

# Curriculum Vitae

## Won-Suk Chung, Ph.D.

### AFFILIATION

Associate Professor  
Department of Biological Sciences, KAIST  
South Korea

### ACADEMIC EDUCATION

- 2003-2009: University of California, San Francisco/ Biomedical Science Graduate Program  
Degree: Ph.D. (Advisor: Dr. Didier Stainier)
- 1997-2001: Seoul National University/ Pharmacy  
Degree: BA

### RESEARCH & PROFESSIONAL EXPERIENCE

- 2022-present: Department of Biological Sciences, KAIST  
Associate professor (with Tenure from 2023)
- 2016-2021: Department of Biological Sciences, KAIST  
Assistant professor
- 2009-2015: Stanford University/ Neurobiology  
Postdoctoral researcher (Advisor: Dr. Ben A. Barres)

### ACADEMIC ACHIEVEMENTS

- 2024: KAIST Academic Grand Prize of 2023
- 2023: Gong-Woo Nature Award from KSBMB
- 2023: KAIST Top 10 Research Achievements of 2022
- 2022: Blue Ribbon Lecture, KSMCB
- 2021: Scitech Korea Young Neuroscientist Award
- 2021: KAIST Top 10 Research Achievements of 2020
- 2021: Prize for academic excellence (KAIST)
- 2017: Research Grant Award from Cure Alzheimer's FUND
- 2017: Inge Grundke-Iqbal Award for Alzheimer's Research from Alzheimer's association (Most impactful study in the last two years)
- 2017: Research Grant Award from Samsung Science and Technology Foundation

- 2016: Chung-Am TJ Park Science Fellowship (Young professor), POSCO TJ Park Foundation
- 2014: The Sammy Kuo Prize in Neuroscience
- 2014-2016: NIH Pathway to Independence Award (K99) from NEI (PI: Won-Suk Chung)  
Impact score of 13 (score range: 10 = highest, 99 = lowest)
- 2012-2014: Memory and Cognitive Disorders Award from The McKnight Foundation (PI: Ben A Barres)
- 2010-2012: NIH Exploratory/Developmental Research Award (R21) from NINDS (PI: Ben A Barres)
- 2009-2012: Postdoctoral fellowship Award from Damon Runyon Cancer Research Foundation
- 2008-2009: Extension of CIRM fellowship based on research progress
- 2006-2008: Fellowship from the California Institute for Regenerative Medicine (CIRM)  
Genentech Graduate Fellowship from Sandler Family Supporting Foundation
- 2004-2005: 2004 and 2005 National Science Foundation (NSF) Honorable Mention
- 1997-2001: Brain Korea 21 Fellowship Seoul National University Scholarships

## PUBLICATIONS

1. **Chung WS<sup>+</sup>**, Baldwin K<sup>+</sup> and Allen NJ<sup>+</sup>. Glia Monograph 2<sup>nd</sup> edition: Astrocytes Control Synapse Formation, Function, and Elimination. **Cold Spring Harbor Laboratory Press**. *in press* (**+Co-corresponding authors**)
2. Lee JH, Kim J, Kim M, Shin SH, **Chung WS**. Astrocytic synapse elimination controls ocular dominance plasticity. **bioRxiv**. 2022.09.23.509193, *in revision*
3. Lee SY, **Chung WS**. Astrocytic crosstalk with brain and immune cells in healthy and diseased conditions. **Curr Opin Neurobiol**. 2024 Jan 29;84:102840. doi: 10.1016/j.conb.2024.102840.
4. Byun YG\*, Kim NS\*, Jeon YS, Choi JB, Park CW, Kim G, Kim K, Jang H, Kim J, Kim E, Han YM, Yoon KJ, Lee SH, **Chung WS**. Stress evokes mental disorder-like behaviors via astrocytic MERTK-dependent synapse phagocytosis. **Immunity**, 2023 Jul 26:S1074-7613(23)00318-7. doi: 10.1016/j.immuni.2023.07.005. Online ahead of print.PMID: 37527657 (\*Equally contributed)
5. Park J, **Chung WS**. Astrocyte-dependent circuit remodeling by synapse phagocytosis. **Curr Opin Neurobiol**. 2023 May 27;81:102732.doi: 10.1016/j.conb.2023.102732
6. Effects of Pyruvate Kinase M2 (PKM2) Gene Deletion on Astrocyte-Specific Glycolysis and Global Cerebral Ischemia-Induced Neuronal Death. Kang BS, Choi BY, Kho AR, Lee SH, Hong DK, Park MK, Lee SH, Lee CJ, Yang HW, Woo SY, Park SW, Kim DY, Park JB, **Chung WS**, Suh

SW. **Antioxidants** (Basel). 2023 Feb 15;12(2):491.  
doi:10.3390/antiox12020491.PMID: 36830049

7. Choi JB, Seol DW, Do HS, Yang HY, Kim TM, Byun YG, Park JM, Choi J, Hong SP, **Chung WS**, Suh JM, Koh GY, Lee BH, Wee G, Han YM. Fasudil alleviates the vascular endothelial dysfunction and several phenotypes of Fabry disease. **Mol Ther**. 2023 Feb 8:S1525-0016(23)00066-7. doi: 10.1016/j.ymthe.2023.02.003. Online ahead of print.
8. Shen H, Shi XJ, Qi L, Wang C, Mamtilahun M, Zhang ZJ, **Chung WS**, Yang GY, Tang YH. Microglia and astrocytes mediate synapse engulfment in a MER tyrosine kinase-dependent manner after traumatic brain injury. **Neural Regen Res**. 2023 Aug;18(8):1770-1776. doi: 10.4103/1673-5374.363187.
9. Kim NS, **Chung WS**. Astrocytes Regulate Neuronal Network Activity by Mediating Synapse Remodeling. **Neurosci Res**. 2022 Sep 25:S0168-0102(22)00252-8. doi: 10.1016/j.neures.2022.09.007.
10. Kim S, Oh H, Choi SH, Yoo YE, Noh YW, Cho Y, Im GH, Lee C, Oh Y, Yang E, Kim G, **Chung WS**, Kim H, Kang H, Bae Y, Kim SG, Kim E. Postnatal age-differential ASD-like transcriptomic, synaptic, and behavioral deficits in Myt1l-mutant mice. **Cell Rep**. 2022 Sep 20;40(12):111398. doi: 10.1016/j.celrep.2022.111398.
11. Jung H\*, Lee SY\*, Lim S, Choi HR, Choi Y, Kim M, Kim S, Lee Y, Han KH, **Chung WS**\*, Kim CH\*. Anti-inflammatory clearance of amyloid beta by a chimeric Gas6 fusion protein. **Nature Medicine**, 2022 August, (\*Equally contributed, \*Co-corresponding authors)  
  
Highlighted in Research Briefing (Toward inflammation-free therapeutics in Alzheimer's disease. *Nat Med* **28**, 1765–1766 (2022). <https://doi.org/10.1038/s41591-022-01972-3>)
12. Lee E\*, Jung YJ\*, Park YR, Lim S, Choi YJ, Lee SY, Kim CH, Mun JY, **Chung WS**. A distinct astrocyte subtype in the aging mouse brain characterized by impaired protein homeostasis. **Nature Aging**, 2022 August, (\*Equally contributed)  
  
Highlighted in News & Views (Baumert, R., Brose, N. & Eroglu, C. Astrocytic traffic jams in the aging brain. *Nat Aging* **2**, 681–683 (2022). <https://doi.org/10.1038/s43587-022-00270-4>)
13. Lee B, Park SJ, Lee S, Lee J, Lee E, Yoo ES, **Chung WS**, Sohn JW, Oh BC, Kim S. Lomitapide, a cholesterol-lowering drug, is an anticancer agent that induces autophagic cell death via inhibiting mTOR. **Cell Death Dis**. 2022 Jul 12;13(7):603. doi: 10.1038/s41419-022-05039-6.
14. Shi X\*, Luo L\*, Wang J\*, Shen H, Li Y, Mamtilahun M, Liu C, Shi R, Lee JH, Tian H, Zhang Z, Wang Y, **Chung WS**\*, Tang Y\*, Yang GY\*. Stroke subtype-dependent synapse elimination by reactive gliosis in mice. **Nat Commun**. 2021 Nov 26;12(1):6943. doi: 10.1038/s41467-021-27248-x. (\*Equally contributed, \*Co-corresponding authors)

15. Lee YB, Min JK, Kim JG, Cap KC, Islam R, Hossain AJ, Dogsom O, Hamza A, Mahmud S, Choi DR, Kim YS, Koh YH, Kim HA, **Chung WS**, Suh SW, Park JB. Multiple functions of pyruvate kinase M2 in various cell types. **J Cell Physiol.** 2021 Jul 26. doi: 10.1002/jcp.30536. Online ahead of print.
16. Park J, Choi Y, Jung E, Lee SH, Sohn JW, **Chung WS**. Microglial MERTK eliminates phosphatidylserine-displaying inhibitory post-synapses. **EMBO J.** 2021 May 19:e107121. doi: 10.15252/embj.2020107121. Online ahead of print.PMID: 34013588
17. Kweon H, Jung WB, Im GH, Ryoo J, Lee JH, Do H, Choi Y, Song YH, Jung H, Park H, Qiu LR, Ellegood J, Shim HJ, Yang E, Kim H, Lerch JP, Lee SH, **Chung WS**, Kim D, Kim SG, Kim E. Excitatory neuronal CHD8 in the regulation of neocortical development and sensory-motor behaviors. **Cell Rep.** 2021 Feb 23;34(8):108780. doi: 10.1016/j.celrep.2021.108780.
18. Lee SY, **Chung WS**. The roles of astrocytic phagocytosis in maintaining homeostasis of brains. **J Pharmacol Sci.** 2021 Mar;145(3):223-227. doi: 10.1016/j.jphs.2020.12.007. Epub 2020 Dec 29.
19. Lee JH\*, Kim JY\*, Noh S, Lee H, Lee SY, Mun JY, Park HJ+, **Chung WS**+. Astrocytes phagocytose adult hippocampal synapses for circuit homeostasis, **Nature (Article)**, 2021 Feb;590(7847):612-617. doi: 10.1038/s41586-020-03060-3. Epub 2020 Dec 23. (\* Equally contributed, +Co-corresponding authors)
20. Cap KC, Jung YJ, Choi BY, Hyeon SJ, Kim JG, Min JK, Islam R, Hossain AJ, **Chung WS**, Suh SW, Ryu H, Park JB. Distinct dual roles of p-Tyr42 RhoA GTPase in tau phosphorylation and ATP citrate lyase activation upon different A $\beta$  concentrations. **Redox Biol.** 2020 Jan 31:101446. doi: 10.1016/j.redox.2020.101446. [Epub ahead of print], PMID:32046944
21. Jeon MT, Moon GJ, Kim S, Choi M, Oh YS, Kim DW, Kim HJ, Lee KJ, Choe Y, Ha CM, Jang IS, Nakamura M, McLean C, **Chung WS**, Shin WH, Lee SG, Kim SR. Neurotrophic interactions between neurons and astrocytes following AAV1-Rheb(S16H) transduction in the hippocampus in vivo. **Br J Pharmacol.** 2019 Oct 28. doi: 10.1111/bph.14882. [Epub ahead of print]
22. Mondragon AA, Yalonetskaya A, Ortega AJ, Zhang Y, Naranjo O, Elguero J, **Chung WS**, McCall K. Lysosomal Machinery Drives Extracellular Acidification to Direct Non-apoptotic Cell Death. **Cell Rep.** 2019 Apr 2;27(1):11-19.e3. doi: 10.1016/j.celrep.2019.03.034.
23. Lee EB and **Chung WS**. Glial control of Synapse number is healthy and diseased brain. **Front. Cell. Neurosci.** 2019 Feb | <https://doi.org/10.3389/fncel.2019.00042>
24. Choi BY, Lee SH, Choi HC, Lee SK, Yoon HS, Park JB, **Chung WS**, Suh SW. Alcohol dependence treating agent, acamprosate, prevents traumatic brain injury-induced neuron death through vesicular zinc depletion. **Transl Res.** 2019 Jan 17. pii: S1931-5244(19)30014-3. doi: 10.1016/j.trsl.2019.01.002. [Epub ahead of print]
25. Byun YK and **Chung WS**. In Vitro Engulfment Assay to Measure Phagocytic Activity of Astrocytes Using Synaptosomes. **Methods Mol Biol.** 2019;1938:155-168. doi: 10.1007/978-1-4939-9068-9\_11.
26. Islam R, Kim JG, Park Y, Cho JY, Cap KC, Kho AR, **Chung WS**, Suh SW, Park JB. Insulin induces phosphorylation of pyruvate dehydrogenase through RhoA activation pathway in HepG2 cells. **FASEB J.** 2018 Sep 18:fj201800917R. doi: 10.1096/fj.201800917R
27. Lee JH, Lee JE, Kahng JY, Kim SH, Park JS, Yoon SJ, Um JY, Kim WK, Lee JK, Park J, Kim EH, Lee JH, Lee JH, **Chung WS**, Ju YS, Park SH, Chang JH, Kang SG, Lee JH. Human glioblastoma

arises from subventricular zone cells with low-level driver mutations. **Nature**. 2018 Aug 1. doi: 10.1038/s41586-018-0389-3

28. Byun YK and **Chung WS**. A Novel In Vitro Live-imaging Assay of Astrocyte-mediated Phagocytosis Using pH Indicator-conjugated Synaptosomes. **J Vis Exp**. 2018 Feb 5;(132). doi: 10.3791/5664018 Feb 5;(132). doi: 10.3791/5664
29. Jung YJ, **Chung WS**. Phagocytic roles of glial cells in healthy and diseased brains. **Biomol Ther**, 2018 Jan 10. doi: 10.4062/biomolther.2017.133. [Epub ahead of print]
30. Lutz AB, **Chung WS**, Sloan SA, Carson GA, Zhou L, Lovelett E, Posada S, Zuchero JB, Barres BA. Schwann cells use TAM receptor-mediated phagocytosis in addition to autophagy to clear myelin in a mouse model of nerve injury. **Proc. Natl. Acad. Sci. USA**, published ahead of print September 5, 2017, doi:10.1073/pnas.1710566114
31. Liddel SA<sup>+</sup>, Guttenplan KA, Clarke LE, Bennett FC, Bohlen CJ, Schirmer L, Bennett ML, Münch AE, **Chung WS**, Peterson TC, Wilton DK, Frouin A, Napier BA, Panicker N, Kumar M, Buckwalter MS, Rowitch DH, Dawson VL, Dawson TM, Stevens B, Barres BA. Neurotoxic reactive astrocytes are induced by activated microglia. **Nature (Article)**. 2017 Jan 26;541(7638):481-487. doi: 10.1038/nature21029. Epub 2017 Jan 18, (+Corresponding author)
32. **Chung WS**<sup>+</sup>, Verghese PB, Chakraborty C, Joung J, Hyman BT, Ulrich JD, Holtzman DM and Barres BA. (2016), A novel allele-dependent role for APOE in controlling the rate of synapse pruning by astrocytes, **Proc. Natl. Acad. Sci. USA**, Published online before print August 24, 2016, doi: 10.1073/pnas.1609896113, (+Corresponding author).
33. Reischauer S, Stone OA, Villasenor A, Chi N, Jin SW, Martin M, Lee MT, Fukuda N, Marass M, Witty A, Fiddes I, Kuo T, **Chung WS**, Salek S, Lerrigo R, Alsiö J, Luo S, Tworus D, Augustine SM, Muceniks S, Nystedt B, Giraldez AJ, Schroth GP, Andersson O and Stainier DY (2016). Cloche is a bHLH-PAS transcription factor that drives haemato-vascular specification. **Nature** 535, 294–298, doi:10.1038/nature18614
34. **Chung WS**<sup>\*</sup>, Welsh CA<sup>\*</sup>, Barres BA and Stevens B. (2015). Do glia drive synaptic and cognitive impairment in disease? **Nature Neurosci**. Nov;18(11):1539-45. doi: 10.1038/nn.4142. Epub 2015 Oct 27 (\* Equally contributed). Highlighted in *Faculty of 1000*.
35. **Chung WS**, Allen NJ and Eroglu C. (2015). Glia Monograph: Astrocytes Control Synapse Formation, Function, and Elimination. **Cold Spring Harbor Laboratory Press**. Feb 6;7(9). pii: a020370. doi: 10.1101/cshperspect.a020370.
36. **Chung WS**<sup>+</sup>, Clarke LE<sup>\*</sup>, Wang GX<sup>\*</sup>, Stafford BK, Sher A, Chakraborty C, Joung J, Foo LC, Thompson A, Chen C, Smith SJ and Barres BA. (2013). Astrocytes mediate synapse elimination through MEGF10 and MERTK pathways. **Nature** (Article). Dec 19;504(7480):394-400 (+Corresponding author, \* Equally contributed). Highlighted in *Faculty of 1000*
37. **Chung WS**<sup>+</sup> and Barres BA. (2012). The role of glial cells in synapse elimination. **Curr Opin Neurobiol**. Jun;22(3):438-45, (+Corresponding author)

38. **Chung WS\***, Andersson O\*, Row R, Kimelman D and Stainier DY. (2010). Suppression of Alk8-mediated Bmp signaling cell-autonomously induces pancreatic  $\beta$ -cells. **Proc. Nat. Acad. Sci. USA**. Jan 19;107(3):1142-7. (\* Equally contributed).
39. **Chung WS+** and Barres BA. (2009). Selective Remodeling: Refining Neural Connectivity at the Neuromuscular Junction. **PLoS Biology**. August,7(8):e1000185 (+Corresponding author).
40. **Chung WS\***, Shin CH\*, and Stainier DY. (2008). Bmp2 signaling regulates the hepatic vs pancreatic fate decision. **Dev Cell**. 15, 738-748 (\* Equally contributed). Highlighted in *Faculty of 1000*
41. Foo LC, Allen NJ, Bushong EA, Ventura PB, **Chung WS**, Zhou L, Cahoy JD, Daneman R, Zong H, Ellisman MH, Barres BA. (2011). Development of a method for the purification and culture of rodent astrocytes. **Neuron**. Sep 8;71(5):799-811.
42. **Chung WS** and Stainier DY. (2008). Intra-endodermal interactions are required for pancreatic  $\beta$ -cell induction. **Dev Cell**. 14, 582-593. Highlighted in *Faculty of 1000*
43. Shin CH, **Chung WS**, Hong S, Ober EA, Verkade H, Field HA, and Stainier DY. (2008). Multiple roles for Med12 in vertebrate endoderm development. **Dev Bio**. 15, 467-479.
44. Bae SK, **Chung WS**, Kim EJ, Rhee JK, Kwon JW, Kim WB and Lee MG. (2004). Pharmacokinetics of DA-7867, a new oxazolidinone, after intravenous or oral administration to rats: intestinal first-pass effect. **Antimicrob Agents Chemother**. 48, 659-662.
45. Bae SK, **Chung WS**, Kim EJ, Rhee JK, Kwon JW, Kim WB and Lee MG. (2004). Pharmacokinetic blood partition and protein binding of DA-7867, a new oxazolidinone. **Biopharm Drug Dispos**. 25, 127-35.
46. **Chung WS**, Kim EJ, Lee I, Kim SG, Lee MG and Kim SH. (2003). The effects of growth hormones on pharmacokinetics of chlorzoxazone in rats with acute renal failure induced by uranyl nitrate. **Life Sci**. 73. 253-63.