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Education

Dec 2011 Ph.D., Neuroscience: University of California Berkeley, Berkeley, CA
May 2006 B.S. Psychology: Duke University, Durham, NC
Summa Cum Laude, departmental distinction

Academic positions and training

2016-present *Assistant Professor*, Department of Psychology, The Ohio State University
2016-present *Assistant Professor*, Department of Neuroscience, The Ohio State University
Medical Center
2016 *Instructor*, Department of Neurology & Neurological Sciences, Stanford
University Medical Center
2012-2016 *Postdoctoral fellow*, Dr. Tony Wyss-Coray Lab, Department of Neurology &
Neurological Sciences, Stanford University Medical Center
2012 *Postdoctoral fellow*, Dr. Daniela Kaufer Lab, Department of Integrative
Biology, University of California Berkeley
2006-2011 *Graduate student*, Dr. Daniela Kaufer Lab, Helen Wills Neuroscience Institute,
University of California Berkeley
Thesis: "Stress effects on adult hippocampal neurogenesis and sexual
reproductive function."
2004-2006 *Independent study student*, Dr. Christina Williams Lab, Duke University
2003-2006 *Research technician*, Williams LifeSkills, Inc., Drs. Virginia & Redford Williams

Grant Support

Role: PI

2023 Chronic Brain Injury pilot grant. Ohio State Discovery Themes. (\$25,000
direct) Co-PI: Dr. Wenjng Sun. "Regulation of glutamatergic circuits by
hippocampal neural stem cells"
2021-2026 R01NS124775 from NIH/NINDS. (\$1,250,000 direct) "Regulation of adult
hippocampal function by the neural stem and progenitor cell secretome."
• Diversity supplement for undergraduate training, 2022-23 (\$8,600
direct)
2021-2022 R21NS123797 from NIH/NINDS. (\$275,000 direct) "Regulation of adult
hippocampal neural stem cells by glutamate transport."
• Diversity supplement for graduate training, 2022 (\$47,600 direct)
2021 Affordable Learning Exchange High Support Grant. Ohio State Office of
Distance Education and eLearning. (\$5,000 direct) "Open access resources
to promote undergraduate neuroscience education."
2021-2023 NSF EAGER Award, IOS-2035041 (\$300,000 total). "EAGER: Open access
resources to promote undergraduate neuroscience education."
• Research Experience for Undergraduates supplement, 2022 (\$11,425
direct/total)
2019-2022 NSF Standard Grant. IOS-1923094 (\$900,000 total). "Adult neural stem cell
self-regulation via soluble growth factor."
2018 Chronic Brain Injury pilot grant. Ohio State Discovery Themes. (\$25,000
direct) Co-PI: Dr. Olga Kokiko-Cochran. "Quantifying the hippocampal
neural stem cell transcriptome after TBI."
2018-2020 NARSAD Young Investigator Grant. Brain Behavior Research Foundation.
(\$70,000 direct) "Visualizing secreted proteins in the brain."

2015-2019 K99/R00 Pathway to Independence Award. NIH/NINDS. (\$749,000 direct)
“Regulation and regeneration of hippocampal plasticity by neural progenitor cells.”

Role: Co-I

2021-2024 Department of Defense grant to PI Dr. Michele Basso, OSU. SC200251.
(\$1,247,000 direct costs) “Eccentric Motor Training with Neuromodulation and Biomarkers for Rehabilitation Readiness in Subacute SCI”

Fellowships and Awards

2019 Psychology Department Distinguished Teaching Award
2013-2015 National Research Service Award postdoctoral fellowship, Stanford University
2011 California Institute for Regenerative Medicine pre-doctoral fellow, UC Berkeley
2010 California Institute for Regenerative Medicine pre-doctoral fellow, UC Berkeley
2007-2009 National Defense Science and Engineering Graduate Fellowship, UC Berkeley
2008 National Science Foundation Graduate Research Fellowship honorable mention
2007 National Science Foundation Graduate Research Fellowship honorable mention
2006 Howard Hughes Neuroscience Fellow, Duke University
2005 Faculty Scholars Award, highest undergraduate honor given by Duke University faculty for innovative scholarship
2005 Phi Beta Kappa, Duke University
2005 NSF-REU Fellow: Summer School in Behavioral Neuroendocrinology, Michigan State University
2004 NSF-REU Fellow: Mechanisms of Behavior, Duke University

Metrics: h-index = 16; i-10 index = 18

Publications

Dause TJ, Denninger JK, Smith BM, **Kirby ED**. 2022. The neural stem cell secretome across neurodevelopment. *Experimental Neurology*, 355: 114142. [Full text here](#)

Smith BM, Saulsbery AI, Sarchet P, Devasthali N, Einstein D, **Kirby ED**. (2022) Oral and injected tamoxifen alter adult hippocampal neurogenesis in female and male mice. *eNeuro*, 9 (2) ENEURO.0422-21.2022 [Full text here](#)

Denninger JK, Walker LA, Chen X, Turkoglu A, Pan A, Tapp Z, Senthilvelan S, Rindani R, Kokiko-Cochran O, Bundschuh R, Yan P, **Kirby ED**. (2022). Robust transcriptional profiling and identification of differentially expressed genes with low input RNA sequencing of adult hippocampal neural stem and progenitor populations. *Frontiers in Molecular Neuroscience*, 15:810722. doi: 10.3389/fnmol.2022.810722 [Full text here](#)

Rieskamp JD, Smith B, Sarchet P, **Kirby ED**. (2022). Estimation of the density of neural, glial, and endothelial lineage cells in the adult mouse dentate gyrus. *Neural Regeneration Research*, 17: 1286-1292. [Full text here](#)

Rieskamp JD, **Kirby ED**. (2020) Editorial: Stem cell secretome and the central nervous system special issue. *Brain Research*, 1742: 146899. [Full text here](#)

Denninger JK, Chen X, Turkoglu AM, Sarchet P, Volk AR, Rieskamp JD, Yan P, **Kirby ED**. (2020). Defining the adult hippocampal neural stem cell secretome: in vivo versus in vitro transcriptomic differences and their correlation to secreted protein levels. *Brain Research*, 1735: 146717. [Full text here](#)

- Walker LA, Sovic MG, Chiang C-L, Hu E, Denninger JK, Chen X, **Kirby ED**, Byrd JC, Muthusamy N, Bundschuh R, Yan P. (2020). CLEAR: Coverage-based Limiting-cell Experiment Analysis for RNA-seq. *Journal of Translational Medicine*, 18: 16. [Full text here](#)
- Dause TJ, **Kirby ED**. (2020). Poor concordance of floxed sequence recombination in single neural stem cells: Implications for cell autonomous studies. *eNeuro*, pii: ENEURO.0470-19.2020. [Full text here](#)
- Dause TJ, **Kirby ED**. (2019). Aging gracefully: social engagement joins exercise and enrichment as a key lifestyle factor in resistance to age-related cognitive decline. *Neural Regeneration Research*, 14, 39-42. [Full text here](#)
- Denninger JK, Smith BM, **Kirby, ED**. (2018). Novel object recognition and object location behavioral testing in mice on a budget. *Journal of Visualized Experiments*, 141, e58593. [Full text here](#)
- Smith BS, Yao X, Chen S, **Kirby ED**. (2018) A larger social network enhances spatial memory and reduces hippocampal microgliosis in aged mice. *Frontiers in Aging Neuroscience*, 10, 142. [Full text here](#)
- Muroy SE, Long KLE, Kaufer D*, **Kirby ED***. (2016). Moderate stress-induced social bonding and oxytocin signaling are disrupted by predator odor in male rats. *Neuropsychopharmacology*, 41, 2160-2170. *Co-corresponding author. [Full text here](#)
F1000 Prime Recommended
- Jaeger PA, Lucin KM, Britschgi M, Vardarajan B, Huang RP, **Kirby ED**, Abbey R, Boeve BF, Boxer AL, Farrer LA, Finch N, Graff-Radford NR, Head E, Hoffree M, Huang R, Johns H, Karydas A, Knopman DS, Loboda A, Masliah E, Narasimhan R, Petersen RC, Podtelezhnikov A, Pradhan S, Rademakers R, Sun CH, Younkin SG, Miller BL, Ideker T, Wyss-Coray T. (2016). Network-driven plasma proteomics expose molecular changes in the Alzheimer's brain. *Molecular Neurodegeneration*, 11, 31. [PubMed Link](#).
- Kirby ED**, Kuwahara AA, Messer RL, Wyss-Coray T. (2015). Adult hippocampal neural stem and progenitor cells regulate the neurogenic niche via secreted VEGF. *Proceedings of the National Academy of Sciences USA*, 112, 4128-4133. Direct submission. [PubMed Link](#).
- Castellano JM, **Kirby ED**, Wyss-Coray T. (2015). Blood-borne revitalization of the aged brain. *JAMA Neurology*, 72, 1191-1194. [PubMed Link](#).
- DeCarolis NA, **Kirby ED**, Wyss-Coray T, Palmer TD. (2015). The role of the microenvironmental niche in declining neural stem cell functions associated with biological aging. *Cold Spring Harbor Perspectives in Medicine*, 5, a025874.
- Chetty S, Friedman AR, Taravosh-Lahn K, **Kirby ED**, Mirescu, C, Guo, F, Krupik, D, Nicholas, A, Geraghty, AC, Krishnamurthy, A, Tsai, M-K, Covarrubias, D, Wong, AT, Francis, DD, Sapolsky, RM, Palmer, TD, Pleasure, D, Kaufer, D. (2014). Stress and glucocorticoids promote oligodendrogenesis in the adult hippocampus. *Molecular Psychiatry*, 19, 1275-1283. [PubMed Link](#). **F1000 Prime Recommended**
- Kirby ED**, Muroy SE, Sun WG, Covarrubias D, Leong MJ, Barchas LA, Kaufer D. (2013). Acute stress enhances adult rat hippocampal neurogenesis and activation of newborn neurons via secreted astrocytic FGF2. *eLife*, 2, e00362. [PubMed Link](#). **F1000 Prime Recommended.**
- Kirby ED**, Jensen K, Goosens KA, Kaufer D. (2012). Stereotaxic surgery for excitotoxic lesion of specific brain nuclei in the adult rat. *Journal of Visualized Experiments*, 65, 4079. [PubMed Link](#).
- Kirby ED**, Friedman AR, Covarrubias D, Ying C, Sun WG, Goosens KA, Sapolsky RM, Kaufer D. (2012). Basolateral amygdala regulation of adult hippocampal neurogenesis and fear-related activation of newborn neurons. *Molecular Psychiatry*, 17, 527-536. [PubMed Link](#).
Featured as cover image
- Kirby ED**, Geraghty AC, Ubuka T, Bentley GE, & Kaufer D. (2009). Stress increases putative gonadotropin inhibitory hormone and decreases luteinizing hormone in male rats.

Proceedings of the National Academy of Sciences USA, 106, 11324-11329. Direct submission with pre-arranged editor. [PubMed Link](#).

Kirby ED & Kaufer D. (2009). "Stress and adult neurogenesis in the mammalian central nervous system." In: H. Soreq, A. Friedman & D. Kaufer, eds. *STRESS: from molecules to behavior*. Weinheim, Germany; Wiley-Blackwell.

Glenn MJ, **Kirby ED**, Gibson EM, Wong-Goodrich S, Mellot TJ, Blusztajn JK, Williams CL. (2008). Age-related declines in exploratory behavior and markers of hippocampal plasticity are attenuated by prenatal choline supplementation in rats. *Brain Research*, 1237, 110-123. [PubMed Link](#).

Glenn MJ, Gibson EM, **Kirby ED**, Mellot TJ, Blusztajn JK, Williams CL. (2007). Prenatal choline availability modulates hippocampal neurogenesis and neurogenic responses to enriching experiences in adult female rats. *European Journal of Neuroscience*, 25, 2473-2482. [PubMed Link](#).

Kirby ED, Williams VP, Hocking MC, Lane JD, Williams RB. (2006). Psychosocial benefits of three formats of a standardized behavioral stress management program. *Psychosomatic Medicine*, 68, 816-823. [PubMed Link](#).

Preprints

Rieskamp JD, Rosado-Burgos I, Christofi, JE, Ansar E, Einstein D, Walters AE, Valentini V, Bruno JP, Kirby ED. (2 November 2022). Excitatory amino acid transporter 1 supports adult hippocampal neural stem cell self-renewal. bioRxiv, <https://www.biorxiv.org/content/10.1101/2022.10.31.514562v2>

Dause TJ, Denninger JK, Rieskamp JD, Kuwahara AA, **Kirby ED**. 10 Aug 2021 (currently in revision). Intracrine vascular endothelial growth factor maintains hippocampal neural stem cell quiescence. bioRxiv, <https://doi.org/10.1101/2021.08.10.455866>

Invited research talks

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| Nov 2022 | BioScholars Seminar, OSU. "Stem cell interactions with adult brain." |
| Oct 2022 | Seminar in CogNeuro BrownBag, OSU. "Stem cell interactions with adult brain." |
| Dec 2020 | Seminar at University of California, Santa Cruz, virtual. "Adult neural stem cells shape their niche through a potent secretome." |
| Aug 2020 | Neurotrauma Research in Progress Seminar. The Ohio State University, Columbus, OH. "Why don't you just do single cell RNAseq? Replicability in low RNA input transcriptomics in mouse injury models." |
| March 2020 | Seminar at Stanford University. Stanford, CA. "The stem cell secretome as a regulator of hippocampal health." *Canceled due to COVID19 |
| March 2020 | Seminar at University of California, Berkeley. Berkeley, CA. "The stem cell secretome as a regulator of hippocampal health." *Canceled due to COVID19 |
| Nov 2018 | Bioscience Joint Workshop: Rare-cells and Single-cell RNAseq. The Ohio State University, Columbus, OH. "Characterizing acutely isolated adult murine neural stem cells using low cell RNA-seq." |
| Sept 2018 | Neurotrauma Research in Progress Seminar. The Ohio State University, Columbus, OH. "The neuroprotective properties of the neural stem cell secretome in brain injury." |
| Mar 2018 | Seminar at University of California, Berkeley. Berkeley, CA. "Beyond new neurons: the secretory role of adult hippocampal neural stem and progenitor cells." |
| Mar 2018 | Seminar at Stanford University. Stanford, CA. "Beyond new neurons: the secretory role of adult hippocampal neural stem and progenitor cells." |

- Oct 2015 Society for Neuroscience Annual meeting nanosymposium speaker, Chicago, IL. "Adult neural progenitor cells regulate hippocampal seizure response via secreted VEGF."
- April 2015 Psychology and Neuroscience Brown Bag Seminar, Duke University, Durham, NC. Invited speaker. "Beyond new neurons: The secretory role of adult hippocampal stem cells."
- April 2013 Psychology and Neuroscience Brown Bag Seminar, Duke University, Durham, NC. Invited speaker. "The benefits of acute stress for adult neurogenesis, memory and social behavior."

Research posters

OSU Campus and regional conference posters

- March 2021 CBI Research Day lightening talk and poster. Denninger, J.K., Kirby, E.D. (Denninger = presenting author). "Defining the adult hippocampal neural stem cell secretome."
- Sept 2020 CBI Research Day poster. Ding, T., Denninger, J.K., Kirby, E. "Behavioral changes associated with loss of NSPC derived VEGF *in vivo* after KA induced excitotoxic injury."
- March 2020 Ohio TBI Summit poster. Ding, T., Denninger, J.K., Kirby, E. "Behavioral changes associated with loss of NSPC derived VEGF *in vivo* after KA induced excitotoxic injury."
- March 2019 CBI Research Day poster. Denninger, J. K., Walker, L. A., Chen, X., Velasquez, J., Turkoglu, A., Yan, P., Bundschuh, R., Kokiko-Cochran, O. N., Kirby, E. "Profiling transcriptional changes in neural stem cells following traumatic brain injury."
- March 2019 Ohio TBI Summit poster. Denninger, J. K., Walker, L. A., Chen, X., Velasquez, J., Turkoglu, A., Yan, P., Bundschuh, R., Kokiko-Cochran, O. N., Kirby, E. "Profiling transcriptional changes in neural stem cells following traumatic brain injury."

National/International conference posters

- Nov 2022 Society for Neuroscience annual meeting, San Diego, CA
- Dause TJ, Kirby ED. "Neural stem and progenitor cell derived vascular endothelial growth factor regulates the vascular niche in the adult mouse dentate gyrus"
 - Osap R, Dause TJ, Kirby ED. "Investigating the role of adult mouse hippocampal neural stem cell expressed vascular endothelial growth factor on endothelial migration *in vitro*."
 - Rosado-Burgos I, Rieskamp JD, Kirby ED. "Glutamate Transport Through Excitatory Amino Acid Transporter 1 is Essential for Neural Stem Cell Maintenance."
- Nov 2021 Society for Neuroscience annual meeting (virtual)
- Devasthali N, Smith BM, Einstein DL, Sarchet P, Kirby ED. "Tamoxifen administered via intraperitoneal injections leads to long-term suppression of adult hippocampal neural progenitor cell proliferation."
- June 2021 International Society for Stem Cell Research, Boston, MA (virtual)
- Rieskamp JD, Valentini V, Bruno JP, Kirby ED. "Excitatory amino acid transporter 1 (EAAT1) is necessary for glutamate-stimulated proliferation of adult mouse hippocampal neural stem cells."
- June 2020 International Society for Stem Cell Research, Boston, MA (virtual)
- Dause TJ, Cheema AS, Kirby ED. "NSPC derived VEGF maintains the vascular niche in the adult mouse dentate gyrus."

- Rieskamp JD, Valentini V, Bruno JP, Kirby ED. "Expression and function of excitatory amino acid transporters in adult mouse hippocampal neural stem cells."
 - Denninger, JK., Walker, LA., Chen, X., Turkoglu, AM., Pan, A., Tapp, Z., Volk, AR., Rivaldi, AC., Kokiko-Cochran, ON., Yan, P., Bundschuh, R., Kirby, ED. "RNA sequencing neural stem and progenitor populations from individual mouse hippocampi."
- March 2019 2nd Neurogenesis Conference posters. Nassau, Bahamas.
- Rieskamp JD, Valentini V, Bruno JP, Kirby ED. "Hippocampal neural precursors clear ambient glutamate via excitatory amino acid transporters."
 - Denninger JK, Hosawi M, Chen KS, Berber E, Ivy AS, Wyss-Coray T, Kirby ED. "Neural stem cell derived VEGF modulates excitotoxic injury in the hippocampus."
- Nov 2018 Society for Neuroscience Annual Meeting posters. San Diego, CA.
- Denninger JK, Kirby ED. "Adult neural stem cells require VEGF intracrine signaling for stem cell maintenance in the dentate gyrus neurogenic niche."
 - Rieskamp JD, Valentini V, Bruno JP, Kirby ED. San Diego, CA. "Hippocampal neural stem cells clear extracellular glutamate via excitatory amino acid transporters."
 - Denninger JK, Chen X., Walker LA, Bundschuh R, Yan P, Kirby ED. "Characterization of adult neural stem cell potential for paracrine signaling based therapies."
- Nov 2017 Society for Neuroscience Annual Meeting poster.
- Smith BM, Kirby ED. "CreERT2 mediated genetic recombination in adult murine neural stem and progenitor cells is induced by tamoxifen delivered via voluntary chow consumption." Washington, DC.

Teaching

Instructor of record

- Stem Cells and the Brain, The Ohio State University (Au 2018, Au 2019, Au 2020)
- Introduction to Behavioral Neuroscience, The Ohio State University (Au 2017, Sp 2017, Sp 2020, Sp 2021, Sp 2022 (x2))

Invited guest lectures

- Spring 2018-Spring 2022. Guest speaker at Fundamentals of Neuroscience graduate course. "Stem cells and the brain." ~10 graduate students. The Ohio State University, Columbus, OH
- Spring 2017-Spring 2022. Guest speaker at Seminar in Behavioral Neuroscience. "Stem cells and the brain." ~50 undergraduate students. The Ohio State University, Columbus, OH
- Nov 2018. Guest speaker in Psychology Enrichment Program. 1 hour lecture on the role of stem cell secreted proteins in the brain. The Ohio State University, Columbus, OH
- March 2017. Guest speaker at Advanced Seminar in Behavioral Neuroscience. "Stem cells and the brain." 10 graduate students. The Ohio State University, Columbus, OH
- December 2015. Guest speaker at BIOL 865: Biologic Basis of Neurologic Disease, master's-level seminar, 8 students, San Francisco State University, San Francisco, CA.
- April 2014. Guest speaker in Fundamentals of Neuroscience course, "Stress, the brain and beyond." ~150 undergraduate students, Duke University, Durham, NC.

Scientific Service

- Graduate program service
 - 2022-present Neuroscience Graduate Program Advisory Board member

- 2022-present Faculty advisor for the Neuroscience Graduate Student Organization
 - 2021-present Co-ombudsperson for the Neuroscience Graduate Program
- Grant/fellowship review (external)
 - 2022, 2021, 2020, 2019, 2017, 2016 Reviewer for National Science Foundation
 - 2021, 2020, 2019, 2017, 2015 Reviewer for National Defense Science and Engineering Graduate Fellowship
- Grant/fellowship/poster review (internal)
 - 2022: Neuroscience Research Day poster judge
 - 2022, 2021, 2019, 2017: CBI Pilot award program reviewer
 - 2022, 2021, 2020, 2019: CBI Paper of the Year judge
 - 2020 Tik-Tok challenge judge: undergraduate neuroscience major video contest
 - 2022, 2019, 2018: Hayes Forum abstract judge
 - 2022, 2019, 2018: IGP symposium abstract judge
- Journal reviewer
 - Adhoc: Aging Cell, Molecular Brain, Molecular Psychiatry, Scientific Reports, Neuroscience, Nature Communications, FEBS Letters, Journal of Neuroscience, Comparative Medicine, Biomolecules, International Journal of Molecular Science, Neural Regeneration Research, Journal of Visualized Experiments, Psychopharmacology, Behavioural Brain Research
- Guest editing
 - Special issue of Biomolecules: "Hormonal regulation of adult neurogenesis." Co-guest editor: Dr. Erica Glasper (finalized 21 July 2021).
 - Special issue of Brain Research: The Stem Cell Secretome in the Central Nervous System (finalized 1 September 2020).

Public service and outreach

- OSU Stem Cell Education Program (O-SCEP). Founded a high school stem cell presentation program that coordinates OSU undergrads, grad students and postdocs to deliver a 1 hour interactive presentation on stem cells for high schoolers. Presented at Metro High School in April 2019. Over 20 presentations planned for Spring 2020, all canceled due to COVID19. New presentations resumed Spring 2022 (Grandview High School).
- Brain Bee (2019 & 2021). Faculty mentor and judge for Brain Bee at OSU (founded and coordinated by Neuroscience Graduate Student Outreach Committee).