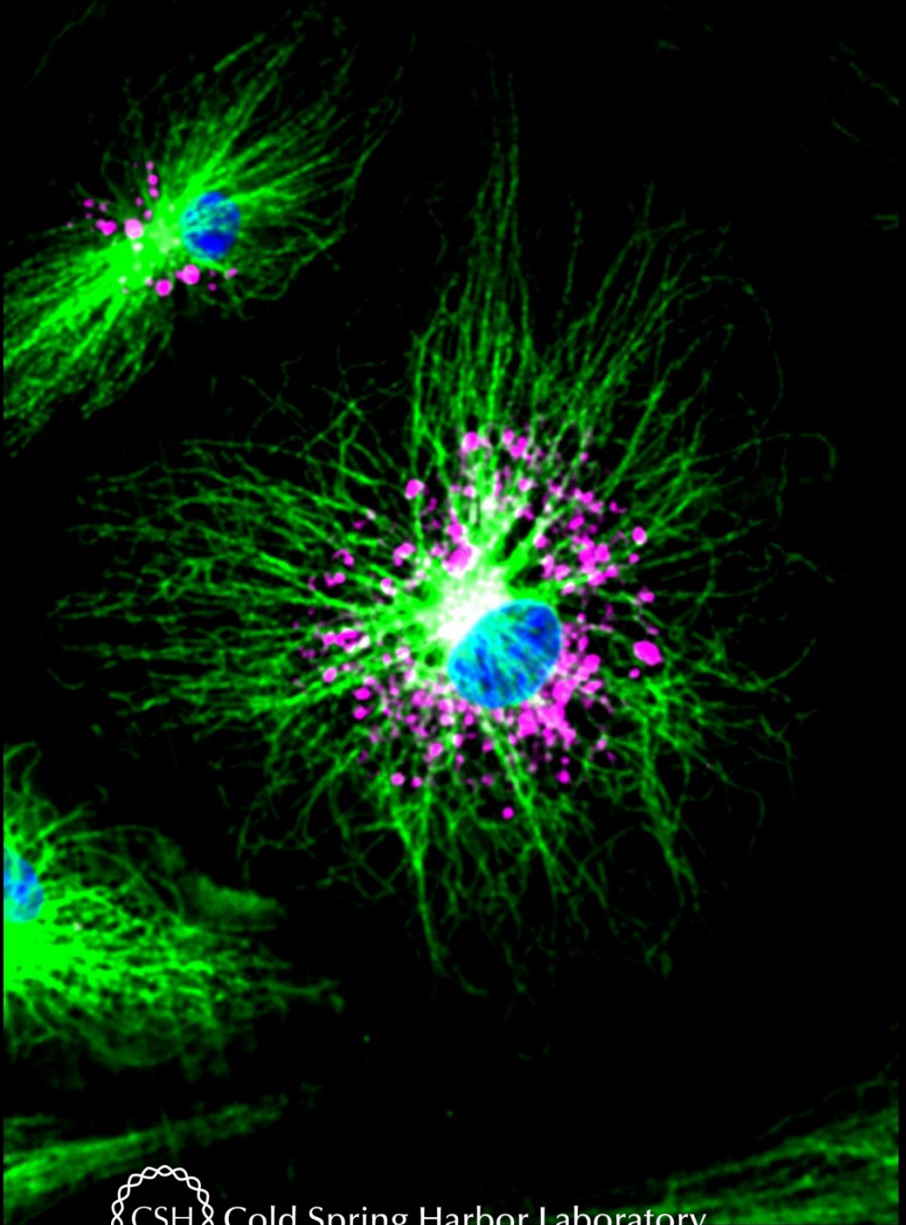


Abstracts of papers presented
at the 2024 meeting on

GLIA IN HEALTH & DISEASE

August 20–August 24, 2024



Cold Spring Harbor Laboratory
MEETINGS & COURSES PROGRAM

Support for this meeting was provided in part by the **National Institute of Neurological Disorders and Stroke**, a branch of the **National Institutes of Health**; and **STEMCELL Technologies**.

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Front Cover: Microglia, green is staining for tubulin, magenta is staining for lysosomes, and blue is nuclei labeled with DAPI. Credit: Patrick Sheehan, Schafer lab, UMass Chan Medical School.

Back Cover: Confocal image of astrocytes in the hippocampus of the adult mouse. Astrocytes - GFAP, nuclei - DAPI (cyan). Credit: Michael O'Dea, Liddelaw Lab, NYU School of Medicine.

Developmental origin and local signals cooperate to determine septal astrocyte identity

Yajun Xie, Christopher M. Reid, Miguel Turrero Garcia, Fiona Dale-Huang, Alejandro Granados, Sarah M. Hanson, Walter Mancia, Jonathan Liu, Manal Adam, Olivia Mosto, Angela O. Pisco, Arturo Alvarez-Buylla, Corey C. Harwell.

Presenter affiliation: University of California, San Francisco, San Francisco, California; Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research, San Francisco, California.

5

Astrocyte morphogenesis requires self-recognition

John Lee, Alina Sergeeva, Göran Ahlsén, Seetha Manneppalli, Fabiana Bahna, Kerry Goodman, Baljit Khakh, Joshua Weiner, Lawrence Shapiro, Barry Honig, Lawrence Zipursky.

Presenter affiliation: University of California Los Angeles, Los Angeles, California.

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WEDNESDAY, August 21—9:00 AM

SESSION 2 BUILDING A NERVOUS SYSTEM II: REMODELING

Chairpersons: **David Lyons**, University of Edinburgh, United Kingdom
Won-Suk Chung, Korea Advanced Institute of Science and Technology, Daejeon

Myelin remodelling in health and disease

David A. Lyons.

Presenter affiliation: University of Edinburgh, Edinburgh, United Kingdom.

7

Piezo1 controls diameter-dependent myelin membrane expansion

Amanda R. Young, Martha Cash, Avipsha Datta, Srijan Bhattacharya, Ryan W. Lewis, Marie E. Bechler.

Presenter affiliation: SUNY Upstate Medical University, Syracuse, New York.

8

Do oligodendrocyte precursor cells govern circuit connectivity through forming stabilising axon:OPC synapses?

Emma Dumble, Denis Yuan, Tim Czopka.

Presenter affiliation: University of Edinburgh, Edinburgh, United Kingdom.

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DO OLIGODENDROCYTE PRECURSOR CELLS GOVERN CIRCUIT CONNECTIVITY THROUGH FORMING STABILISING AXON:OPC SYNAPSES?

Emma Dumble, Denis Yuan, Tim Czopka

Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, United Kingdom

The non-myelinating roles of oligodendrocyte precursor cells (OPCs) have long been an enigma in the field. Recent research by our group showed that OPCs play a role in sculpting the visual system by regulating axonal remodelling in zebrafish. OPCs were found to regulate retinal ganglion cell (RGC) axonal arbor size, with an absence of OPCs leading to enlarged RGC terminal arbors and degraded visual processing, thus indicating OPCs regulate the synaptic connectivity of neurons. How OPCs exert their functions on remodelling axons is unknown. As OPCs are the only glial cell type that receive postsynaptic contacts from surrounding neurons, we investigate whether axon:OPC synapses play a role in regulating axon dynamics and connectivity in the visual system.

To investigate this, we have generated new transgenic lines to visualise endogenous OPC postsynapses *in vivo* using fibronectin intrabodies (FingR) specific to the postsynaptic proteins: Gephyrin (inhibitory) and PSD95 (excitatory). Studying the developmental dynamics of OPC postsynapses, we show that the number of inhibitory postsynapses per OPC are much more prevalent in non-myelinating areas of the CNS such as the optic tectum, compared to the spinal cord where OPCs readily differentiate to myelinating oligodendrocytes. Within the optic tectum, the number of inhibitory synapses per OPC increases during the first week of tectal development when RGC arbors establish their territories. Later, during the time when visual circuitry is refined to solidify circuit connections, the density of individual OPC post-synapses decreases. Therefore, we postulate that axon:OPC synapses may have a function in governing circuit connectivity.

To test how OPCs may regulate RGC synapse dynamics, we performed time-lapse imaging of their interactions with OPCs. Our data show that a fraction of OPC processes form stable appositions to axonal presynapses. Depletion of OPCs increased RGC arbour dynamics and variability in pre-synapse density of RGCs, indicating an instability in RGC presynapses after OPCs are lost. Consequently, when we track these RGC presynapses over longer periods of time, we find that the loss of OPCs leads to a significant loss of RGC presynapses. Additionally, we will present experiments to confirm the presence of axon:OPC synapses at these sites of dynamic remodelling, and approaches to test our working hypothesis that axon:OPC synapses serve as temporary guideposts to regulate precise development of neuronal connections.

