

Mei Zhen, PhD

Lunenfeld-Tanenbaum Research Institute
600 University Avenue, Room 870
Toronto, ON
M5G 1X5

Office: 416-586-1592
Lab: 416-586-6138
meizhen@lunenfeld.ca
www.zhenlab.com

Education

Post-doctoral Fellow in Neuroscience; Mentor: Dr. Yishi Jin, UC Santa Cruz, HHMI	1996-2000
PhD in Biochemistry; Mentor: Dr. Peter Candido, University of British Columbia	1990-1995
BSc in Biochemistry, Wuhan University, China	1986-1990

Appointments

Co-Director, the Nanoscale Biomedical Imaging Facility, Sinai Health System and the Hospital for Sick Children	2018-
Professor of Molecular Genetics, University of Toronto	2012-
Senior Scientist, the Lunenfeld-Tanenbaum Research Institute	2006-
Associate Professor of Molecular Genetics, Physiology, University of Toronto	2006-2012
Scientist, the Lunenfeld-Tanenbaum Research Institute	2001-2006
Assistant Professor of Molecular Genetics, University of Toronto	2001-2006

Distinctions

Fellow, the Canadian Institute for Advanced Research	2023-2028
Canada Research Chair (Tier 1) in Neural Circuit Development and Function	2018-2025
Fellow, The Radcliffe Institute for Advanced Study, Harvard University	2013-2014
Lawrence and Judy Tanenbaum Research Chair in Neuroscience, MSH	2008-2011
Mobility Program in Science and Technology, the Government of France	2008
Early Researcher Award, the Ontario Ministry of Research and Innovation	2007-2011
EJLB Scholar, the EJLB Foundation	2007-2010
Canada Research Chair (Tier 2) in Neuroscience	2001-2011
Long-term Post-doctoral Fellowship, the Human Frontier Science Foundation	1996-1998
University Graduate Fellowship, the University of British Columbia	1991-1995

Service

Reviewing Editor, eNeuron	2023-2026
Graduate Advisory Team, Department of Molecular Genetics, University of Toronto	2019
Graduate Admissions Committee, Department of Molecular Genetics, University of Toronto	2018
Advisory Board Member, WormBase	2018
Steering Committee, Research Coordination Network on Comparative Neurobiology, NSF	2017-
Review Committee, Canadian Gairdner Foundation	2015-2018
Review Committee, Radcliffe Institute, Harvard University	2014

Graduate Admissions Committee, Department of Physiology, University of Toronto	2014-2016
Graduate Awards Committee, Department of Physiology, University of Toronto	2014-2016
Graduate Awards Committee, Department of Molecular Genetics, University of Toronto	2010-2017
Steering Committee, Collaborative Graduate Program in Developmental Biology, University of Toronto	2006-2012
Reviewer for Journals (eNeuron, Nature, Science, Neuron, eLife, Current Biology, Nature Methods, PLoS Genetics, PLoS Biology, Development, Genetics)	2001-
Reviewer for Grant Panels (NIH, NSF, the Brain Initiative, CIHR, CRC, NSERC, ERC, Human Frontier Science Program, Allen Foundation)	2001
Supervisory Committee for thesis studies, University of Toronto (BSc, MSc, PhD)	2001-

International Conferences, Courses, Workshops

Workshop lectures, Brain Initiative, NIH	2020-2022
Course Coordinator, Neural Systems & Behaviour, MBL	2018-2019
Organizing Committee, International <i>C. elegans</i> Meetings and Workshops	2008-2017
Session Chair, American Society for Cell Biology	2013
Program Advisor, 2012 Gairdner Award Neural Symposium	2012
Course Coordinator, <i>C. elegans</i> course, Cold Spring Harbor Laboratory	2008-2010

Teaching

International

<i>C. elegans</i> , from genome editing to imaging, EMBL, Heidelberg, Germany	2022
Neural Systems & Behavior, Marine Biological Laboratory, Woods Hole, MA, USA	2019
Developmental Neurobiology, Okinawa Institute of Science and Technology, Japan	2017-2019
The <i>C. elegans</i> Course, Cold Spring Harbor Laboratory, Cold Spring, NY, USA	2008-2010

University of Toronto

JDB1025H: Developmental Biology (Collaborative Program in Developmental Biology)	
JYG1555H: Cellular and Molecular Neurobiology (Physiology)	
MMG1012H: Advanced Imaging: Techniques and Application in Biological Systems (Molecular Genetics)	
MMG1012H: Developmental Neurobiology (Molecular Genetics)	
MGY480Y: Undergraduate Research Thesis Course (Fourth Year)	
MGY399Y: Undergraduate Research Opportunity Program (Third Year)	
MGY299Y: Undergraduate Research Opportunity Program (Second Year)	

Publications *: correspondence

Connectomics

Cuentas-Condori A, Chen S, Gallick K, Krout M, Tipps J, Flautt L, Mulcahy B, Zhen M, Richmond J, Miller DM.III (2023). **The Epithelial Na⁺ Channel UNC-8 promotes an endocytic mechanism that recycles presynaptic components from old to new boutons in remodeling neurons.** Accepted, *Cell Reports*.

Pavarino EC, Yang E, Dhanyasi N, Wang M, Bidel F, Lu X, Yang F, Mukesh BR, Drescher B, Hochner B, Katz PS, Zhen M, Lichtman JW, Meriovitch Y. (2023). **mEMbrain: an interactive deep learning MATLAB tool for connectomic segmentation on commodity desktops.** *Frontiers in Neural Circuits* 17:952921.

Mulcahy B, Witvliet D, Mitchell JM, Schalek RL, Berger D, Wu Y, Holmyard D, Lu Y, Ahamed T, Samuel ADT, Chisholm AD, Lichtman JW, Zhen M. (2022). **Post-embryonic maturation of the *C. elegans* motor circuit.** *Current Biology* 32(21): 4645-4659.

Witvliet D, Mulcahy B, Mitchell JM, Meirovitch Y, Berger DR, Wu Y, Liu Y, Koh WR, Parvathala R, Holmyard D, Schalek RL, Shavit N, Chisholm AD, Lichtman JW*, Samuel ADT*, Zhen M*. (2021). **Connectomes across development reveal principles of brain maturation in *C. elegans*.** *Nature* 596: 257-261. PMID 34349261.

Britz S, Markert SM, Witvliet D, Steyer AM, Tröger S, Mulcahy B, Kollmannsberger P, Schwab Y, Zhen M, Stigloher C. (2021). **Structural analysis of the *C. elegans* dauer larval anterior sensilla by Focused Ion Beam-Scanning Electron Microscopy.** *Frontiers in Neuroanatomy* 15:732520. PMID: 34819841

Cuentas-Condori A, Mulcahy B, He S, Palumbos S, Zhen M, Miller DM III. (2019). ***C. elegans* neurons have functional dendritic spines** *eLife* 8: e47918. PMID: 31584430.

Mulcahy B*, Witvliet D, Holmyard D, Mitchell J, Chisholm A, Samuel ADT*, Zhen M*. (2018). **A Pipeline for Volume Electron Microscopy of the *Caenorhabditis elegans* Nervous System.** *Frontiers in Neural Circuits* 12:94. PMID: 30949033.

Kaltdorf KV, Theiss M, Markert SM, Zhen M, Dandekar T, Stigloher C, Kollmannsberger P. (2018). **Automated classification of synaptic vesicles in electron tomograms of *C. elegans* using machine learning.** *PLoS One Computational Biology* 13(10):e0205348. PMID: 30296290.

Markert SM, Britz S, Proppert S, Lang M, Witvliet D, Mulcahy B, Sauer M, Zhen M, Bessereau JL, Stigloher C. (2016). **Filling the gap: adding super-resolution to array tomography for correlated ultrastructural and molecular identification of electrical synapses at the *C. elegans* connectome.** *Neurophotonics* 3(4): 041802. PMID: 27175373.

Circuits

Li Y, Chitturi J, Yu B, Zhang Y, Wu J, Ti P, Hung W, Zhen M, Gao S* (2023). **The glutamate-gating ubiquitin ligase UBR-1 affects the synaptic strength between the GABAergic and glutamatergic signaling.** In Revision, *Cell Reports*.

Meng J, Ahamed T*, Yu B, Hung W, El Mouridi S, Leclercq-Blondel A, Gendrel M, Wang Z, Chen L, Wen Q, Boulain T, Gao S, Zhen M*. (2023). **A tonically active neuron continuously drives mutually**

exclusive motor states at different timescales. Under review, *bioRxiv* 2022.04.06.487231.

Bach M, Bergs A, Mulcahy B, Zhen M, Gottschalk A. (2023). **Coordinated electrical and chemical signaling between two neurons orchestrates switching of motor states.** Under Review, *bioRxiv* 2023.01.04.522780

Lin A*, Qin S, Casademunt H, Wu M, Hung W, Cain G, Tan NZ, Valenzuela R, Lesanpezeshki L, Venkatachalam V, Pehlevan C*, Zhen M,* Samuel ADT.* (2023). **Functional imaging and quantification of multi-neuronal olfactory responses in *C. elegans*.** *Science Advances* 9, eade1249.

Lu Y, Ahamed T, Mulcahy B, Witvliet D, Guan SA, Hung W, Meng J, Wen Q, Samuel ADT, Zhen M.* (2022). **Extrasynaptic signaling enables an asymmetric juvenile motor circuit to produce a symmetric gait.** *Current Biology* 32: 4631–4644.

Susoy V, Hung W, Witvliet D, Whitener JE, Wu M, Graham BJ, Zhen M, Venkatachalam V, Samuel ADT. (2021). **Natural sensory context drives diverse brain-wide activity during *C. elegans* mating.** *Cell* 184(20): 5122-5137.e17. PMID: 34534446

Ji N, Venkatachalam V, Rodgers H, Hung W, Kawano T, Clark C, Lim M, Alkema MJ*, Zhen M*, Samuel ADT*. (2021). **Corollary discharge promotes a sustained motor state in a neural circuit for navigation.** *eLife* 2021;10:e68848. PMID: 33880993

Chen L, Liu Y, Su P, Hung W, Li H, Wang Y, Yue Z, Ge M, Wu Z, Zhang Y, Fei P, Chen L, Tao L, Mao H, Zhen M, Gao S. (2021). **Escape Steering by Cholecystokinin Peptidergic Signaling.** *Cell Reports* 38(6): 110330. PMID: 35139370.

Yuan W, Zhang X, Qi X, Hung W, Florman J, Huo J, Xu T, Xie Y, Alkema M, Zhen M, Wen Q. (2020). **Flexible motor sequence generation during stereotyped escape responses.** *eLife* 2020;9:e56942/ PMID: 32501216. PMCID: PMC7338056.

Ao Y, Zeng K, Yu B, Miao Y, Hung W, Zhen M, Yang X, Zhang Y, Gao S. (2019). **An Upconversion Nanoparticle Enables Near Infrared-Optogenetic Manipulation of the *C. elegans* Motor Circuit.** *ACS Nano* 13(3): 3373-3386. PMID: 30681836.

Wen Q*, Gao S*, Zhen M*. (2018). ***C. elegans* excitatory ventral cord motor neurons derive rhythm for body undulation.** *Phil. Trans. R. Soc. B.* 373(1758). PMID: 30201835.

Xu T, Huo J, Shao S, Po M, Kawano T, Lu Y, Qu M, Zhen M, Wen Q. (2018). **A descending pathway through electrical coupling facilitates undulatory wave propagation in *C. elegans*.** *PNAS* 115(19): E4493-E4502. PMID: 29686107.

Gao S*, Guan S, Fouad AD, Meng J, Huang Y, Li Y, Alcaire S, Hung W, Kawano T, Lu Y, Qi YB, Jin Y, Alkema M, Fang-Yen C, Zhen M*. (2018). **Excitatory Motor Neurons are Local Oscillators for Reverse Locomotion.** *eLife* 6:e299915. PMID: 29360035.

Lim MA*, Chitturi J, Laskova V, Meng, J, Findeis D, Wiekenbert A, Mulcahy B, Luo L, Li Y, Lu Y, Hung W, Qu Y, Ho C, Holmyard D, McWhirter R, Ni J, Samuel ADT, Miller DM, Schnabel R, Calarco JA, Zhen M*. (2016). **Neuroendocrine modulation sustains the *C. elegans* forward motor state.** *eLife*. e19887, 2016. PMID: 27855782. PMCID: PMC5120884.

Venkatachalam V*, Ji N, Wang X, Clark C, Mitchell JK, Klein M, Tabone CJ, Florman J, Ji H, Greenwood J, Chisholm AD, Srinivasan J, Alkema M*, Zhen M*, Samuel ADT*. (2016). **Pan-neuronal imaging in roaming *Caenorhabditis elegans***. *PNAS* 113(8): E1082-8. PMID: 26711989. PMCID: PMC4776525.

Ardeshiri R, Mulcahy B, Zhen M, Rezai P. (2016). **A Hybrid Microfluidic Device for On-demand Orientation and Multidirectional Imaging of *C. elegans* Organs and Neurons**. *Biomicrofluidics* 10(6): 064111. eCollection 2016. PMID: 27990213. PMCID: PMC5135714.

Zhen M* and Samuel ADT.* (2015). ***C. elegans* locomotion: small circuits, complex functions**. *Curr Opin Neurobiol.* 33:117-126. PMID: 25845627.

Wen Q, Po MD, Hulme E, Chen S, Liu X, Kowk SW, Gershow M, Leifer AM, Butler V, Fang-Yen C, Kawano T, Schafer WR, Whitesides G, Wyart M, Chklovskii DB, Zhen M, Samuel, ADT. (2012). **Proprioceptive coupling within motor neurons drives *C. elegans* forward locomotion**. *Neuron* 76(4): 750-761. PMID: 23177960.

Kawano T, Po MD, Gao S, Leung G, Ryu WS, Zhen M*. (2011). **An Imbalancing Act: Gap Junctions Reduce the Backward Motor Circuit Activity to Bias *C. elegans* for Forward Locomotion**. *Neuron* 72(4): 572-586. PMID: 22099460.

Gao S and Zhen M.* (2011). **Action potentials drive body wall muscle contractions in *Caenorhabditis elegans***. *PNAS* 108(6): 2557-2562. PMID: 21248227.

Liewald JF, Brauner M, Stephens GJ, Bouhours M, Schultheis C, Zhen M, Gottschalk A. (2008). **Optogenetic analysis of synaptic function**. *Nature Methods* 5(10): 895-902. PMID: 18794862.

Neuronal Excitability

Gao S*, Xie L, Kawano T, Po MD, Pirri J, Guan S, Alkema M, Zhen M*. (2015). **The NCA sodium leak channel is required for persistent motor circuit activity that sustains locomotion**. *Nature Communications* 6 (6323). PMID: 25716181.

Qi Y, Po MD, Mac P, Kawano T, Jorgensen EM, Zhen M, Jin Y. (2013). **Hyperactivation of B-type motor neurons results in aberrant synchrony of the *C. elegans* motor circuit**. *Journal of Neuroscience* 33(12): 5319-5325. PMID: 23516296.

Xie L, Gao S, Alcaire SM, Aoyagi K, Wang Y, Griffin JK, Stagljar I, Nagamatsu S, Zhen M*. (2013). **NLF-1 Delivers a Sodium Leak Channel to Regulate Neuronal Excitability and Modulate Rhythmic Locomotion**. *Neuron* 77(6): 1069-1082. PMID: 23522043.

Bouhours M, Po MD, Gao S, Hung W, Li H, Georgiou J, Roder JC, Zhen M*. (2011). **A Co-operative Regulation of Neuronal Excitability by UNC-7 Innexin and NCA/NALCN Leak Channel**. *Molecular Brain* 4:16. PMID: 21489288.

Sancar F, Touroutine D, Gao S, Oh HJ, Gendrel M, Bessereau JL, Kim H, Zhen M, Richmond JE. (2011). **The dystrophin-associated protein complex maintains muscle excitability by regulating Ca(2+)-dependent K(+) (BK) channel localization**. *Journal of Biological Chemistry* 286(38): 33501-10. PMID: 21795674.

Yeh E, Ng S, Zhang M, Bouhours M, Wang Y, Wang M, Hung W, Aoyagi K, Melnik-Martine, K, Li M, Liu F, Schafer WR, Zhen M*. (2008). **A putative cation channel, NCA-1, and a novel protein, UNC-80, transmit neuronal activity in *C. elegans*.** *PLoS Biology* 6(3) e55. PMID: 18336069.

Neural Development and Synaptic Transmission

Wu S, Li Y, Roy C, Wang Y, Mulcahy B, William Li, Calarco J, Hung W*, Zhen M*. (2023). **Two Muscle-Specific and Direct Transcriptional Targets of DAF-16/FOXO Activated by Reduced Insulin/IGF-1 Signaling.** Submitted, *bioRxiv* 2022.12.09.519372

Tien C, Yu B, Huang M, Stepien K, Sugita K, Xie X, Han L, Monnier P, Zhen M, Rizo J, Gao S, Sugita S. (2020). **Open syntaxin overcomes synaptic transmission defects in diverse *C. elegans* exocytosis mutants.** *Nature Communications* 11(5516). PMID: 33139696.

Huang YC, Pirri JK, Rayes D, Gao S, Mulcahy B, Grant J, Saheki Y, Francis MM, Zhen M, Alkema AJ. (2020). **Gain-of-function mutations in the UNC-2/CaV2 α channel lead to hyperactivity and excitation-dominant synaptic transmission in *Caenorhabditis elegans*** *eLife* 2019; 8:e45905. PMID: 31364988.

Park S, Bin NR, Yu B, et al. Feng ZP, Monnier P, Sun HS, Zhen M, Gao S, Rizo J, Sugita S. (2017). **UNC-18 and Tomosyn antagonistically control synaptic vesicle priming downstream of UNC-13 in *C. elegans*.** *J Neurosci.* 37(36): 8797-8815. PMID: 28821673.

Opperman KJ, Mulcahy B, Giles AC, Risley M, Birnbaum RL, Tulgren ED, Dawson-Scully K, Zhen M, Grill B. (2017). **The HECT family ubiquitin ligase EEL-1 regulates neuronal function and development.** *Cell Reports* 19: 822-835. PMID: 28445732.

Meng J, Ma X, Tao H, JPin X, Witvliet D, Zhu M, Dong M, Zhen M, Jin Y, Qi YB. (2017). **Myrf ER-Bound Transcription Factors Drive *C. elegans* Synaptic Plasticity via Cleavage-Dependent Nuclear Translocation.** *Developmental Cell* 41: 180-194. PMID: 28441531.

Park S, Bin NR, Michael Rajah M, Kim B, Chou TC, Kang SY, Sugita K, Parsaud L, Smith M, Monnier PP, Ikura M, Zhen M, Sugita S. (2015). **Conformational states of syntaxin-1 govern the necessity of N-peptide binding in exocytosis of PC12 cells and *Caenorhabditis elegans*.** *Mol Biol Cell* 27(4): 669-85. PMID: 26700321. PMCID: PMC4750926.

Maro GS, Gao S, Olechwier AM, Hung WL, Liu M, Özkan E, Zhen M,* Shen K* (2015). **MADD-4/Punctin and Neurexin Organize the *C. elegans* GABAergic Postsynapses through Neuroligin.** *Neuron* 86: 1420-1432. PMID: 26028574.

Wang J, Chitturi, J, Ge Q, Laskova V, Li X, Ding M, Zhen M,* Huang X*. (2015). **The *C. elegans* COE Transcription Factor UNC-3 Activates Lineage-Specific Apoptosis and Affects Neurite Growth.** *Development* 142(8): 1447-57. PMID: 25790851.

Norris AD, Gao S, Norris ML, Ray D, Ramani AK, Fraser AG, Morris Q, Hughes TR, Zhen M*, Calarco, JA*. (2014). **A Pair of RNA-Binding Proteins Controls Networks of Splicing Events Contributing to Specialization of Neural Cell Types.** *Molecular Cell* 54(6): 946-59. PMID: 24910101.

Hung WL, Hwang, C, Gao S, Liao EH, Chitturi J, Wang Y, Li H, Stigloher C, Bessereau JL, Zhen M.* (2013). **Attenuation of Insulin Signaling Contributes to FSN-1-mediated Regulation of Synapse Development.** *EMBO J.* 32(12): 1745-1760. PMID: 23665919.

Najarro EH, Wong L, Zhen M, Carpio EP, Goncharov A, Garriga G, Lundquist EA, Jin Y, Ackley BD. (2012). ***C. elegans* Flamingo Cadherin FMI-1 Regulates GABAergic Neuronal Development.** *Journal of Neuroscience* 32(12): 4196-211. PMID: 22442082.

Po MD*, Calarco JA*, Zhen M*. (2012). **Releasing the inner inhibition for axon regeneration.** *Neuron* 73(2): 207-9. PMID: 22284174.

Stigloher C, Zhan H, Zhen M, Richmond J, Bessereau JL. (2011). **The presynaptic dense projection of the *Caenorhabditis elegans* cholinergic neuromuscular junction localizes synaptic vesicles at the active zone through SYD-2/liprin and UNC-10/RIM-dependent interactions.** *Journal of Neuroscience* 31(12): 4388-4396. PMID: 21430140.

Kim JS*, Hung W, Zhen M*. (2010). **The Long and the Short of SAD-1 Kinase.** *Communicative and Integrative Biology* 3(3): 1-5. PMID: 20714407.

Po MD, Hwang C, Zhen M*. (2010). **PHRs: bridging axon guidance, outgrowth and synapse development.** *Current Opinion in Neurobiology* 20(1): 100-7. PMID: 20079626.

Kim JSM, Hung W, Narbonne P, Roy R, Zhen M*. (2010). ***C. elegans* STRADa and SAD Cooperatively Regulate Neuronal Polarity and Synaptic Organization.** *Development* 137(1): 93-102. PMID: 20023164.

Yeh E, Kawano T, Ng S, Fetter R, Hung W, Wang Y, Zhen M*. (2009). ***C. elegans* Innexins Regulate Active Zone Differentiation.** *Journal of Neuroscience* 29(16): 5207-17. PMID: 19386917.

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Kim JS, Lilley BN, Zhang C, Shokat KM, Sanes JR, Zhen M*. (2008). **A chemical-genetic strategy reveals distinct temporal requirements for SAD-1 kinase in neuronal polarization and synapse formation.** *Neural Development* 3(1): 23. PMID: 18808695.

Li C, Inglis PN, Leitch CC, Efimenko E, Zaghoul NA, Mok CA, Davis EE, Bialas N, Healey MP, Heon E, Zhen M, Swoboda P, Katsanis N, Leroux MR. (2008). **An Essential role for DYF-11/MIP-T3 in assembling functional intraflagellar transport complexes.** *PLoS Genetics* 4(3): e1000044. PMID: 18369462.

Wang W, Bouhours M, Gracheva EO, Liao EH, Xu K, Sengar A, Xin X, Roder J, Boone C, Richmond JE, Zhen M and Egan SE. (2008). **ITSN-1 Controls Vesicle Recycling at the Neuromuscular Junction and Functions in Parallel with DAB-1.** *Traffic* 9(5): 742-54. PMID: 18298590.

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Hung W, Hwang C, Po MD, Zhen M*. (2007). **Neuronal polarity is regulated by a direct interaction between a scaffolding protein, Neurabin, and a presynaptic SAD-1 kinase in *Caenorhabditis elegans*.** *Development* 134(2): 237-249. PMID: 17151015.

Patel MR, Lehrman EK, Poon VY, Crump JG, Zhen M, Bargmann CI, Shen K. (2006). **Hierarchical assembly of presynaptic components in defined *C. elegans* synapses.** *Nature Neuroscience* 9(12):

1488-1498. PMID: 17115039.

Wang Y, Gracheva EO, Richmond J, Kawano T, Couto JM, Calarco JA, Vijayarajnam V, Jin Y, Zhen M*. (2006). **The C2H2 zinc-finger protein SYD-9 is a putative post-transcriptional regulator for synaptic transmission.** *PNAS* 103(27): 10450-10455. PMID: 16803962.

Zhen M. (2006). **Presynaptic terminal differentiation.** In *Protein Trafficking in Neurons.* (A.J. Bean, Ed.) London: Elsevier Academic Press. Pages 75-96.

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Liao EH, Hung W, Abrams B, Zhen M*. (2004). **An SCF-like ubiquitin ligase complex that controls presynaptic differentiation.** *Nature* 430 (6997): 345-50. PMID: 15208641.

Zhen M.* and Jin. Y.* (2004). **Presynaptic terminal differentiation: transport and assembly.** *Current Opinion in Neurobiology* 14(3): 280-7. PMID: 15194107.

Crump JG, Zhen M, Jin Y, Bargmann CI. (2001). **The SAD-1 kinase regulates presynaptic vesicle clustering and axon termination.** *Neuron* 29(1): 115-29. PMID: 11182085.

Zhen M, Huang X, Bamber B, Jin Y. (2000). **Regulation of presynaptic terminal organization by *C. elegans* RPM-1, a putative guanine nucleotide exchanger with a Ring-H2 finger domain.** *Neuron* 26(2): 331-43. PMID: 10839353.

Zhen M, and Jin Y. (1999). **The liprin protein SYD-2 regulates the differentiation of presynaptic termini in *C. elegans*.** *Nature* 401(6751): 371-5. PMID: 10517634.

Methods (Light Microscopy)

Dong XK, Kheiri K, Lu YN, Xu ZY, Zhen M, Liu XY. (2021). **Towards a live soft microrobot: optogenetic locomotion control of *Caenorhabditis elegans*.** *Science Robotics* 6(55): eabe3950. PMID: 34193562.

Wang Z, Zhu L, Zhang H, Li G, Li C, Yi L, Yang Y, Ding Y, Zhen M, Gao S, Hsiai T, Fei P. (2021). **Real-time volumetric reconstruction of biological dynamics with light-field microscopy and deep learning.** *Nature Methods.* 18: 551-556. PMID: 33574612.

Zhao F, Yang Y, Li Y, Jiang H, Xie X, Yu T, Wang X, Liu Q, Zhang H, Jia H, Liu S, Zhen M, Zhu D, Gao S, Fei P. (2020). **Efficient and cost-effective 3D cellular imaging by sub-voxel-resolving light-sheet add-on microscopy.** *J. Biophotonics* 13(6):e201960243. PMID: 32077244.

Luyben TT, Rai J, Li H, Georgiou J, Avila A, Zhen M, Collingridge GL, Tominaga T, Okamoto K. (2020). **Optogenetic manipulation of postsynaptic cAMP using a novel transgenic mouse line enables synaptic plasticity and enhanced depolarization in the hippocampal dentate gyrus.** *Frontiers in Neural Circuits* 14, No. 24. PMID: 32581725. PMCID: PMC7283606.

Diseases and Stem Cells

Varga BV, Faiz M, Yang H, Pivonkova H, Gao S, Khelifi G, Linderoth E, Zhen M, Hussein SM, Nagy A. (2022). **Signal requirement for cortical potential of transplantable human neuroepithelial stem cells.** *Nature Communications* 13(2844). PMID:35606347.

Markert SM, Skoruppa M, Yu B, Mulcahy B, Zhen M, Gao S, Sendtner M, and Stigloher C. (2020). **Overexpression of an ALS-associated FUS mutation in *C. elegans* disrupts NMJ morphology and leads to defective neuromuscular transmission.** *Biology Open* 9(12):bio055129. PMID: 33148607

Bakooshli MA, Lippmann ES, Mulcahy B, Tung K, Pegoraro E, Ahn H, Ginsberg H, Zhen M, Ashton R, Gilbert PM. (2019). **A 3D model of human skeletal muscle innervated with stem cell-derived motor neurons enables epsilon-subunit targeted Myashtenic Syndrome studies.** *eLife* 2019;8:e4453. PMID: 31084710

Chitturi J, Hung W, Abdel Rahman AM, Lim MA, Calarco JA, Baran R, Huang X, Dennis J, Zhen M.* (2018). **The UBR-1 ubiquitin ligase regulates glutamate metabolism to generate coordinated motor patters in *Caenorhabditis elegans*.** *PLoS Genetics* 14(4): e1007303. PMID: 29649217.

Murakami T, Qamar S, Lin JQ, Schierle GS, Rees E, Miyashita A, Costa AR, Dodd RB, Chan FT, Michel CH, Kronenberg-Versteeg D, Li Y, Yang SP, Wakutani Y, Meadows W, Ferry RR, Dong L, Tartaglia GG, Favrin G, Lin WL, Dickson DW, Zhen M, Ron D, Schmitt-Ulms G, Fraser P, Shneider NA, Holt C, Vendruscolo M, Kaminski CF, St George-Hyslop P. (2015). **ALS/FUS mutations induce irreversible hydrogel-like assemblies that impede RNP granule function.** *Neuron* 88: 678-90. PMID: 26526393.

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