CHANDRA L. TUCKER, Ph.D.
Professor
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University of Colorado School of Medicine
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EDUCATION

B.S. (1990) Biology, California Institute of Technology, Pasadena, CA

Ph.D. (1999) Biochemistry, University of Washington, Seattle, WA (9/93 – 6/99)
Advisor: Dr. James B. Hurley, Professor, Department of Biochemistry, University of Washington. *Thesis: Structural and Functional Studies of Retinal Guanylyl Cyclase*

Postdoctoral Training, University of Washington, Seattle, WA (6/99 – 6/04)
Advisor: Dr. Stanley Fields, Professor, Howard Hughes Medical Institute and Department of Genome Sciences

ACADEMIC APPOINTMENTS

7/08 – 8/11 Assistant Research Professor, Department of Biology, Duke University
9/1/11 – 6/30/15 Assistant Professor, Pharmacology, University of Colorado School of Medicine
7/1/15 – 6/30/20 Associate Professor, Pharmacology, University of Colorado School of Medicine
7/1/20 - present Professor, Pharmacology, University of Colorado School of Medicine

OTHER PROFESSIONAL POSITIONS

6/90 – 2/92 Research Technician, Lab of Dr. Emil Bogenmann, Children's Hospital of LA, Los Angeles, CA.
2/92 – 6/93 Research Technician, Lab of Dr. Peter Ghazal, Immunology, Scripps Research Institute, La Jolla.
6/05 – 8/11 Director of Yeast Model Systems Genomics Group, Department of Biology, Duke Univ.

HONORS, SPECIAL RECOGNITIONS, and AWARDS

1988, 1989 Caltech Summer Undergraduate Research Fellowship
1994 – 1998 NIH Training Grant Recipient in Vision Research
1999 National Eye Institute Travel Fellowship Grant
2000 – 2003 National Institutes of Health Postdoctoral Fellowship (NRSA)
2009 – 2014 Scientific Advisory Board, Oxalosis and Hyperoxaluria Foundation
2012 Awarded best paper published in 2012 in Journal of Biological Chemistry in 'Plant Biology' field
2013 McKnight Technological Innovations in Neuroscience Award
2015 Co-organizer – Keystone Conference on Optogenetics 2015
2016 Co-organizer - Janelia Farm Workshop, Genetic Manipulation of Neuronal Activity IV
2016 Outstanding Research Award – 2016 Department of Pharmacology, UC Denver
2017 Co-organizer, 2017 Imaging Workshop, ASCB/EMBO Annual Meeting
2018 Co-organizer, 2018 Janelia Workshop, Genetic Manipulation of Neuronal Activity V'
2020 Keynote Speaker, 2020 Optogenetics Workshop, Columbia (cancelled- pandemic)
2021 Keynote Speaker, 2021 International Plant Photobiology meeting, CSH Labs
2022 Plenary Speaker, 2022 Nanoscience Days, University of Jyvaskyla, Finland
2023 Keynote speaker, 2023, 3rd Optogenetics Australia Meeting

PUBLICATIONS

RESEARCH ARTICLES and REVIEWS PUBLISHED in PEER-REVIEWED JOURNALS

1. Chen, J., **Tucker, C.L**., Woodford, B., Szel, A., Lem, J., Gianella-Borradori, A., Simon, M. I., and Bogenmann, E. (1994) The human blue opsin promoter directs transgene expression in short-wave cones and bipolar cells in the mouse retina. *Proc. Natl. Acad. Sci. U.S.A.* 91, 2611-2615.
2. Baskar, J.F., Smith, P. P., Ciment, G. S., Hoffmann, S., **Tucker, C.**, Tenney, D. J., Colberg-Poley, A. M., Nelson, J. A., and Ghazal, P. (1996) Developmental analysis of the cytomegalovirus enhancer in transgenic animals. *J. Virol.* 70, 3215-3226.
3. **Tucker, C. L**., Laura, R. P., and Hurley, J. B. (1997) Domain-specific stabilization of photoreceptor membrane guanylyl cyclase by adenine nucleotides and guanylyl cyclase activating proteins (GCAPs). *Biochemistry* 36, 11995-2000.
4. **Tucker, C. L**., Hurley, J. H., Miller, T. R., and Hurley, J. B. (1998) Two amino acids convert a guanylyl cyclase, RetGC-1, into an adenylyl cyclase. *Proc. Natl. Acad. Sci. U.S.A.* 95, 5993-5997.
5. **Tucker, C. L.**, Woodcock, S. C., Kelsell, R. E., Hunt, D. M., and Hurley, J. B. (1999) Biochemical analysis of a dimerization domain mutation in RetGC-1 associated with dominant cone-rod dystrophy. *Proc. Natl. Acad. Sci. U.S.A.* 96, 9039-9044.
6. Ramamurthy, V., **Tucker, C.**, Wilkie, S.E., Daggett, V., Hunt, D.M., and Hurley, J.B. (2001) Interactions within the coiled-coil domain of RetGC-1 guanylyl cyclase are optimized for regulation rather than high affinity. *J. Biol. Chem.* 276, 26218-26229.
7. **Tucker, C. L.**, Gera, J. F. and Uetz, P. (2001) Towards an understanding of complex protein networks. *Trends Cell Biol.* 11, 102-106.
8. **Tucker, C. L.** and Fields, S. (2001) Engineering a yeast sensor of ligand binding. *Nature Biotechnology* 19, 1042-1046. (reviewed in: Nature Biotechnology 19, 1022-1023; Nature Reviews Drug Discovery 1, 6-7; Analytical Chemistry 74, 13A)
9. Brockerhoff, S. E., Rieke, F., Matthews, H. R., Taylor, M. R., Kennedy, B., Ankoudinova, I., Niemi, G. A., **Tucker, C. L.**, Xiao, M., Cilluffo, M. C., Fain, G. L., and Hurley, J. B. (2002) Light stimulates a transducin-independent increase of cytoplasmic Ca2+ and suppression of current in cones from the zebrafish mutant nof. *J. Neurosci.* 23, 470-480.
10. **Tucker, C. L.** (2002) High-throughput cell-based assays in yeast. *Drug Discovery Today* 7 (Suppl.), S125-S130.
11. **Tucker, C. L.**, Ramamurthy, V., Pina, A., Loyer, M., Dharmaraj, S., Li, Y., Maumenee, I., Hurley, J. B., and Koenekoop, R. K. (2004) Functional analyses of mutant recessive GUCY2D alleles identified in Leber congenital amaurosis patients. *Mol. Vision* 10, 297-303.
12. **Tucker, C. L.** and Fields, S. (2004) Quantitative genome-wide analysis of yeast deletion strain sensitivities to oxidative and chemical stress. *Comp. & Funct. Genomics* 5, 216-224.
13. Hopper, E. D., Pittman, A.M.C., Fitzgerald, M.C., and **Tucker, C. L.** (2008) In vivo and in vitro examination of stability of primary hyperoxaluria-associated human alanine:glyoxylate aminotransferase. *J. Biol. Chem.*, 283, 30493-30502.
14. ***Tucker, C. L.**, Peteya, L, Pittman, A.M.C, and Zhong, J. (2009) A genetic test for yeast two-hybrid bait competency using RanBPM. *Genetics*, 182, 1377-1379 (*corresponding author)
15. Hopper, E. D., Pittman, A.M.C., **Tucker, C. L.,** Campa, M. J., Patz, E. F., and Fitzgerald, M. C. (2009) Hydrogen/deuterium exchange- and protease digestion-based screening assay for protein-ligand binding detection. *Anal. Chem.* 81, 6860-6867.
16. West, G. M., **Tucker, C. L**., Xu, T., Park, S. K., Han, X., Yates, J. R., and Fitzgerald, M. C. (2010) Quantitative proteomics approach for identifying protein-drug interactions in complex mixtures using protein stability measurements. *Proc. Natl. Acad. Sci. U.S.A.* 107, 9078-9082.
17. Kennedy, M.J., Hughes, R.M., Peteya, L.A., Schwartz, J.W., Ehlers, M.D., and **Tucker, C.L.** (2010) Rapid blue light induction of protein interactions in living cells. *Nature Methods. 7*, 973-975.
18. Pajerowska-Mukhtar, K.M., Wang, W., Tada, Y., Oka, N., **Tucker, C.L.**, Fonseca, J.P., and Dong, X. (2012) The HSF-like transcription factor TBF1 is a major molecular switch for plant growth-to-defense transition. *Curr Biol.* 22, 103-112.

19. **Tucker, C.L.** (2012) Manipulating cellular processes using optical control of protein-protein interactions. Prog. Brain Res. 196, 95-117.
20. Hughes, R.M., Vrana, J.D., Song, J., and **Tucker, C.L.** (2012) A light-dependent, dark-promoted interaction of Arabidopsis cryptochrome 1 and phytochrome B. J. Biol. Chem. 287, 22165-22172. ***Paper of the Week*** ****Awarded best plant biology paper in JBC in 2012 ****
21. Hughes, R.M., Bolger, S., Tapadia, H., and **Tucker, C.L.** (2012) Light-mediated control of DNA transcription in yeast. Methods 58, 385-391.
22. Pittman, A.M., Lage, M.D., Poltoratsky, V., Vrana, J., Paiardini, A., Roncador, A., Cellini, B., Hughes, R.M., and **Tucker, C.L.** (2012) Rapid profiling of disease alleles using a tunable reporter of protein misfolding. *Genetics* 192, 831-842. ****Highlighted in Nature Reviews Genetics***
23. Pathak, G.P., Vrana, J.D., and **Tucker, C.L.** (2013) Optogenetic control of cell function using engineered photoreceptors. *Biol Cell* 105, 59-72.
24. Lage, M.D., Pittman, A.M., Roncador, A., Cellini, B., and **Tucker, C.L.** (2014) Allele-specific characterization of alanine:glyoxylate aminotransferase variants associated with primary hyperoxaluria. *PLOS ONE* 9, e94338 doi: 10.1371/journal.pone.0094338
25. **Tucker, C.L.**, Vrana, J.D., and Kennedy, M.J. (2014) Tools for controlling protein interactions with light. *Curr. Protoc. Cell Biol.* 64, 17.16.1 – 17.16.20
26. Hansen, M.G., Fregoso, V., Vrana, J.D., **Tucker, C.L.**, and Niswander, L. (2014) Peripheral nervous system defects in a mouse model for peroxisomal biogenesis disorders. *Dev. Biol.* doi:10.1016/ydbio.2014.08.026
27. Taslimi, A., Vrana, J.D., Chen, D., Borinskaya, S., Mayer, B., Kennedy, M.J., and **Tucker, C.L.** An optimized optogenetic clustering tool for probing protein interaction and function. (2014) *Nature Commun.* 5: 4925. doi 10.1038/ncomms5925 ****Highlight in Nature Meth., Nov 2014****
28. Pathak, G., Strickland, D., Vrana, J.D., and **Tucker, C.L.** (2014) Benchmarking optical dimerizer systems. *ACS Synthetic Biology,* 2014 Oct 28.
29. Schindler, S.E., McCall, J.G., Yan, P., Hyre, K.L., Li, M., **Tucker, C.L.**, Lee, J., Bruchas, M.R., and Diamond, M.I. Photo-activatable Cre recombinase regulates gene expression *in vivo*. (2015) *Sci. Rep.* 5, 13627.
30. Spiltoir, J., Strickland, D., Glotzer, M., and **Tucker, C.L.** Optical regulation of peroxisomal trafficking. (2015) *ACS Synthetic Biology*, Epub 2015 Nov 2.
31. Taslimi, A., Zoltowski, B., Miranda, J.G., Pathak, G., Hughes, R.M., and **Tucker, C.L.** (2016) Optimized second generation CRY2/CIB dimerizers and photoactivatable Cre recombinase. *Nature Chem. Biology* 12, 425-430.
32. Pathak, G., Spiltoir, J.I., Hoglund, C., Polstein, L.R., Heine-Koskinen, S., Gersbach, C.A., Rossi, J., and **Tucker, C.L.** (2017) Bidirectional approaches for optogenetic regulation of gene expression in mammalian cells using Arabidopsis cryptochrome 2. *Nucleic Acids Res.* doi 10.1093/nar/gkx260.
33. Liu, Q., and **Tucker, C.L.** (2017) Engineering genetically-encoded tools for optogenetic control of protein activity. *Curr. Op. Chem. Biol.* doi 10.1016/j.cbpa.2017.05.001
34. Cook, S.G., Bourke, A.M., O'Leary, H., Zaegel, V., Lasda, E., Mize-Berge, J., Quillinan, N., **Tucker, C.L.**, Coultrap, S.J., Herson, P.S., Bayer, K.U. Analysis of the CaMKIIa and b splice-variant distribution among brain regions reveals isoform-specific differences in holoenzyme formation. (2018) Sci. Rep. 8, 5448. Doi 10.1038/s41598-018-23779-4.
35. Locke, C., Machida, K., **Tucker, C.L.**, Wu, Y., and Yu, J. Optogenetic activation of EphB2 receptor in dendrites induced actin polymerization by activating Arg kinase. (2018) Biol. Open 6, 1820-1830.
36. Spiltoir, J.I. and **Tucker, C.L.** Photodimerization systems for regulating protein-protein interactions with light. (2019) Curr. Opin. Struct. Biol. 57, 1-8.
37. Liu, Q., Sinnen, B.L., Boxer, E.E., Buchta, W.C., Schneider, M.W., Gibson, E.S., Wysoczynski, C.L., Gottschalk, A., Aoto, J., ***Tucker, C.L.**, and *Kennedy, M.J. A photoactivatable botulinum neurotoxin for inducible control of neurotransmission. (2019) Neuron 101, 863-875.

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38. Hernandez-Candia, C. N., Wysoczynski, C.L., and **Tucker, C.L.**, Advances in optogenetic regulation of mammalian cells using cryptochrome 2 (CRY2). (2019) Methods, doi.org/10.1016/j.ymeth.2019.03.011.
39. Meador, K.M., Wysoczynski, C.L. Norris, A.J., Aoto, J., Bruchas, M.R., and **Tucker, C.L.** Achieving tight control of a photoactivatable Cre recombinase gene switch: new design strategies and functional characterization in mammalian cells and rodent. (2019) Nucleic Acids Res. gkz585
40. Hernandez-Candia, C. N. and **Tucker, C.L.** (2020) Optogenetic control of gene expression using cryptochrome 2 and a light-activated degron. Methods in Molecular Biology, doi: 10.1007/978-1-0716-0755-8_10.
41. Cleveland, J. and **Tucker, C.L.** Photo-SNAP-tag, a light-regulated chemical labeling system. (2020) ACS Chemical Biology 15, 2212-2220.
42. Pearce, S. and **Tucker, C.L.** (2021) Dual Systems for Enhancing Control of Protein Activity through Induced Dimerization Approaches, Adv. Biology. doi.org/10.1002/adbi.202000234
43. Hernandez-Candia, C. N., Pearce, S., and **Tucker, C.L.** A modular tool to query and inducibly disrupt biomolecular condensates. (2021) Nat. Commun. https://doi.org/10.1038/s41467-021-22096-1
44. Cleveland, J.D, Taslimi, A., Liu, Q., VanKeuren, A., Churchill, M.E.A., and **Tucker, C.L.** (2022) Reprogramming the cleavage specficity of Botulinum neurotoxin B1. ACS Synthetic Biology 11, 3318-3322.
45. Taslimi, A., Fields, K.M., Dahl, K.D., Liu, Q. and **Tucker, C.L.** (2022) Spatiotemporal control of necroptotic cell death and plasma membrane recruitment using engineered MLKL domains. Cell Death Discov. 8, 469
46. Hernandez, C., Brady, B., Harrison, E., and **Tucker, C.L.** (2024) A platform to induce and mature biomolecular condensates using chemicals and light. Nat. Chem.Biol. 20, 452-462
47. Rumian, N.L., Barker, C.M., Larsen, M.E., Tullis, J.E., Freund, R.K., Taslimi, A., Coultrap, S.J., **Tucker, C.L.**, Dell'Acqua, M.L., and Bayer, K.U. (2024) LTP expression mediated by autonomous activity of GluN2B-bound CaMKII. Cell Rep. 43, 114866.
48. Taslimi, A., Jeibmann, A., Goett-Zink, L., Kottke, T., and **Tucker, C.L.** (2025) Constitutively active Arabidopsis cryptochrome 2 alleles identified using yeast selection and deep mutational scanning. J. Biol. Chem. 301, 110265.
49. Van Keuren, A.M., Simoes, C.T., and **Tucker, C.L.** (2025) Chemical control of protease activity and gene expression using a biotin-released inhibitory domain. ACS Synth. Biol. 14, 3065-3077.