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REVIEW ARTICLE

Schwann cell precursors in health and disease

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Abstract

Schwann cell precursors (SCPs) are frequently regarded as neural crest-derived cells (NCDCs) found in contact with axons during nerve formation. Nevertheless, cells with SCPs properties can be found up to the adulthood. They are well characterized with regard to both gene expression profile and cellular behavior —for instance, proliferation, migratory capabilities and survival requirements—. They differ in origin regarding their anatomic location: even though most of them are derived from migratory NCCs, there is also contribution of the boundary cap neural crest cells (bNCCs) to the skin and other tissues. Many functions are known for SCPs in normal development, including nerve fasciculation and target innervation, arterial branching patterning and differentiation, and other morphogenetic processes. In addition, SCPs are now known to be a source of many neural (glia, endoneural fibroblasts, melanocytes, visceral neurons, and chromaffin cells) and non-neural-like (mesenchymal stromal cells, able e.g., to generate dentine-producing odontoblasts) cell types. Until now no reports of endoderm-like derivatives were reported so far. Interestingly, in the Schwann cell lineage only early SCPs are likely able to differentiate into melanocytes and bone marrow mesenchymal stromal cells. We have also herein discussed the literature regarding their role in repair as well as in disease mechanisms, such as in diverse cancers. Moreover, many caveats in our knowledge of SCPs biology are highlighted all through this article. Future research should expand more into the relevance of SCPs in pathologies and in other regenerative mechanisms which might bring new unexpected clinically-relevant knowledge.

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