Mark Steven Cembrowski
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Assistant Professor • Dept. of Cellular and Physiological Sciences • University of British Columbia
2350 Health Sciences Mall • Rm 3353 • Life Sciences Institute • Vancouver, BC • V6T 1Z3 • Canada

Citizenship

Canada and United States

Education

Ph.D. in Applied Mathematics, Northwestern University, 2011

Thesis: "Realistic modeling of rod bipolar and AII amacrine cells: synaptic and intrinsic properties of neurons comprising a retinal microcircuit"

Advisors: William Kath (Dept. of Engineering Sciences and Applied Mathematics), Hermann Riecke (Dept. of Engineering Sciences and Applied Mathematics), and Joshua Singer (Depts. of Ophthalmology and Physiology)

M.S. in Applied Mathematics, Northwestern University, 2008

B.Sc. in Mathematics, University of British Columbia, 2007

Project: "Evolution Equations for Coupled Patterns and Mean-Flow Dynamics" (as part of an Undergraduate Student Research Award from the Natural Sciences and Engineering Research Council of Canada, 2007, advised by Rachel Kuske in the Dept. of Mathematics)

Affiliations

Assistant professor (primary affiliation)
Department of Cellular and Physiological Sciences, Faculty of Medicine
University of British Columbia

Investigator
Djavad Mowafaghian Centre for Brain Health
University of British Columbia

Visiting Scientist
Janelia Research Campus
Howard Hughes Medical Institute

Next Generation Leader
Allen Institute for Brain Science

Previous employment

Research scientist (2015-2018) and **postdoctoral associate** (2012-2015)
Janelia Research Campus, HHMI. Laboratory Head: Nelson Spruston

Major awards, distinctions, and fellowships

- **Next Generation Leader.** Allen Institute, 2018. (1 of 6 selected worldwide in 2018)
- **Top nominated speaker award**, Janelia Research Campus Annual Symposium. 2017.
- **Graduate Research Fellowship**, National Science Foundation. 2009.
- **Postgraduate Scholar Award - Doctoral**, Natural Sciences and Engineering Research Council of Canada. 2009.
- **University Scholar**, Northwestern University Graduate School. 2009.
- **Multidisciplinary Visual Sciences Training Grant**, National Institutes of Health. 2008.
- **Royal E. Cabell Fellowship**, Northwestern University. 2007.
- **Science Scholar**, University of British Columbia. 2007.
- **Undergraduate Student Research Award**, Natural Sciences and Engineering Research Council of Canada. 2007.

Research publications (*: co-first, #: corresponding)

13. **Cembrowski, M.S.#,** Wang, L., Lemire, A., DiLisio, S.F., Copeland, M., Clements, J., Spruston, N. The subiculum is a patchwork of discrete subregions. eLife 7, 10/7554/eLife.37701, 2018.
    - *Research Highlight*. Lewis, S. Patchwork subiculum. Nature Reviews Neuroscience 20(1): 3, 2019.
12. **Cembrowski, M.S.#,** Phillips, M.G., DiLisio, S.F., Shields, B.C., Winnubst, J., Chandrashekar, J., Bas, E., Spruston, N.# Dissociable structural and functional hippocampal outputs via distinct subiculum cell classes. Cell 173(5): 1280–1292, 2018.
    - *Research Highlight*. Whalley, K. A regional divide. Nature Reviews Neuroscience 19(7): 390, 2018.
11. Bloss, E.B., **Cembrowski, M.S.**, Karsh, B., Colonell, J., Fetter, R.D., Spruston, N.# Single excitatory axons form clustered synapses onto CA1 pyramidal cell dendrites. Nature Neuroscience 21(3): 353-363, 2018.
10. **Cembrowski, M.S.#**, Spruston, N. Integrating results across methodologies is essential for producing robust neuronal taxonomies. Neuron 94(1): 747-751, 2017.
9. **Cembrowski, M.S.**, Wang., L., Sugino, K., Shields, B.C., Spruston, N.# Hipposeq: a comprehensive RNA-seq database of gene expression in hippocampal principal neurons. eLife 5, 10.7554/eLife.14997, 2016.
8. Bloss, E.B., **Cembrowski, M.S.**, Karsh, B., Colonell, J., Fetter, R., Spruston, N.# Structured patterns of dendritic inhibition support branch-specific forms of integration in CA1 pyramidal cells. Neuron 89(5): 1016-1030, 2016.
7. **Cembrowski, M.S.**, Bachman, J.L., Wang, L., Sugino, K., Shields, B.C., Spruston, N.# Spatial gene-expression gradients underlie prominent heterogeneity of CA1 pyramidal neurons. Neuron 89(2): 351-368, 2016.
    - *Featured article of the issue.* Previewed by Tushev, G. and Schuman, E.M. Rethinking Functional Segregation: Gradients of Gene Expression in Area CA1. Neuron 89(2):242-243, 2016.
    - *Of Outstanding Interest.* Mallory, C.S. and Giocomo, L.M. Heterogeneity within hippocampal place coding. Review, Current Opinion in Neurobiology 49:158-167, 2018.
    - *Highlighted reference (1 of 6).* Soltesz, I. and Losonczy, A. CA1 pyramidal cell diversity enabling parallel information processing in the hippocampus. Review, Nature Neuroscience 21(18): 484-493, 2018.
    - *Of Special Interest.* Valero, M. and de la Prida, L,M. The hippocampus in depth: a sublayer-specific perspective of entorhinal–hippocampal function. Review, Current Opinion in Neurobiology 52:107-114, 2018.
    - *Of Special Interest.* Suvrathan, A. Beyond STDP – Towards Diverse and Functionally Relevant Plasticity Rules. Review, Current Opinion in Neurobiology 54:12-19, 2019.
6. Kim, Y.*, Hsu, C.-L.*, **Cembrowski, M.S.,** Mensh, B.D., Spruston, N.# Dendritic sodium spikes are required for long-term potentiation at distal synapses on hippocampal pyramidal neurons. eLife 4, doi:10.7554/eLife.06414, 2015.
    - *Recommendation on Faculty of 1000.*
5. Choi, H., Lei, Zhang, L., **Cembrowski, M.S.**, Sabottke, C.F., Markowitz, A.L., Butts, D.A., Kath, W.L., Singer, J.H., Riecke, H.# Intrinsic bursting of AII amacrine cells underlies oscillations in the rd1 mouse retina. Journal of Neurophysiology 112(6): 1491-1504, 2014.

4. Ke, J., Wang, Y., Borghuis, B.G., **Cembrowski, M.S.**, Riecke, H., Kath, W.L., Demb, J.B., Singer, J.H.[#] Adaptation to background light enables contrast coding at rod bipolar cell synapses. Neuron 81(2): 388-401, 2014**.**
    - *Recommendation on Faculty of 1000.*
3. **Cembrowski, M.S.[#]**, Logan, S., Tian, M., Jia, L., Li, W., Kath, W.L., Riecke, H., Singer, J.H. The mechanisms of repetitive spike generation in an axonless retinal interneuron. Cell Reports 1(2): 155-166, 2012.
2. Jarsky, T.*, **Cembrowski, M.S.*,** Logan, S., Kath, W.L., Riecke, H., Demb, J., Singer, J.H.[#] A synaptic mechanism for retinal adaptation to luminance and contrast. The Journal of Neuroscience 31(30): 11003-110515, 2011.
1. Lim, E.M., Cembrowski, G.S., **Cembrowski, M.,** Clarke, G.[#] Race-specific WBC and neutrophil count reference intervals. International Journal of Laboratory Hematology 32(6): 590-597, 2010.

Reviews and commentaries ([#]: corresponding)

4. **Cembrowski, M.S.[#]** Single-cell transcriptomics. Journal of Neuroscience Methods, in preparation (invited submission as part of special tissue).
3. **Cembrowski, M.S.[#],** Spruston, N.[#] Heterogeneity within classical cell types is the rule: lessons from hippocampal pyramidal neurons. Nature Reviews Neuroscience, in press (invited submission).
2. **Cembrowski M.S.[#],** Menon, V.[#] Continuous variation within cell types of the nervous system. Trends in Neurosciences 41(6): 339-350, 2018 (invited submission).
1. **Cembrowski, M.S.[#]**, Spruston, N. Illuminating the neuronal architecture underlying context in fear memory. Cell 167(4): 888-889, 2016 (invited submission).

Invited talks

15. "Cell-type-specific rules of a hippocampal-dependent memory." Center for Neural Engineering Seminar, Pennsylvania State University, PA, USA. 2019. Upcoming.
14. "Cell-type-specific rules of hippocampal-dependent memory." Allen Institute for Brain Science Showcase Symposium, Allen Institute, Seattle, WA, USA. 2018.
13. "The transcriptional identity of hippocampal pyramidal cells." 11th FENS Forum of Neuroscience, Federation of European Neurosciences Societies, Berlin, Germany. 2018.
12. "Dissociable structural and functional hippocampal outputs via distinct classes of cells in the subiculum." scRNA Sequencing Interest Group Seminar, Johns Hopkins University, Baltimore, Maryland, USA. 2018.
11. "Dissociable structural and functional hippocampal outputs via distinct classes of cells in the subiculum." Special seminar, Montreal Neurological Institute, Montreal, QC, Canada. 2018.
10. "Dissociable structural and functional hippocampal outputs via distinct classes of cells in the subiculum." Neuroscience for Mental Health Seminar, Douglas Institute, McGill University, Montreal, QC, Canada. 2018.
9. "A cell-type- and stage-specific deconstruction of a spatial working memory." Seminar, Department of Cellular and Physiological Sciences, University of British Columbia, Vancouver, BC, Canada. 2018.
8. "Hippocampal output is parallel in structure and function." Annual symposium, Janelia Research Campus, Ashburn, VA, USA. 2017. *Top nominated speaker award.*
7. "A molecules-to-behavior taxonomy of output neurons in the mouse hippocampus." Seminar, Modeling, analysis and theory team, Allen Institute, Seattle, WA, USA. 2016.

6. "Continuously variable transcriptional differences underlie prominent CA1 pyramidal cell heterogeneity." Hippocampal Consortium Meeting, Janelia Research Campus, Ashburn, WA, USA. 2016.
5. "Continuously variable transcriptional differences underlie prominent CA1 pyramidal cell heterogeneity." Center for Neural Informatics, Structure, and Plasticity Seminar, Krasnow Institute for Advanced Study, George Mason University, Fairfax, VA, USA. 2015.
4. "Subcellular input organization of cell-type specific inhibitory inputs to CA1 pyramidal neuron dendrites." Human Brain Project Hippocamp CA1: Collaborative and Integrative Modeling of Hippocampal Area CA1 meeting. University College London, London, England. 2015.
3. "Transcriptional profiling of the hippocampus: diversity across and within regions." Janelia Farm Project Team Advisory Symposium, Ashburn, VA, USA. 2014.
2. "A single, distal dendritic location underlies action potential-like spiking in an axonless retinal interneuron." Janelia Farm Research Campus, Ashburn, VA, USA. 2011.
1. "A single, distal dendritic location underlies action potential-like spiking in an axonless retinal interneuron." Advanced Topics in Vision Seminar, Northwestern University, Chicago, IL, USA. 2011.

Other talks

3. "Cell-type-specific rules of a subiculum-dependent memory." Spring Hippocampal Meeting, Sicily, Italy. 2019. Upcoming.
2. "A cell-type- and stage-specific deconstruction of a spatial working memory." SickKids Hospital, Toronto, ON, Canada. 2018.
1. "A synaptic mechanism for retinal adaptation to luminance and contrast". Retinal Neurobiology and Visual Processing Conference, Federation of American Societies for Experimental Biology. Steamboat Springs, CO, USA. 2012.

Press coverage

2. "Neurobiology: gene expression captured on-site". Nature Methods 14(11):1037-1040, 2017, by Vivien Marx.
1. "Investments Boost Neurotechnology Career Prospects". Science 346(6209):111-114, 2014, by Jeffrey M. Perkel.

Funding sources

5. **Graduate Research Fellowship**, National Science Foundation ($121,000 USD). 2009-2011.
4. **University Scholar**, Northwestern University Graduate School ($36,000 USD). 2009.
3. **Postgraduate Scholar Award - Doctoral**, Natural Sciences and Engineering Research Council of Canada (NSERC) ($63,000 CAD; declined). 2009.
2. **Multidisciplinary Visual Sciences Training Grant** (T32EY007128), National Institutes of Health ($42,000 USD; declined $20,000). 2008-2009.
1. **Royal E. Cabell Fellowship**, Northwestern University ($53,000 USD). 2007.

Competitive special topics courses

3. Advanced Sequencing Technologies and Applications Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, USA. 2012.
2. Neuroinformatics Course, Marine Biological Laboratory, Woods Hole, MA, USA. 2012.
1. Advanced Course in Computational Neuroscience, Bernstein Center for Computational Neuroscience, Freiberg, Germany. 2010.

Teaching experience

3. Graduate teaching assistant, Department of Engineering Sciences and Applied Mathematics, 2008. Taught Math 234: Multivariable Calculus; overall class evaluation (CTEC) score of 6.00/6.00.
2. Graduate teaching assistant, Department of Engineering Sciences and Applied Mathematics, 2008. Taught Math 234: Multivariable Calculus; overall class evaluation (CTEC) score of 5.77/6.00.
1. Undergraduate teaching assistant, Department of Mathematics, University of British Columbia, 2005. Taught Mathematics 317: Calculus IV.

Direct mentorship

4. Jessica Passlack, Janelia Undergraduate Scholar. 2018.
3. Salvatore DiLisio, surgery technician. 2017. *Led to authorship on Cembrowski et al., Cell, 2018.*
2. Matthew Phillips, Janelia Undergraduate Scholar. 2015, 2016. *Led to authorship on Cembrowski et al., Cell, 2018.*
1. Joshua Fass, Janelia Undergraduate Scholar. 2013.

Student committees

1. Brittany Zhang, laboratory of Jason Snyder, PhD committee.

Reviewing

Reviewer and/or review collaborator for Cell, Nature Neuroscience, Neuron, Cell Reports, Current Biology, PLoS Biology, Journal of Neuroscience, Hippocampus, Journal of Neurophysiology, Journal of Chemical Neuroanatomy, Neuroinformatics

Service

4. Next Generation Leader Advisory Council, Allen Institute, 2018-2021.
3. Invited grant reviewer, “Neurosciences and Neural Disorders” ERC Consolidator Grant 2018, European Research Council.
2. IACUC Member at Janelia Research Campus, 2017-2018.
1. Chair, Education and Outreach, Engineers for a Sustainable World, Northwestern Chapter. 2008-2009.