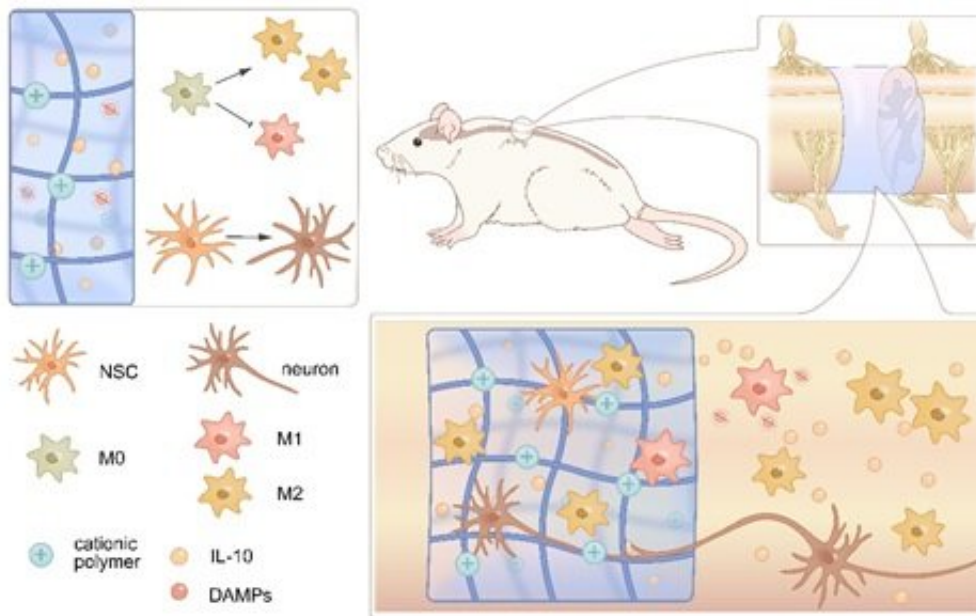


Novel hydrogel promotes neural regeneration after spinal cord injury

January 13 2022, by Zhang Nannan



Schematic diagram of the dual-functional immunoregulatory hydrogel for regulating the inflammatory microenvironment after spinal cord injury. Credit: IGDB

Researchers led by Prof. Dai Jianwu from the Institute of Genetics and Developmental Biology of the Chinese Academy of Sciences developed a multifunctional scaffold to effectively regulate the immune microenvironment after spinal cord injury and reduce secondary injury effects, according to a recent study published in *Biomaterials*.

By modifying a photocrosslinking gelatin hydrogel with a cationic polymer, polyamidoamine, and an anti-inflammatory cytokine, interleukin-10 (IL-10), the scaffold could enhance tissue remodeling and promote axonal regeneration.

Spinal cord injury causes axon damage and neural cell death, leading to dysfunction. Spinal cord injury is divided into two stages: primary injury and secondary injury, which is initiated by the primary injury and lasts for several weeks. Spinal cord injury -triggered infiltration and activation of immune cells creates an inflammatory [microenvironment](#) characterized with damage-associated molecular patterns (DAMPs) that exacerbates secondary damage and impairs neurological functional recovery.

With the capabilities of effective scavenging of DAMPs and sustained release of IL-10, such a dual-functional immunoregulatory hydrogel not only reduced pro-inflammatory responses of macrophages and microglia, but also enhanced neurogenic differentiation of neural stem [cells](#).

In the complete transection SCI mouse model, the scaffold counteracted the inflammatory microenvironment by suppressing cytokine production, regulating immune cell activation, leading to the neural regeneration and axon growth without scar formation.

The dual-functional immunoregulatory scaffold with neuroprotection and neural regeneration effects significantly promoted electrophysiological enhancement and motor function recovery after spinal cord injury.

This study suggests that functional [scaffold](#) reconstruction of the immune microenvironment is a promising and effective method for treating severe spinal cord [injury](#).

More information: He Shen et al, A DAMP-scavenging, IL-10-releasing hydrogel promotes neural regeneration and motor function recovery after spinal cord injury, *Biomaterials* (2021). [DOI: 10.1016/j.biomaterials.2021.121279](https://doi.org/10.1016/j.biomaterials.2021.121279)

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