

Single-soma RNA-seq of Human DRG and TG Neurons

April 22

Tuesday, 12:30 pm

Billings Building—Rosedale Room

SPEAKER:



Wenqin Luo, M.D., Ph.D.

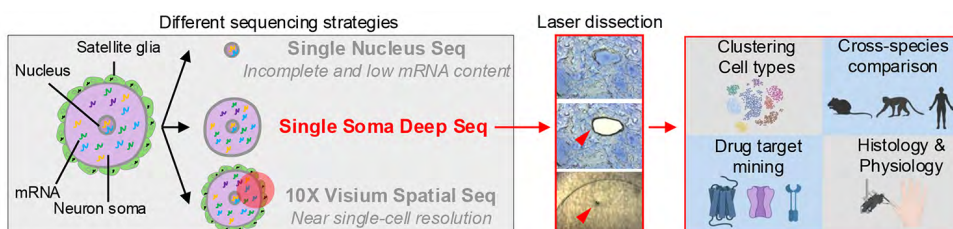
Professor of Neuroscience
Perelman School of Medicine
University of Pennsylvania

Host: Xiaofei Guan, Ph.D.

For more information contact
Darlene White
daw9085@med.cornell.edu

Abstract

Research abstract: Primary somatosensory neurons, including dorsal root ganglion (DRG) and trigeminal ganglion (TG) neurons, detect internal and external stimuli from the trunk and head of the body, respectively. Currently, the translational success of novel therapeutics developed in pain studies using model organisms has been low, which may be due to species differences in primary somatosensory neurons. Thus, a big question is what the molecular and cellular features of human DRG and TG neurons are. To attempt to reveal the molecular profiles of human primary somatosensory neurons and their functional characteristics, our team used laser capture microdissection (LCM)—which avoided dissociation-related technical issue—to isolate and enrich individual human DRG and TG neuron soma and combined it with Smart-seq2 for deep single-soma RNA sequencing. In addition, we used 10x Xenium spatial transcriptomics to validate the top molecular markers and cell types. Last, we obtained in vivo physiological recordings from human subjects to test the temperature-sensing functional properties of somatosensory afferents from multiple DRG cell types. Our comprehensive approach has led to several key novel findings about human DRG/TG neurons.



Publications

1. Yu H, Nagi S, Usoskin D, Hu Y, Kupari J, Otmane B, Yan H, Cranfill S, Su Y, Lv Y, Wymer J, Glanz M, Albrecht P, Song H, Ming G, Prouty S, Seykora J, Wu H, Ma M, Marshall A, Rice F, Li M, Olausson H*, Ernfors P*, Luo W* (co-corresponding author): *Leveraging deep single-soma RNA sequencing to explore the neural basis of human somatosensation*. *Nature Neuroscience*, Nov 2024 (PMCID: PMC11614738).
2. Gautam M, Yamada A, Yamada A, Wu Q, Krisada K, Ling J, Yu H, Dong P, Ma M, Gu J*, and Luo W*: *Distinct local and global functions of mouse A β low-threshold mechanoreceptors in mechanical nociception*. *Nature Communications*, April 2024 (PMCID: PMC10995180).
3. Cui L, Guo J, Cranfill S, Gautam M, Bhattarai J, Olson W, Beattie K, Challis R, Wu Q, Song X, Raabe T, Gradinaru V, Ma M, Liu Q*, Luo W*: *Glutamate in primary afferents is required for itch transmission*, *Neuron*, Jan 2022 (PMCID: PMC8898340).