

For a primary research article related to study of the cytoskeleton in a cell type of your choosing

1) The cell type you chose

Myelinating cells: oligodendroglia and Schwann cell.

2) The name of the primary research publication you found interesting

The actin cytoskeleton in myelinating cells – Tanya L. Brown, Wendy B. Macklin [1]

3) The research question being asked in the publication

In **myelinating cells**, the cytoskeleton acts as a scaffold to mediate cell-to-cell interactions and exhibits specific activity patterns. The paper describes cytoskeletal molecules which regulate these patterns during cell differentiation and myelination.

4) The cellular model that was used to try to answer the research question

- *In-vitro* experiments and various animal models (rats, mice, knockout mice) have been used in this research topic and identified:

- Actin polymerizing proteins (WAVE1, WAVE2), and signal transduction molecular switches, RhoGTPases, which regulate cell proliferation and myelination.
 - Major actin depolymerizing molecules: *cofilin*, *gelsolin*
 - PAK molecules which regulate oligodendrocyte development.
- In the PNS, *in vitro* inhibition of the Rho/ROCK pathway in Schwann cells lead to shorter and sometimes thicker myelin internodes, while *in vivo* deletion of N-SWAP in the same cells has similar effect in damaged sciatic fiber.
- Experiments with various animal models (Trembler J mouse, Shiverer mouse, hereditary neuropathy with liability to pressure palsy (HNPP) mouse) show that diseases could cause cytoskeletal changes in CNS and PNS and changes in cytoskeletal regulators can lead to diseases.

5) How many review articles resulted from a search of this specific topic? Be sure to include citations.

Within the last 5 years, 6 review articles on the “actin cytoskeleton in myelinating cells”, were published:

- Evolvability of the actin cytoskeleton in oligodendrocytes during central nervous system development and aging [2]
- Cytoskeletal Signal-Regulated Oligodendrocyte Myelination and Remyelination [3]
- WIP, YAP/TAZ and Actin Connections Orchestrate Development and Transformation in the Central Nervous System [4]
- The oligodendrocyte growth cone and its actin cytoskeleton: a fundamental element for progenitor cell migration and CNS myelination [5]
- Direct effects of Ca²⁺/calmodulin on actin filament formation [6]
- Galectin-3-Mediated Glial Crosstalk Drives Oligodendrocyte Differentiation and (Re)myelination [7].

[1] T. L. Brown and W. B. Macklin, “The actin cytoskeleton in myelinating cells.,” *Neurochem Res*, p. 10.1007/s11064-019-02753-0, Mar. 2019, doi: 10.1007/s11064-019-02753-0.

[2] A. I. Seixas, M. M. Azevedo, J. Paes de Faria, D. Fernandes, I. Mendes Pinto, and J. B. Relvas, “Evolvability of the actin cytoskeleton in oligodendrocytes during central nervous system development and aging,” *Cell. Mol. Life Sci.*, vol. 76, no. 1, pp. 1–11, Jan. 2019, doi: 10.1007/s00018-018-2915-8.

- [3] S. Miyata, "Cytoskeletal Signal-Regulated Oligodendrocyte Myelination and Remyelination," in *Myelin: Basic and Clinical Advances*, K. Sango, J. Yamauchi, T. Ogata, and K. Susuki, Eds. Singapore: Springer, 2019, pp. 33–42. doi: 10.1007/978-981-32-9636-7_3.
- [4] I. M. Antón and F. Wandosell, "WIP, YAP/TAZ and Actin Connections Orchestrate Development and Transformation in the Central Nervous System," *Front Cell Dev Biol*, vol. 9, p. 673986, Jun. 2021, doi: 10.3389/fcell.2021.673986.
- [5] E. J. Thomason, M. Escalante, D. J. Osterhout, and B. Fuss, "The oligodendrocyte growth cone and its actin cytoskeleton: a fundamental element for progenitor cell migration and CNS myelination," *Glia*, vol. 68, no. 7, pp. 1329–1346, Jul. 2020, doi: 10.1002/glia.23735.
- [6] M. Izadi, W. Hou, B. Qualmann, and M. M. Kessels, "Direct effects of Ca²⁺/calmodulin on actin filament formation," *Biochemical and Biophysical Research Communications*, vol. 506, no. 2, pp. 355–360, Nov. 2018, doi: 10.1016/j.bbrc.2018.07.159.
- [7] L. Thomas and L. A. Pasquini, "Galectin-3-Mediated Glial Crosstalk Drives Oligodendrocyte Differentiation and (Re)myelination," *Front Cell Neurosci*, vol. 12, p. 297, Sep. 2018, doi: 10.3389/fncel.2018.00297.