Stanford

Yang Hu, MD, PhD

Professor of Ophthalmology

Bio

ACADEMIC APPOINTMENTS

- Professor, Ophthalmology
- Member, Bio-X
- Member, SPARK at Stanford
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Douglas Johnson Award for Glaucoma Research, BrightFocus Foundation (2013)
- The Knights Templar Eye Foundation Travel Fellowship Award, The Knights Templar Eye Foundation/ISER (2016)
- William & Mary Greve Special Scholar Award, Research to Prevent Blindness (2018)
- Catalyst for a Cure Research Consortium-3, Glaucoma Research Foundation (2019)
- Stein Innovation Award, Research to Prevent Blindness (2023)

PROFESSIONAL EDUCATION

- Postdoc, Harvard Medical School , Neuroscience (2009)
- Ph.D, Weill Medical College of Cornell University , Neuroscience (2006)
- Residency, Beijing Friendship Hospital , Ophthalmology (1998)
- MD, Beijing Medical University , Medicine (1996)

LINKS

- Hu Lab Site: http://med.stanford.edu/hulab.html

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Regenerative and neuroprotective therapies have long been sought for CNS neurodegenerative diseases but none have been found. That there is no curative neuroprotective or restorative therapy for neurodegeneration is a central challenge for human health. My lab focuses on the mechanisms responsible for neuronal degeneration and axon regeneration after injury or diseases with the goal of building on this understanding to develop effective combined strategies to promote neuroprotection and functional recovery: 1) Through established collaborations with experts in immunology, physiology and cancer, we were the first to demonstrate that axon-injury induced neuronal ER stress is a common mechanism for both RGC soma and axon neurodegeneration. We are currently developing ER stress modulators and AAV-mediated gene therapy strategies for neuroprotection. 2) We are pioneering in the application of AAV-mediated therapies for safer and more

effective treatment of glaucoma and related optic neuropathies. We have identified an RGC-specific promoter for CRISPR/Cas9-based gene therapy in RGCs. We are screening mutated AAV capsid libraries to identify AAVs that can specifically infect RGCs but not other retinal cells and make RGC targeting more precise, including in human tissues. 3) We have recently developed novel inducible mouse and NHP glaucoma models that faithfully replicates a secondary post-operative glaucoma following vitreoretinal surgeries; and a genetic mouse glaucoma model to mimic normal tension glaucoma. 4) Through collaboration with experts in adaptive optics, machine deep learning and genetics, we are developing reliable morphological and functional in vivo readouts of RGCs and illustrating genetic causes of RGC degeneration. 5) Previously, we performed molecular dissection of the PTEN/mTOR pathway in mouse RGCs in vivo and illuminated the mechanisms by which AKT interacts with mTORC1 and mTORC2 and their downstream effectors S6K1, 4E-BP and GSK3# to regulate optic nerve regeneration. We currently use a newly developed tracing method to purify regenerating RGCs and survival but non-regeneration RGCs, by which we identified true axon regeneration-associated genes. In summary, our work emphasizes understanding fundamental molecular mechanisms while maintaining a consistent focus on clinically relevant scenarios and therapies that will allow us to translate lab discoveries into effective vision restoration treatments.

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Fuyun Bian, Xue Feng, Mu Li, Liping Liu, Ming Yang, Yuyang Zeng

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Neurosciences (Phd Program)

Publications

PUBLICATIONS

- **Optineurin-facilitated axonal mitochondria delivery promotes neuroprotection and axon regeneration.** *bioRxiv : the preprint server for biology*
  Liu, D., Webber, H. C., Bian, F., Xu, Y., Prakash, M., Feng, X., Yang, M., Yang, H., You, I., Li, L., Liu, L., Liu, P., Huang, et al
  2024
- **RGC-specific ATF4 and/or CHOP deletion rescues glaucomatous neurodegeneration and visual function.** *Molecular therapy. Nucleic acids*
  Fang, F., Liu, P., Huang, H., Feng, X., Li, L., Sun, Y., Kaufman, R. J., Hu, Y.
  2023; 33: 286-295
- **Osteopontin drives retinal ganglion cell resiliency in glaucomatous optic neuropathy.** *Cell reports*
  Zhao, M., Toma, K., Kinde, B., Li, L., Patel, A. K., Wu, K. Y., Lum, M. R., Tan, C., Hooper, J. E., Kriegstein, A. R., La Torre, A., Liao, Y. J., Welsbie, et al
  2023; 42 (9): 113038
- **Silicone Oil-Induced Ocular Hypertension Glaucoma Model (SOHU) in Rodent and Nonhuman Primate.** *Methods in molecular biology (Clifton, N.J.)*
  Fang, F., Zhang, J., Hu, Y.
  2023; 2708: 57-69
- **Differential effects of SARM1 inhibition in traumatic glaucoma and EAE optic neuropathies.** *Molecular therapy. Nucleic acids*
  Liu, P., Chen, W., Jiang, H., Huang, H., Liu, L., Fang, F., Li, L., Feng, X., Liu, D., Dalal, R., Sun, Y., Jafar-Nejad, P., Ling, et al
  2023; 32: 13-27