Stanford

Mable Lam

Postdoctoral Scholar, Neurosurgery

Bio

BIO

Dr. Mable Lam is a postdoctoral fellow in the laboratory of Dr. Brad Zuchero in the Department of Neurosurgery. She received her PhD from UCSF, where she investigated the cell biology and biochemistry of membrane trafficking in the laboratory of Dr. Peter Walter. These studies motivated her current research to identify membrane trafficking pathways for the formation of myelin, an insulating membrane sheath around axons that accelerates conduction velocity. In the future, she plans to elucidate cellular pathways that drive myelin remodeling during neuroplasticity and myelin regeneration in the context of demyelinating diseases.

STANFORD ADVISORS

- Brad Zuchero, Postdoctoral Faculty Sponsor

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Myelin is required for rapid nerve signaling by insulating axons to accelerate action potential propagation. Myelin-forming cells of the central nervous system, called oligodendrocytes, orchestrate one of the most complex morphological transformations in neurobiology. Each oligodendrocyte can extend multiple processes that selectively wrap axons in tens to hundreds of spiraling membrane layers, forming myelin sheaths that vary in thickness and length. Furthermore, oligodendrocytes can respond to neural activity by adding new sheaths or by changing the geometry of pre-existing sheaths to tune neural circuitry, a process known as adaptive myelination.

What are the membrane trafficking mechanisms that drive adaptive myelination in oligodendrocytes?

How can these mechanisms be stimulated to promote myelin regeneration in disease?

By using transgenic mouse models and primary oligodendrocytes, we have found that SNARE-mediated exocytosis drives membrane addition in myelin sheaths. Current research is focused on how these pathways in oligodendrocytes may be regulated during adaptive myelination.

Publications

PUBLICATIONS

- **CNS myelination requires VAMP2/3-mediated membrane expansion in oligodendrocytes.** *Nature communications*
  Lam, M., Takeo, K., Almeida, R. G., Cooper, M. H., Wu, K., Iyer, M., Kantarci, H., Zuchero, J. B.
  2022; 13 (1): 5583
- **pHusion: A robust and versatile toolset for automated detection and analysis of exocytosis.** *Journal of cell science*
  O'Shaughnessy, E. C., Lam, M., Ryken, S. E., Wiesner, T., Lukasik, K., Zuchero, J. B., Leterrier, C., Adalsteinsson, D., Gupton, S. L.

2024

- **SRF transcriptionally regulates the oligodendrocyte cytoskeleton during CNS myelination.** *Proceedings of the National Academy of Sciences of the United States of America*
  Iram, T., Garcia, M. A., Amand, J., Kaur, A., Atkins, M., Iyer, M., Lam, M., Ambiel, N., Jorgens, D. M., Keller, A., Wyss-Coray, T., Kern, F., Zuchero, et al
  2024; 121 (12): e2307250121

- **Oligodendrocyte calcium signaling promotes actin-dependent myelin sheath extension.** *Nature communications*
  Iyer, M., Kantarci, H., Cooper, M. H., Ambiel, N., Novak, S. W., Andrade, L. R., Lam, M., Jones, G., Münch, A. E., Yu, X., Khakh, B. S., Manor, U., Zuchero, et al
  2024; 15 (1): 265

- **BMAL1 loss in oligodendroglia contributes to abnormal myelination and sleep.** *Neuron*
  Rojo, D., Dal Cengio, L., Badner, A., Kim, S., Sakai, N., Greene, J., Dierckx, T., Mehl, L. C., Eisinger, E., Ransom, J., Arellano-Garcia, C., Gumma, M. E., Soyk, et al
  2023

- **Misfolded proteins bind and activate death receptor 5 to trigger apoptosis during unresolved endoplasmic reticulum stress** *ELIFE*
  Lam, M., Marsters, S. A., Ashkenazi, A., Walter, P.
  2020; 9

- **The Mars1 kinase confers photoprotection through signaling in the chloroplast unfolded protein response** *ELIFE*
  Perlaza, K., Toutkoushian, H., Boone, M., Lam, M., Iwai, M., Jonikas, M. C., Walter, P., Ramundo, S.
  2019; 8

- **Confirming a critical role for death receptor 5 and caspase-8 in apoptosis induction by endoplasmic reticulum stress** *CELL DEATH AND DIFFERENTIATION*
  Lam, M., Lawrence, D. A., Ashkenazi, A., Walter, P.
  2018; 25 (8): 1530-1531