ExoPTEN: Pioneering Exosome-Based Therapies with Innovative Solutions for Spinal Cord Injury and Beyond

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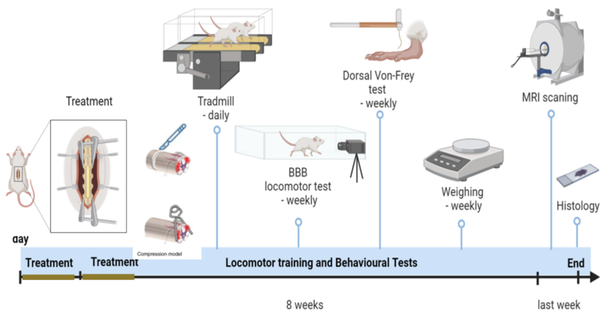
INTRODUCTION

NurExone is advancing an exosome-based therapeutic approach for spinal cord injury (SCI). Our technology leverages bone marrow-derived mesenchymal stem cells (MSCs) EVs to deliver a proprietary siRNA targeting PTEN, a key inhibitor in the mTOR pathway. Our EVs are effectively post production loaded with this siRNA ensuring the preservation of both EVs and payload functionality. With FDA orphan drug designation secured, we aim to conduct clinical trials demonstrating safety and significant improvement of motor, sensory, and functional and structural recovery in SCI patients

METHODS

Preclinical Models:
Schematic study representation of acute SCI (transection/compression) in rat models. ExoPTEN was administered via intranasal and intrathecal routes. Efficacy was assessed using: motor functionality (BBB locomotor scoring); sensory tests (Von Frey-VF); structural recovery (MRI, DTI-MRI, Immunohistochemistry)



Homing Capacity:
Exosome Tracking: Fluorescently labeled ExoPTEN particles were tracked in vivo up to 7 days post-injury.
Manufacturing Optimization:
Scale-Up: Production was transitioned from small-scale to large-scale 3D culture systems, with analytical methods ensuring process robustness.

ACKNOWLEDGMENTS

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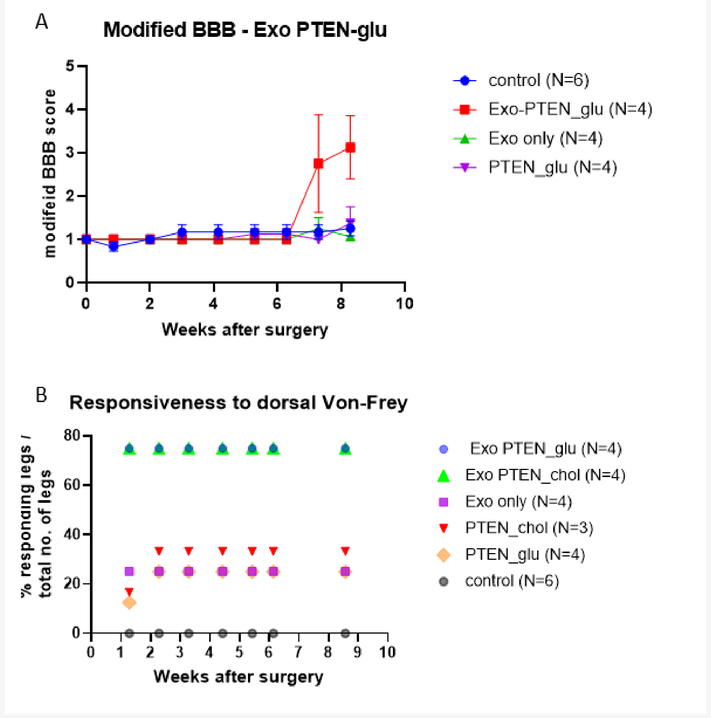
SUMMARY OF RESULTS

ExoPTEN demonstrated improved efficacy across all functional and structural tests, showing significant enhancements in motor, sensory, and structural recovery in both spinal cord injury models. Additionally, ExoPTEN exhibited robust homing capacity to the injury site, even 7 days post-injury. We successfully optimized the production process, when transitioning from small-scale to large-scale 3D culture systems

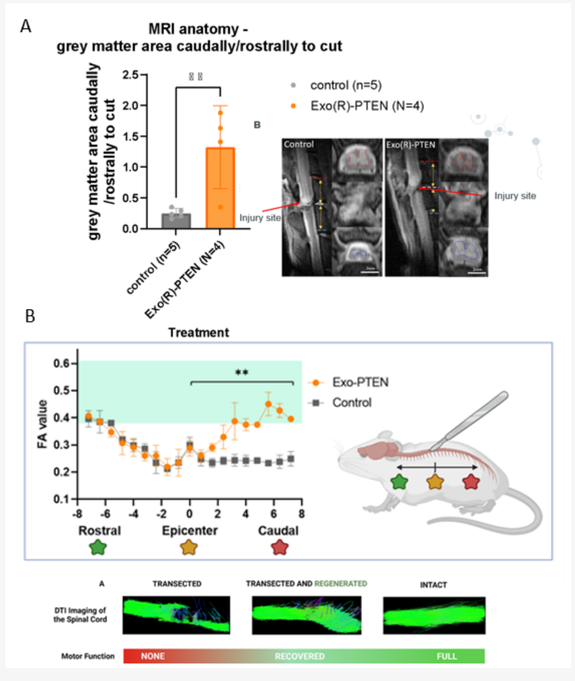
RESULTS

Figure 1: ExoPTEN improves motor and sensory function in rats post SCI



Rats post SCI were evaluated for motor function with BBB scoring (1A) and sensory improvement with VF tests (1B)

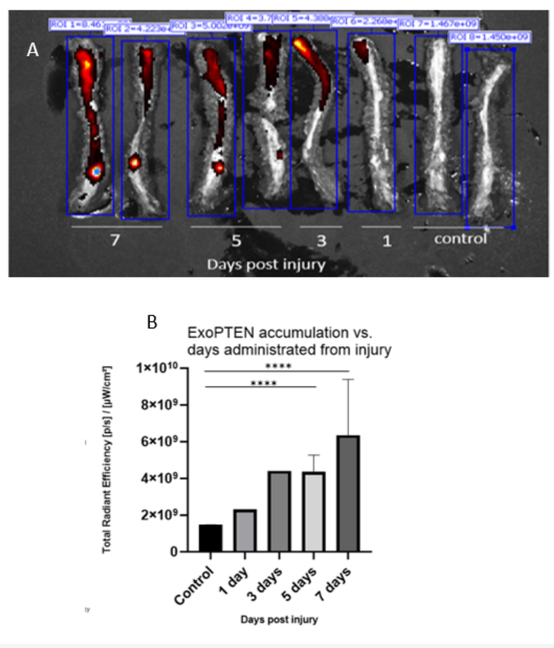
Figure 2: ExoPTEN improves structural and neuronal tissue integrity in rats post SCI



Rats post SCI were evaluated for structural improvement by quantifying grey area in anatomy MRI (2A) and tissue integrity with MRI-DTI (2B)

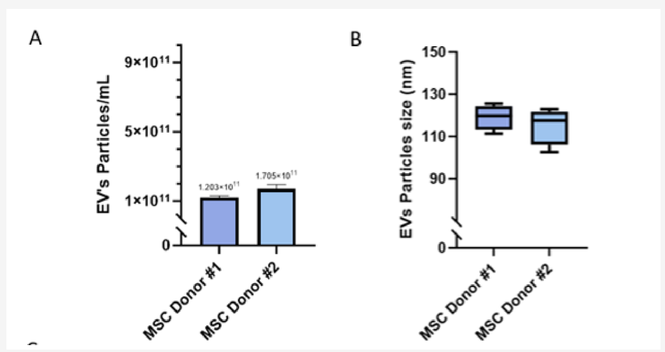
RESULTS

Figure 3: ExoPTEN exhibits prolonged therapeutic window potential



Homing capacity of ExoPTEN was imaged using IVIS imaging of fluorescently labeled EVs in the spinal cord of rats post SCI (3A) and quantified for spinal cord signal intensity (3B)

Figure 4: ExoPTEN displays a robust manufacturing process



ExoPTEN manufacturing robustness from different donors and 2D to 3D scaling as shown in particle concentration (4A) particle size distribution (4B), homing capacity (4C and 4D)

CONCLUSIONS

The positive preclinical outcomes, along with the orphan drug designation (ODD) and highly supportive FDA response to our pre-IND submission, underscore the potential of NurExone's exosome-based therapy for SCI. We are expanding our pipeline to treat new indications while addressing CMC and analytical method requirements as we advance toward clinical trials.