqua lab; member, 2018-present)

Mason Kleinjan (Biomedical Sciences PhD program, Kennedy lab; member, 2018-present)

Theresa Welle (Neuroscience PhD program, Smith lab; member, 2019-present)

Jungmin Kim (Neuroscience PhD program, Aoto lab; member, 2019-present)  
Brian Lloyd (Neuroscience PhD program, Aoto lab; member, 2019-present)  
Eric Stokes (Pharmacology PhD program, Aoto lab; member, 2020-present)  
Kyle Northington (Cell Biology, Stem Cells and Development PhD program, Bates lab; member, 2020-present)  
Mostafa El-Kalliny (Medical Scientist Training Program, Zoe lab; member, 2021-present)  
Carley Miller (Medical Scientist Training Program, Aoto lab; member, 2021-present)  
Harrison Ramsay (Neuroscience PhD program, Kennedy lab; member, 2021-present)  
Robin Vareed (Neuroscience PhD program, Peters lab; member, 2020-present)  
Sarah Wolfe (Neuroscience PhD program, Smith lab; member, 2021-present)  
Matthew Larsen (Neuroscience PhD program, Bayer lab; member, 2021-present)  
Amber Stewart (Pharmacology PhD program, Smith lab; member, 2022-present)

#### Mentoring Program

Pharmacology PhD Program, Major Seminar Advisor for Eric G. Stokes  
Medical Scientist Training Program, Pharmacology Seminar Advisor for Carley Miller  
Biomedical Sciences PhD Program, BSP Seminar Advisor for Samantha Oetjen and Jessica Olivas-Corral  
Neuroscience PhD Program, Speaking and Presenting Seminar Advisor for Theresa Welle  
Developmental Biology Section, Post-Doctoral Fellow Mentoring Advisor for Yong-II Kim  
Optics and Photonics Group, University of Colorado Boulder, NSF Innovation Corps (I-Corps) Advisor for Samuel Gilinsky

### **PROFESSIONAL SERVICES**

#### Ad Hoc Journal Reviewer

Nature Communication, Cell Reports, Frontiers in Cellular Neuroscience, Frontiers in Synaptic Neuroscience, Journal of Neuroscience Research, Neuron, Translational Psychiatry

#### Ad Hoc Grant Review Work

2020 - 2021 K to R Grant Review Panel, CCTSI, University of Colorado School of Medicine  
June, 2021 Molecular Neuropharmacology and Signaling Study Section (MNPS), NIH  
2022 AB Nexus Grant Review Panel, University of Colorado Anschutz and Boulder

#### Editorial and Advisory Board

Review Editor on the Editorial Board of Frontiers in Synaptic Neuroscience  
Science Mentor on the Editorial Board of Frontiers for Young Minds  
International Advisor for Yonsei University Division of Biological Science and Technology BK21 Program, Korea  
Global Mentor for University of Science and Technology (UST) Graduate School, Korea  
eTALK Committee Member, AKN (Association of Korean Neuroscientists in America)

#### Univ. of Colorado School of Medicine Committees and Service

2022 - Present Pharmacology Department & Neurotechnology Center (NTC) Faculty Search Committee  
2020 - Present Biomedical Sciences PhD Program Admissions Committee  
2022 - Present Pharmacology PhD Program Admissions Committee  
2022 Frontiers in Pharmacology (PHCL 7600) Course Director  
2022 - Present Principles of Pharmacology (Course Director, PHCL 7620) Course Director  
2019 - Present NTC Seminar Committee (Chair)  
2020 - Present Neuroscience PhD Program Seminar Committee (Chair)  
2022 - Present Pharmacology Department & PhD Program Seminar Committee  
2022 - Present Neuroscience PhD Program Preliminary Exam Committee  
2019 - Present Pharmacology PhD Program, student interviewer

2019 - Present Neuroscience PhD Program, student interviewer  
 2020 - Present Biomedical Sciences PhD Program, student interviewer  
 2019 - Present Medical Scientist Training Program (MD/PhD Program), student interviewer  
 2019 - Present Poster Judge, Student Research Day, Pharmacology PhD Program  
 2020 - 2023 Pharmacology Department, Annual Retreat Organizer  
 2021 - 2022 Neuroscience PhD Program, Annual Retreat Organizer

**INVITED TALKS (selected, since 2018)**

2018 Neuroscience Graduate Program, Univ. of Colorado SOM, CO  
 2019 GRC: Dendrites: Molecules, Structure and Function, CA  
 2019 Department of Pharmacology, Univ. of Colorado SOM, CO  
 2020 Department of Anesthesiology, Univ. of Colorado SOM, CO  
 2021 2021 International Conference of the Korean Society for Molecular and Cellular Biology, Korea  
 2021 Department of Physiology and Biomedical Sciences, Seoul National University, Korea  
 2021 Division of Biological Science and Technology, Yonsei University, Korea  
 2021 Brain Science Institute Korea Institute of Science and Technology (KIST), Korea  
 July, 2022 UST Global Mentoring Conference, Korea  
 Sept, 2022 Career Development Seminar, School of Life Science, GIST, Korea  
 Sept, 2022 Neuroscience Seminar Series, University of Colorado Boulder  
 Oct, 2022 Department of Molecular and Integrative Physiology, University of Michigan Medical School  
 Nov, 2022 Department of Molecular, Cellular and Integrative Neurosciences, Colorado State University  
 Nov, 2022 Department of Molecular and Cellular Biology, Kennesaw State University  
 Nov, 2022 Center for Cognition and Sociality, Institute for Basic Science (IBS), Korea  
 Mar, 2023 Sunposium (Neural Circuits Research Conference), Max Planck Florida Institute, FL  
 July, 2023 Department of Biological Sciences, KAIST  
 July, 2023 Department of Brain and Cognitive Sciences, DGIST, Korea  
 Aug, 2023 Symposium Organizer & Speaker, Japanese Neuroscience Meeting, Japan

**PROFESSIONAL ACTIVITIES**

2001 - 2003 Mandatory military service in the Republic of Korea Marine Corps  
 2003 - 2004 Cambridge ESOL (First Certificate in English) Courses, Dublin, Republic of Ireland  
 2009 - 2010 UC Davis Representative of KOLIS (UCD-KOLIS)  
 2009 - 2013 Member of Korean-American Scientists and Engineers Association (KSEA) and Korean life scientists in the bay area (KOLIS, KSEA-APS)  
 2014 - 2018 Member of MPFI Postdoctoral Association and Panel  
 2013 - Present Society for Neuroscience, USA  
 2021 - Present Member of Linda Crnic Institute for Down Syndrome