Yifei Cai

Education

2013–2018 **Ph.D. in Biochemistry and Molecular Biology**, *Peking University*, China.
Thesis: Decoding competing endogenous RNA regulatory mechanisms in Alzheimer's disease.

2009–2013 **B.S. in Pharmacy**, *Guangzhou University of Chinese Medicine*, China.

Professional Appointments

2023–Present **Associate Research Scientist**, *School of Medicine*, Yale University, New Haven, CT.
Advisor: Jaime Grutzendler.
- Established antisense oligonucleotide (ASO)-mediated human iPSC screening platform for axonal pathology in Alzheimer's disease.
- Uncovered cell-type-specific proteomes in human brains.
- Revealed heterogeneity of subcellular proteomes of phosphorylated Tau species in sporadic Alzheimer's disease humans and aged non-human primates.

2024 **EMBL CPP Fellow**, *European Bioinformatics Institute*, EMBL, Cambridgeshire, UK.
Advisor: Evangelia Petsalaki.
- Developed a novel computation approach for multiomics integration to uncover cell-cell communication at the myelin-axon interface.

2018–2023 **Postdoctoral Associate**, *School of Medicine*, Yale University, New Haven, CT.
Advisor: Jaime Grutzendler.
- Developed antibody-based subcellular proximity labeling proteomics in human postmortem brains and mice.
- Established a human iPSC model to recapitulate amyloid plaque and axonal pathology in Alzheimer's disease.
- Uncovered molecular architecture and novel mechanisms of axonal pathology in Alzheimer's disease using subcellular proteomics and iPSC modeling.
- Revealed myelin-axon interface disruption and interactome in Alzheimer's disease humans and mice using advanced imaging and subcellular proteomics.
- Intravital two photon imaging of astrocyte apoptosis and microglia mRNA location translation.

2013–2018 **Graduate Researcher**, *Health Science Center*, Peking University, Beijing, China.
Advisors: Jun Wan and Zhenguo Wu.
- Decoded non-coding RNA-mRNA regulatory mechanism in Alzheimer's disease.
- Deciphered autism-associated *de novo* mutations and SAM domain on EphB2 in neurodevelopment.

2016–2017 **Graduate Visiting Scholar**, *Columbia University Medical Center*, New York, NY.
Advisor: Joseph A. Gogos
- Generation and analysis schizophrenia risk gene SETD1A-deficient human neurons.
- Illustrated correlation between Setd1a direct targets and schizophrenia GWAS signals with bioinformatics approaches.

2016 **Graduate Visiting Scholar**, University of Connecticut, Farmington, CT.
Advisor: Kepeng Wang
- Characterizing signaling transduction of EphB2 SAM domain in neurons.

2011–2013 **Undergraduate Researcher**, Guangzhou University of Chinese Medicine, China.
Advisor: Xing Zeng
- Identified correlations between genetic polymorphism of Cytochrome 450s and adverse drug events.

Publications

See also Google Scholar. ∗ Equal contribution; † Corresponding author.

1. **Y. Cai**†, I.P. Sousa*, M. Slobodyanyuk*, F. Chen*, T. Huynh, P. Tang, L. Fuentes, A. Braker, R. Welch, A. Huttner, L. Tong, P. Yuan, T.T. Lam, A.C. Nairn, E. Petsalaki, J. Reimand, J. Grutzendler†. Myelin–axon interface vulnerability in Alzheimer's disease revealed by subcellular proteomics and imaging of human and mouse brain. (2025) *Nature Neuroscience*. doi: 10.1038/s41593-025-01973-8.
2. **Y. Cai**†, J. Kanyo, R. Wilson, S. Bathla, P. Cardozo, L. Tong, S. Qin, L.A. Fuentes, I.Pinheiro-de-Sousa, T. Huynh, L. Sun, M. Mohammad, Z. Tian, H. Gan, A. Braker, K. Trinh, A. Huttner, T. T. Lam, E. Petsalaki, K. J. Brennand, A.C. Nairn, J. Grutzendler†. Subcellular proteomics and iPSC modeling uncover reversible mechanisms of axonal pathology in Alzheimer's disease. (2025) *Nature Aging*. doi: 10.1038/s43587-025-00823-3.
3. P. Yuan, M. Zhang, L. Tong, T.M. Morse, R.A. McDougal, H. Ding, D. Chan, **Y. Cai**, J. Grutzendler. PLD3 affects axonal spheroids and network defects in Alzheimer's disease. *Nature*. 612, 328–337 (2022).
4. J. Mukai, E. Canavo, Z. Sun, A. Diamantopoulou, P. Thakur, C. Chang, **Y. Cai**, S. Lomvardas, A. Takata, B. Xu, J.A. Gogos. Recapitulation and reversal of schizophrenia-related phenotypes in Setd1a-deficient mice. *Neuron*. 104 (3): 471-487 (2019).
5. J. Guo, **Y. Cai**, X. Ye, N. Ma, Y. Wang, B. Yu, J. Wan. Regulation of neurite outgrowth by miR-409-5p is involved in Alzheimer's disease development. *Front. Neurosci.* 13, 2164 (2019).
6. **Y. Cai**, J. Wan. Competing endogenous RNA regulations in neurodegenerative disorders: current challenges and emerging insights. *Front. Mol. Neurosci.* 11, 370 (2018).
7. **Y. Cai**, Z. Sun, H. Jia, H. Luo, X. Ye, Q. Wu, X. Yi, W. Zhang, J. Wan. Rpph1 upregulates CDC42 expression and promotes hippocampal neuron dendritic spine formation by competing with miR-330-5p. *Front. Mol. Neurosci*. 10, 27 (2017).
8. **Y. Cai***, Z. Liang*, T. He, G. Zhang, J. Huang, X. Zeng. Augmenting LASSO regression with decision tree for identifying the correlation of genetic polymorphism and adverse events. *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, 355-360 (2013).

Grants and Awards (Selected)

2025-2026 **Carol and Gene Ludwig Program for the Study of Neuroimmune Interactions in Dementia Pilot Project Award** ($100,000 USD)
Principle Investigator
Investigate the role of complement pathway in axonal pathology in Alzheimer's disease

2024-2025 **Yale ADRC Development Project Grant** ($75,000 USD)
Co-Principle Investigator
Subcellular proteomics of pT217-tau in sporadic Alzheimer's disease

2023-2024 **European Molecular Biology Laboratory Corporate Partnership Programme Fellowship** (2,000 Euro)
Principle Investigator
Cell-cell communication analysis of different brain cell types in Alzheimer's disease brain and health

2023–2024 **Yale/NIDA Neuroproteomics Center Pilot Project Grant** ($20,000 USD)
Principle Investigator
Cell-type-specific human brain proteomics by immunopanning and antibody-based proximity labeling.

2023–2026 **Alzheimer's Association International Research Fellowship** ($200,000 USD)
Principle Investigator
Uncovering mechanisms of axonal pathology in Alzheimer's disease.

2022–2023 **Yale ADRC Research Scholar Award** ($30,000 USD)
Principle Investigator
Molecular mechanisms of axonal pathology in Alzheimer's disease human neurons.

2021–2023 **BrightFocus Postdoctoral Fellowship in Alzheimer's Disease** ($200,000 USD)
Principle Investigator
Molecular mechanisms of axonal pathology in Alzheimer's disease.

2019–2021 **Yale/NIDA Neuroproteomics Center Pilot Project Grant** ($20,000 USD)
Principle Investigator
Proteomic screening of neuronal and glial subcellular compartments isolated by proximity labeling and FACS in fixed and fresh brain samples.

2025 AAIC Conference Fellowship, *Alzheimer's Association*.

2018 IBRO International Travel Grant, *International Brain Research Organization*.

2018 Excellent Graduate of Beijing, *Committee of Education of Beijing, China*.

2018 Excellent Graduate of Peking University, *Peking University*, Beijing, China.

2017 Exceptional Award of Academic Innovation, *Peking University*, Beijing, China.

2010 National Scholarship, *Ministry of Education of China*.

2008 Volunteer Service Advanced Individual, *Guangzhou Volunteer Association*, China.

Talks and Seminars (Selected)

May 2026 Glial Club Seminar. *Uncovering mechanisms of axon-myelin vulnerability in Alzheimer's disease*, (virtual, **invited**).

Jul 2025 Alzheimer's Association International Conference. *Vulnerability of the Myelin-Axon Interface Uncovered by Subcellular Proteomics and Imaging of Alzheimer's Human Brain*, Toronto, Canada (**invited, co-chaired the Integrative omics studies unravels pathomechanisms in Alzheimer'sdisease and related dementia section**).

Jun 2025 Cytoskeleton of Neurons and Glia Seminar series. *Uncovering mechanisms of axon-myelin vulnerability in Alzheimer's disease*, (virtual, **invited**)..

May 2025 Center for Neuroimmunology and Glia Biology, The University of Texas Health Science Center at Houston. *Uncovering mechanisms of axon-myelin vulnerability in Alzheimer's disease*, Houston, TX (**invited**).

Apr 2025 Department of Neurobiology and Behavior, University of California, Irvine. *Uncovering mechanisms of axon-myelin vulnerability in Alzheimer's disease*, Irvine, CA (**invited**).

Feb 2025 Department of Biochemistry and Immunology, Institute of Biological Sciences, Federal University of Minas Gerais. *Uncovering the molecular and cellular mechanisms of myelin-axon pathology in Alzheimer's disease human brain*, Belo Horizonte, Brazil (virtual, **invited**).

Feb 2025 Byrd Alzheimer's Center and Research Institute, University of South Florida. *Uncovering axon-myelin vulnerability in the Alzheimer's disease human brain*, Tempa, FL (**invited**).

May 2024 Yale/NIDA Neuroproteomics Center External Advisory Board Meeting. *Antibody-based Proximity Labeling for Cell Type-specific and Subcellular Proteomics in Human Brain*, (virtual, **invited**).

Apr 2024 Yale/NIDA Neuroproteomics Center Research in Progress Seminar. *Antibody-based Proximity Labeling for Cell Type-specific and Subcellular Proteomics in Human Brain*, (virtual, **invited**).

Mar 2024 Gordon Research Conference on Myelin. *Myelin-axon disruption reveal by subcellular proteomics and imaging in Alzheimer's human brains*, Ventura, CA (**invited**).

Sept 2023 Yale Alzheimer's Disease Research Center Seminar. *Subcellular proteomics and iPSC modeling to study axon and myelin pathology in Alzheimer's human brain*, (virtual, **invited**).

Jun 2023 Evangelia Petsalaki group at European Bioinformatics Institute. *Myelin-axon disruption reveal by subcellular proteomics and imaging in Alzheimer's human brains*, Cambridgeshire, UK (virtual, **invited**).

Jul 2022 Gordon Research Seminar on Molecular and Cellular Neurobiology. *Spatial proteomics and iPSC modeling uncover mechanisms of axonal pathology in Alzheimer's disease*, Ventura, CA (**invited**).

May 2022 Yale Interdepartmental Neuroscience Research In Progress. *Spatial proteomics and iPSC modeling uncover mechanisms of axonal pathology in Alzheimer's disease*, New Haven, CT.

Mar 2019 Yale Brain Bee. *Diving into the difference cell types of the brain*, New Haven, CT.

Jan 2018 Yale University. Decoding competing endogenous RNA,*regulatory mechanism in Alzheimer's disease*, New Haven, CT (virtual, **invited**).

Aug 2017 Stanford University. *Regulatory RNA and application: decoding genetic, molecular and cellular mechanism in neural disorders*, Palo Alto, CA (**invited**).

Aug 2017 Brown University. *Regulatory RNA and application: decoding genetic, molecular and cellular mechanism in neural disorders*, Providence, RI (**invited**).

Jul 2017 Kalina Hristova Lab at Johns Hopkins University. *Molecular mechanism of autism-associated de novo mutations and SAM domain on EphB2 in neurodevelopment*, Baltimore, MD (**invited**).

Mar 2014 IIAS-PKU Workshop on: Strategies and Design Principles of the Complex Cellular System. *Decision-making strategies in axon guidance*, Hebrew University of Jerusalem, Israel.

Teaching and Mentoring

Advisor

2019 - Pres Mentored 4 Yale University undergraduate students in neurodegeneration research and thesis work. Two of them were awarded fellowships under my mentorship.

2021 - Pres Mentored 3 Yale University postgraduate students in neurodegeneration research. Two of them were accepted into PhD programs under my mentorship.

2020 - 2023 Mentored 2 Yale University Interdepartment Neuroscience Program graduate students and 1 visiting MD student in neurodegeneration research.

2020 - 2021 Mentored 1 Yale University visiting undergraduate student, who was awarded a fellowship under my mentorship.

2016 - 2017 Mentored 1 Columbia University visiting MD student in neuroscience research.

Teaching Training

2020 - 2021 Certificate of College Teaching Preparation, Yale University Center for Teaching and Learning

2021 - 2022 University Teaching, University of Hong Kong (Coursera, online)

Teaching Assistant

2015 - 2017 Biochemistry and Molecular Biology Lab Course, Peking University Health Science Center

Professional Service and Outreach

Peer-review service

2018 - Pres Reviewed for *Nature, Cell, Nature Neuroscience, Science Translational Medicine, Cell Report, eLife*; Ad hoc reviewer for *npj Dementia*, *Biomedicine* and *pharmacotherapy, Journal of Food Biochemistry and Biological Science Research*.

Neuroscience Education Outreach

2023 - 2024 Speaker: *Walk to End Alzheimer's*, awardee class 2023.

2023 - 2024 Speaker: *Alzheimer's Association funded research showcase*, awardee class 2023.

2021 - 2024 Instructor: *Yale Brain Education Day*.

2019 Speaker: *Yale Brain Bee, invited*.

University Contribution

2022 - 2023 Postdoc board member, *Women in Science at Yale*.

2021 - 2022 Committee member, *Yale Neuroscience Postdoc Committee.*

2021 - 2022 Member, *Wu Tsai Institute at Yale Graduate Student and Postdoc committee.*

2019 Panelist: *Early Career Professional Lunch Panel of Asian Network at Yale.*