Direct derivation and Prospective Isolation of Schwann Cell Precursors from Human Pluripotent Stem Cells

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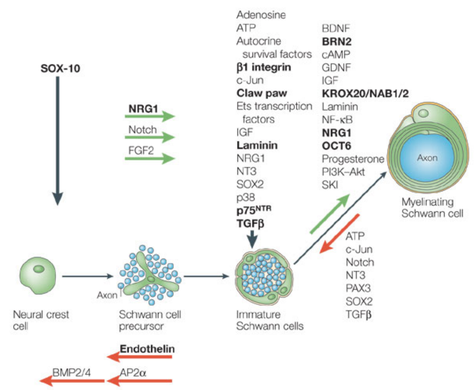
Abstract

Introduction: Genetic and acquired peripheral neuropathies are a significant source of disability, yet few effective treatments are available. Because of the role Schwann cells play in myelination and neuroregeneration, transplantation of Schwann cells or their precursors may offer a potential therapy in a subset of neuropathies. Here we report the derivation of Schwann cell precursors from human pluripotent stem cells. **Method:** A previously reported protocol[1] for neuronal differentiation also yields Schwann cell precursors in close apposition to the neurons. Using dual-SMAD inhibition (with LDN-193189 and SB431542), followed by extended culture with a cocktail of three small molecules (SU5402, CHIR99021 and DAPT), human embryonic (H9) stem cells are effectively differentiated into putative Schwann cell precursors, using defined conditions. **Results:** Real time PCR demonstrates significant enrichment of PMP22, cadherin19, and myelin protein zero, and immunocytochemistry shows expression of S100B in the putative Schwann cell precursors. Additionally, we found that FACS for an integrin surface marker allows for prospective isolation of this cell population following differentiation. **Conclusion:** Using a modified dual-SMAD inhibition protocol, we report the direct derivation and prospective isolation of Schwann cell precursors, in defined conditions.

Background: Schwann cell development



Nat Rev Neurosci. 2005 Sep;6(9):671-82.

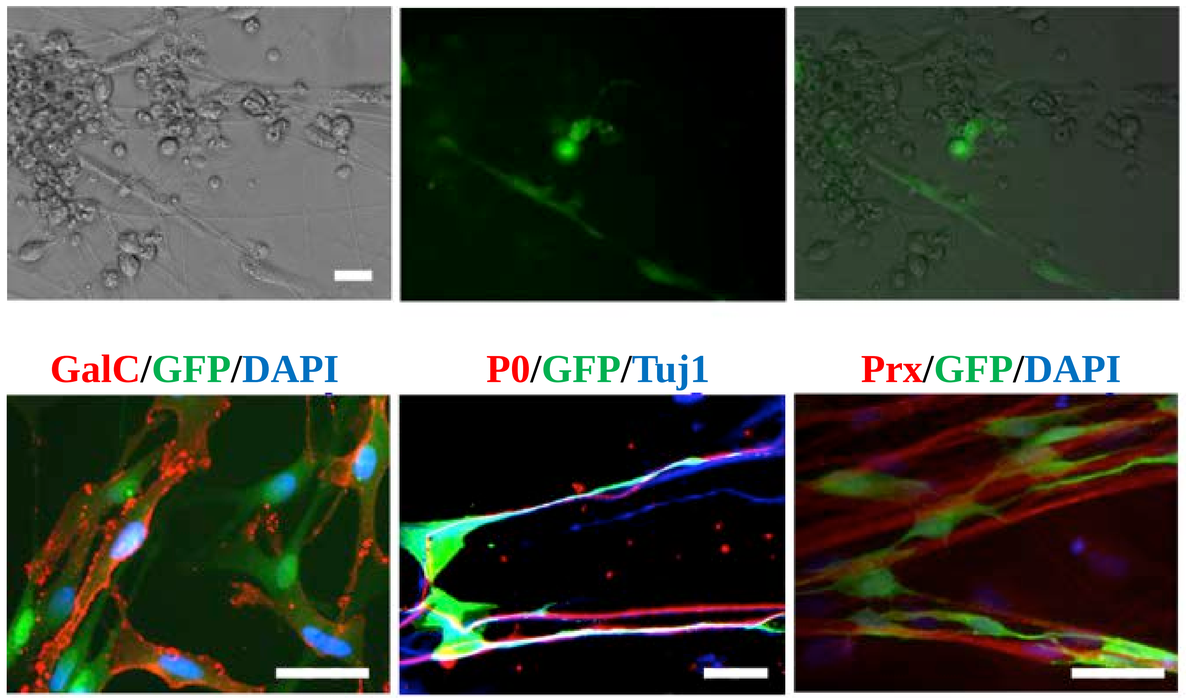
References

1. Chambers SM, et al. Combined small-molecule inhibition accelerates developmental timing and converts human pluripotent stem cells into nociceptors. Nat Biotechnol. 2012 Jul 1;30(7):715-20
2. Jessen KR, Mirsky R. The origin and development of glial cells in peripheral nerves. Nat Rev Neurosci. 2005 Sep;6(9):671-82.

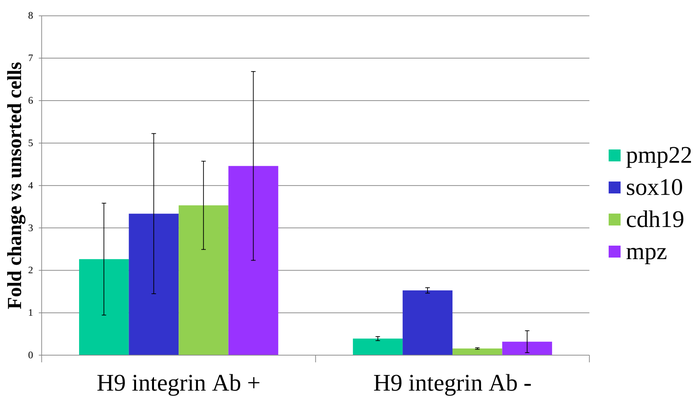
Acknowledgements

Experiments were performed with the use of reagents from Life Technologies.
Scan QR code to download poster or visit lifetechnologies.com/isscr2013

Results: Differentiation by LSB3i treatment

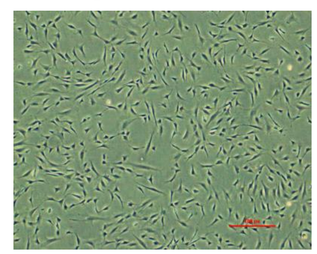


Results: Prospective isolation by FACS



qPCR for Schwann cell precursor markets

Brightfield



S100B/DAPI