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WHAT'S NEW

A peripheral glial niche orchestrates the early stages of skin wound healing

This section is a contribution from the SKINTEGRITY.CH interdisciplinary research consortium. The collaborative work was performed by Dr. Salome Stierli and colleagues, under the lead of SKINTEGRITY.CH co-chair Prof. Lukas Sommer.

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Salome Stierli. *Skin wound healing depends on a tightly coordinated dialogue between multiple cell types. While the contribution of immune cells and fibroblasts has been studied extensively, the role of the peripheral nervous system has remained less well understood. In particular, research has largely focused on axons, although peripheral nerves also contain glial cells that ensheathe them. In our study, we found that these glial cells rapidly dedifferentiate after skin injury and form a local pro-reparative niche. By combining spatial and single-cell approaches with functional mouse models, we show that repair glia regulate the recruitment of monocytes and macrophages and thereby initiate the early wound response.*

Repair glia emerge in a nerve-associated wound niche

Following injury, mature peripheral glial cells within cutaneous nerves dedifferentiate into a repair glia state. These repair glia remain closely associated with nerve bundles in the early wound bed. Transcriptomic analyses revealed that glial cells in wounds differ markedly from those in uninjured skin. Upon injury, they downregulate markers of mature glial cells and adopt a gene expression program resembling an immature, precursor-like repair state.
Strikingly, the area surrounding nerve bundles becomes enriched in immune cells, fibroblasts, and proliferating cells, forming a spatially organized pro-reparative niche during early stages of healing *(Figure 1)*. Upon peripheral glial cell depletion, this niche is profoundly altered: immune cell abundance around nerves is reduced and cell proliferation in the wound bed declines. These findings indicate that repair glia contribute to the establishment of a localized environment that supports early wound responses.

Repair glia recruit macrophages through monocyte chemoattractant proteins

A central finding of our work is that repair glia help initiate the inflammato-

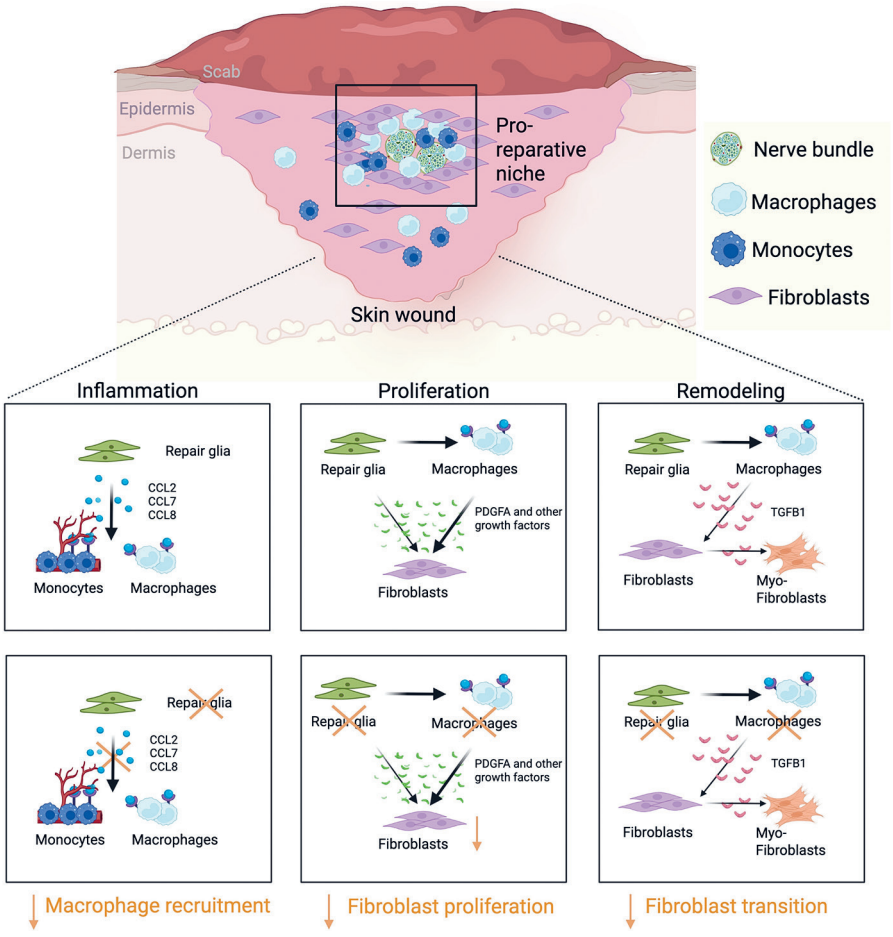

Fig. 1: Overview of repair glia in peripheral nerves as part of a regenerative niche in acute skin wounds.

ry response by producing monocyte chemoattractant proteins. Spatial transcriptomics and single-cell analyses identified strong interactions between repair glia and macrophages in the wound bed, with chemokines such as CCL2, CCL7, and CCL8 emerging as prominent candidate signals. These factors are specifically enriched in repair glia at very early stages after injury, when fibroblasts are still relatively sparse in the wound bed.

Functional experiments support this model. In vitro, glia-derived CCL2 and CCL7 promote monocyte recruitment. In vivo, depletion of repair glia reduces monocyte and macrophage numbers in early wounds. Importantly, selective deletion of the key family member *Ccl2* in the glial lineage is sufficient to lower macrophage numbers and delay wound closure. Together, these data identify repair glia as an early source of chemotactic signals that recruit monocyte-derived macrophages into the wound.

Macrophages link glial activity to fibroblast responses

The effects of repair glia extend beyond immune cell recruitment. Loss of glia results not only in fewer macrophages, but also in reduced fibroblast proliferation, lower fibroblast abundance, and impaired transition of fibroblasts into myofibroblasts at later stages of healing. These processes are essential for granulation tissue formation and wound contraction.

Our data support a model in which repair glia act upstream of macrophages, which in turn regulate fibroblast responses. Macrophages are well-established sources of pro-fibrotic factors such as TGFβ and fibroblast growth factors that promote fibroblast proliferation and myofibroblast differentiation. Thus, by controlling macrophage recruitment, repair glia indirectly influence fibroblast activation. In addition, repair glia may also contribute more locally to fibroblast proliferation through the secretion of growth-promoting factors such as PDGFα. Overall, these findings indicate that repair glia actively coordinate early inflammation and subsequent fibroblast responses during wound healing.

Implications for skin repair

These findings add a new dimension to our understanding of cutaneous wound healing. They identify peripheral glia as previously underappreciated regulators of the early wound environment and place nerves at the center of a spatially organized reparative niche. More broadly, the study highlights communication between nerves, immune cells, and stromal cells as an important principle of tissue repair. Since innervation is a common feature of most tissues, similar glia-dependent mechanisms may also operate in other organs. In the skin, a better understanding of this early neuro-immune-stromal crosstalk may open new perspectives for promoting repair in settings where healing is delayed or dysregulated, such as in chronic wounds.

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Reference

Stierli S, Salas-Bastos A, Micheli S, Ballwein I, Kelemen A, Lehmann J, Loos B, Jordaan WS, Stifter SA, Gwerder M, Nakandalage R, Stadler J, Greter M & Sommer L (2026). A peripheral glial niche orchestrates the early stages of skin wound healing. Cell Stem Cell, S1934-5909(25), 00449-7. DOI 10.1016/j.stem.2025.12.015