

## Ranjie Xu, Ph.D.

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### Professional experience

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- 2022.08 – present      Assistant Professor, Department of Basic Medical Sciences,  
Purdue University, USA
- 2017.07 – 2022.04      Postdoctoral Associate, Department of Cell Biology and Neuroscience,  
Rutgers University, USA
- 2016.07 – 2017.06      Postdoctoral Research Associate, Department of Developmental Neuroscience,  
University of Nebraska Medical Center, USA

### Education

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- 2009.09 -2015.04      Ph.D. in Neuroscience; University of Science and Technology of China, P.R. China
- 2005.09-2009.07      B.A. in Biotechnology; Anhui Normal University, P.R. China

### Publications (\*Indicates the corresponding author)

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- Ji, Y., Chen, X., Joseph, M.C., McLean, J.L., Yang, Y., Yuan, C., Rochet, J.C., Liu, Fei., and **Xu, R\***. (2024). Alzheimer's disease patient brain extracts induce multiple pathologies in vascularized neuroimmune organoids for disease modeling and drug discovery. (*Molecular Psychiatry*, minor revision; a patent application in progress)  
*bioRxiv* link <https://www.biorxiv.org/content/10.1101/2024.10.28.620680v1>
- Ji, Y., McLean, J.L., and **Xu, R\***. (2024). Emerging Human PSC-based Human-Animal Brain Chimeras for Advancing Disease Modeling and Cell Therapy for Neurological Disorders. *Neuroscience Bulletin* 1-18.
- Que Z, Olivero-Acosta MI, Chen I, Zhang J, Wettschurack K, Wu J, Xiao T,... Rochet JC, **Xu R**, Brewster AL, Wu LJ, Yuan C, Skarnes WC, Yang Y. (2024). Human iPSC-derived microglia sense and dampen hyperexcitability of cortical neurons carrying the epilepsy-associated SCN2A-L1342P mutation. *Molecular Psychiatry* 1-14
- Wu, J., Zhang, J., ... Chen, X. **Xu, R\***, Yang, Y. (2023). Microglial over-pruning of synapses during development in autism-associated SCN2A-deficient mice and human cerebral organoids. *bioRxiv*
- Wang, L., Mirabella, V. R., Dai, R., Su, X., **Xu, R.**, Jadali, A., . . . Tian, J. J. M. P. (2022). Analyses of the autism-associated neuroligin-3 R451C mutation in human neurons reveal a gain-of-function synaptic mechanism. *Molecular Psychiatry* 1-16.
- Jin, M., **Xu, R.**, Wang, L., Alam, M.M., Ma, Z., Zhu, S., Martini, A.C., Jadali, A., Bernabucci, M., Xie, P., Kwan, K., Pang, Z.P., Head, E., Liu, Y., Hart, R.P., Jiang, P. (2022). Type-I-interferon signaling

drives microglial dysfunction and senescence in human iPSC models of Down syndrome and Alzheimer's disease. *Cell Stem Cell* 29 (7), 1135-1153. e8

- **Xu, R.**, Boreland, A.J., Li, X., Erickson, C., Jin, M., Atkins, C., Pang, Z.P., Daniels, B.P., and Jiang, P\*. (2021). Developing human pluripotent stem cell-based cerebral organoids with a controllable microglia ratio for modeling brain development and pathology. *Stem Cell Reports* 16, 1923-1937. [https://www.cell.com/stem-cell-reports/fulltext/S2213-6711\(21\)00317-9](https://www.cell.com/stem-cell-reports/fulltext/S2213-6711(21)00317-9)
- **Xu, R.**, X, Li., Boreland, A., Posyton, A., Kwan, K., Hart, R.P., and Jiang, P. (2020). Human iPSC-derived mature microglia retain their identity and functionally integrate in the chimeric mouse brain. *Nature Communications* 11 (1), 1-16 <https://www.nature.com/articles/s41467-020-15411-9>
- **Xu, R.**, Brawner, A., Li, S., Kim, H., Xue, H., Pang, Z., Kim, W.-Y., Hart, R., Liu, Y., and Jiang, P. (2019). OLIG2 drives abnormal neurodevelopmental phenotypes in human iPSC-based organoid and chimeric mouse models of Down syndrome. *Cell Stem Cell* 24 (6), 908-926. e8 <https://www.sciencedirect.com/science/article/pii/S1934590919301638?via%3Dihub>
- **Xu, R.**, Hu, Q., Ma, Q., Liu, C., and Wang, G. (2014). The protease Omi regulates mitochondrial biogenesis through the GSK3 $\beta$ /PGC-1 $\alpha$  pathway. *Cell death & disease* 5 (8), e1373 <https://www.nature.com/articles/cddis2014328>
- **Xu, R.**, Hu, Q., and Wang, G. (2015). Mitochondrial biogenesis is involved in neurodegeneration and aging. *Gene and Gene Editing* 1 (2), 103-110
- Jiang, P., Turkalj, L., **Xu, R.** (2020). High-fidelity modeling of human microglia with pluripotent stem cells. *Cell Stem Cell* 26 (5), 629-631
- Kim, H., **Xu, R.**, Ragunathan, P., Dunaevsky, A., Liu, Y., Dreyfus, C., and Jiang, P. (2019). Pluripotent stem cell-derived cerebral organoids reveal human oligodendrogenesis with dorsal and ventral origins. *Stem Cell Reports* 12 (5), 890-905
- Wu, S., **Xu, R.**, Duan, B., and Jiang, P. (2017). Three-dimensional hyaluronic acid hydrogel-based models for in vitro human iPSC-derived NPC culture and differentiation. *Journal of Materials Chemistry B* 5 (21), 3870-3878
- Brawner, A.T., **Xu, R.**, Liu, D., and Jiang, P. (2017). Generating CNS organoids from human induced pluripotent stem cells for modeling neurological disorders. *International journal of physiology, pathophysiology and pharmacology* 9 (3), 101
- Ma, Q., Hu, Q., **Xu, R.**, Zhen, X., and Wang, G. (2015). Protease Omi facilitates neurite outgrowth in mouse neuroblastoma N2a cells by cleaving transcription factor E2F1. *Acta Pharmacologica Sinica* 36 (8), 966
- Zhou, L., Wang, H., Ren, H., Chen, D., Gao, F., Hu, Q., Fu, C., **Xu, R.**, Ying, Z., and Wang, G. (2013). Bcl-2-dependent upregulation of autophagy by sequestosome 1/p62 in vitro. *Acta Pharmacologica Sinica* 34 (5), 651
- Hu, Q., Li, B., **Xu, R.**, Chen, D., Mu, C., Fei, E., and Wang, G. (2012). The protease Omi cleaves the mitogen-activated protein kinase MEK1 to inhibit microglial activation. *Science Signaling*. 5 (238), ra61-ra61
- Li, B., Hu, Q., **Xu, R.**, Ren, H., Fei, E., Chen, D., and Wang, G. (2012). Hax-1 is rapidly degraded by the proteasome-dependent on its PEST sequence. *BMC cell biology* 13 (1), 20

## **Fundings:**

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### Ongoing

1. NIA U01AG088662 (Yuan, PI; Xu, MPI, award: \$3.9 M)  
09/15/2024 to 06/30/2029  
Elucidate Gene-environmental interactions employed by Pb in promoting ADRD in aging brains.
2. NINDS R21NS140907 (Xu, PI)  
09/17/2024 to 08/31/2026  
Develop a human-mouse chimeric brain model for studying tau pathology in human neurons in vivo
3. CTSI Alzheimer's Disease Pre-Clinical Translational Science Grant (Xu, PI)  
09/10/2024 to 08/31/2025  
Engineered human microglial cell therapy for Alzheimer's disease
4. Purdue Institute for Integrative Neuroscience (Xu, PI)  
10/31/2024 to 04/30/2026  
Develop complex brain organoids for modeling neurodegeneration and Alzheimer's disease.
5. CTSI Women Health (Koss, PI; Xu, Co-I)  
12/01/2023 to 11/31/2024  
Sex differences in the timing and severity of cognitive deficits and pathology using the 3xTg mouse model of Alzheimer's disease.

### Completed

1. Showalter Trust (Xu, PI)  
07/01/2023 to 06/30/2024  
Dissecting human microglial function in Alzheimer's disease using human induced pluripotent stem cell (iPSC)-based human microglial models.
2. Purdue Institute for Integrative Neuroscience (Chmielewski, PI; Xu, co-PI)  
10/31/2023 to 10/30/2024  
Accessing Advanced Brain Organoids Using Modular 3D Peptide Materials
3. Purdue Institute for Integrative Neuroscience (Shi, PI; Xu, co-PI)  
10/31/2023 to 10/30/2024  
TBI-on-a-chip: linking blast-induced tissue deformation to biochemical pathologies leading to Alzheimer's disease using human iPSC organoids Materials.
4. Purdue Institute for Integrative Neuroscience (PI; Xu)  
10/01/2022 to 09/31/2023  
Methods for peptide-induced 3D culture formation

## **Professional activities**

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- External reviewer for journals, including Journal of Neuroscience, Cellular and Molecular Life Sciences,

Molecular Brain, Neuroscience Bulletin, JoVE, Aging, Journal of Medical Discovery, Stem Cell Reviews and Reports, Stem Cell Research & Therapy, Frontiers in Aging Neuroscience, etc.

- Ad hoc grant reviewer committees for NIH (Chronic Dysfunction and Integrative Neurodegeneration Study Section), Alzheimer's Association, and CTSI.

### **Teaching and Mentoring:**

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#### Courses Taught

- BMS 53400 System Mammalian Physiology

### **Professional Society Membership:**

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- Society for Neuroscience
- Society to Advance Alzheimer's Research and Treatment (ISTAART)