Astrocytic Contribution to Motor Recovery After Spinal Cord Injury

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ABSTRACT

Spinal cord injury results in loss of motor, sensory, and autonomic functions. Astrocytes, a cell type in the central nervous system, react to injury in a process called astrogliosis that impacts repair. At the site of injury, reactive astrocytes form an astrocytic scar that yields neuroprotective effects. Impaired formation of this scar causes increased tissue damage along with worsened motor recovery.¹ Our lab identified leucine zipper-bearing kinase (LZK) as a key activator of astrogliosis that promotes wound healing after spinal cord injury in mice². This project examines the effect of astrocyte-specific LZK gene manipulation on hind-limb motor recovery following spinal cord injury. To determine the role of LZK on functional recovery post-injury, a complete crush was performed at thoracic level T8. Hindlimb function was measured using i) Basso Mouse Scale, an open field test that assesses gross motor function³; and ii) regular horizontal ladder test that measures skilled stepping over 2 months after injury⁴. Analysis demonstrated decreased function following LZK gene deletion. Decreased gross and fine motor function improvement was seen for the LZK-knockout when compared to the control genotype, suggesting that LZK is necessary for functional recovery. This is further suggested through increased gross motor function observed for the LZK-over-expression when compared to the control genotype. Further research must be done to determine the role of LZK-over-expression in fine motor recovery.

METHODS

All behavior was conducted blinded to animal genotypes. ¹GFAP-CreERT²; LZKOE³
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RESULTS

CONCLUSIONS

LZK-KO animals demonstrated decreased gross motor improvements when compared to the control genotype, as evidenced through Basso Mouse Scale data. LZK-OE animals demonstrated an increase in gross functional recovery when compared to the control. This suggests that LZK plays a role in functional recovery after SCI. Further experiments will be conducted to determine the effect of LZK-OE on functional recovery.

REFERENCES