

## **Overexpression of microRNA 21 Leads to Increased Glial Scarring in Spinal Cord Injury**

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Spinal Cord Injury (SCI) results in major functional neurological impairments with little to no recovery. The cellular events that are triggered from the injury such as apoptosis, the inflammatory process and the formation of the glial scar lead to the majority of the functional deficits. These cellular processes are controlled by gene expression within cells, which in turn can be regulated by epigenetic microRNA molecules (miRNAs).

MicroRNA-21 (miR-21) is highly expressed after SCI and may have an important role in the subsequent pathophysiological or repair mechanisms.

Mice with global overexpression of miR-21 (OE) (n=6) or global knockdown of miR-21 (KO) (n=5) underwent SCI and histology of the spinal cord lesion were compared to wild-type (WT) (n=6) mice. Immunohistochemistry was performed on the injured spinal cords to study the astroglial response with the biomarker glial fibrillary acidic protein (GFAP) for reactive astrocytes; microglial infiltration with the biomarker ionized calcium binding adaptor molecule 1 (Ibal) for activated microglia; and glutamatergic axon survival with the biomarker vesicular glutamate transporter 1 (VGLUT1). MiR-21 OE mice were found to have significantly increased GFAP staining at the lesion site, with 66% (p=0.0198) and 116% increase (p=0.0017), as compared to miR-21 KO and WT mice respectively. MiR-21 OE mice showed a trend towards increased Ibal staining at the lesion compared to miR-21 KO and WT mice, although this did not reach significance. MiR-21 KO resulted in a non-significant reduction of almost 50% in VGLUT1 staining. The increased glial scar formation that is modulated by miR-21 may therefore have an important role to play in axon survival and regeneration by providing a permissive environment for axonal growth. Further research will uncover insight into the therapeutic potential of miR21 after a SCI to promote recovery.

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