

# Extracellular vesicles-based therapy for spinal cord injury



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## INTRODUCTION

Patients with spinal cord injury (SCI) usually suffer from permanent neurological deficits, while spontaneous recovery and therapeutic efficacy are limited. Exosomes are natural membrane vesicles (50–150 nm) of endosomal origin, secreted by various cells including mesenchymal stem cells (MSCs). They have emerged as promising nanocarriers for drug delivery and targeted therapy, as alternatives to stem cell therapy. Phosphatase and tensin homolog (PTEN) is expressed in neurons and regenerating axons and plays a vital role in controlling the regeneration of corticospinal neurons via downregulating cytoplasmic mammalian target of rapamycin (mTOR) activity. This study presents intranasal administrations of MSC-derived exosomes loaded with PTEN-siRNA (ExoPTEN), which targeted the spinal cord lesion in rats with complete spinal cord injury and enabled significant functional recovery.

NurExone Biologic Inc. (TSXV:NRX)(FSE:J90) is a TSX Venture Exchange listed pharmaceutical company that is developing a platform for biologically-guided ExoTherapy to be delivered, non-invasively, to patients who suffered traumatic spinal cord injuries. ExoTherapy was conceptually demonstrated in animal studies at the Technion, Israel Institute of Technology. NurExone is translating the treatment to humans, and the company holds an exclusive worldwide license from the Technion and Tel Aviv University for the development and commercialization of the technology.

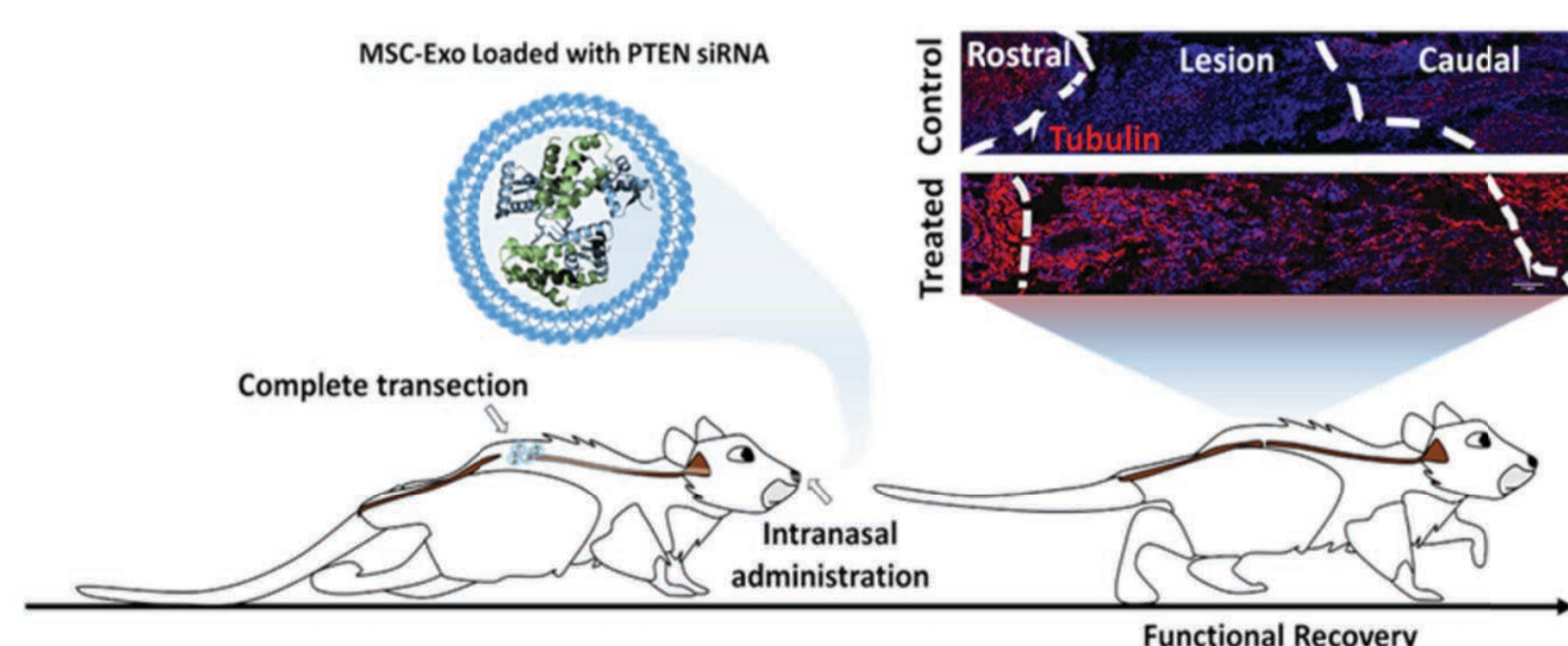
## OBJECTIVES

Our goal is to develop a therapy for spinal cord injuries with the following features:

- Non- invasive
- Rapid
- Cell free
- Biologically-guided
- No immune response in patients
- Off the shelf administration

NurExone Biologic's Exotherapy holds a great promise for clinical healing

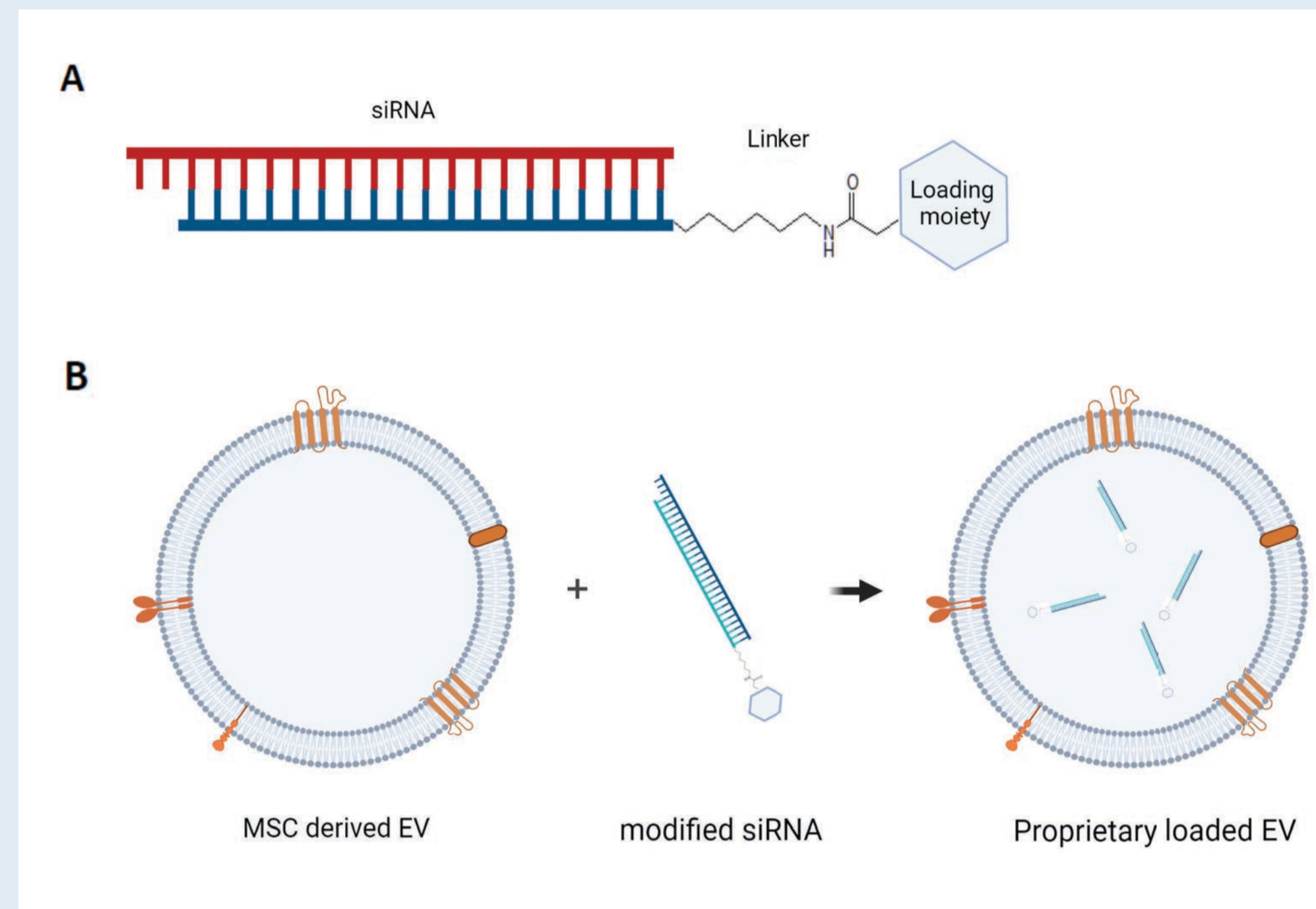
## EXO-PTEN OVERVIEW



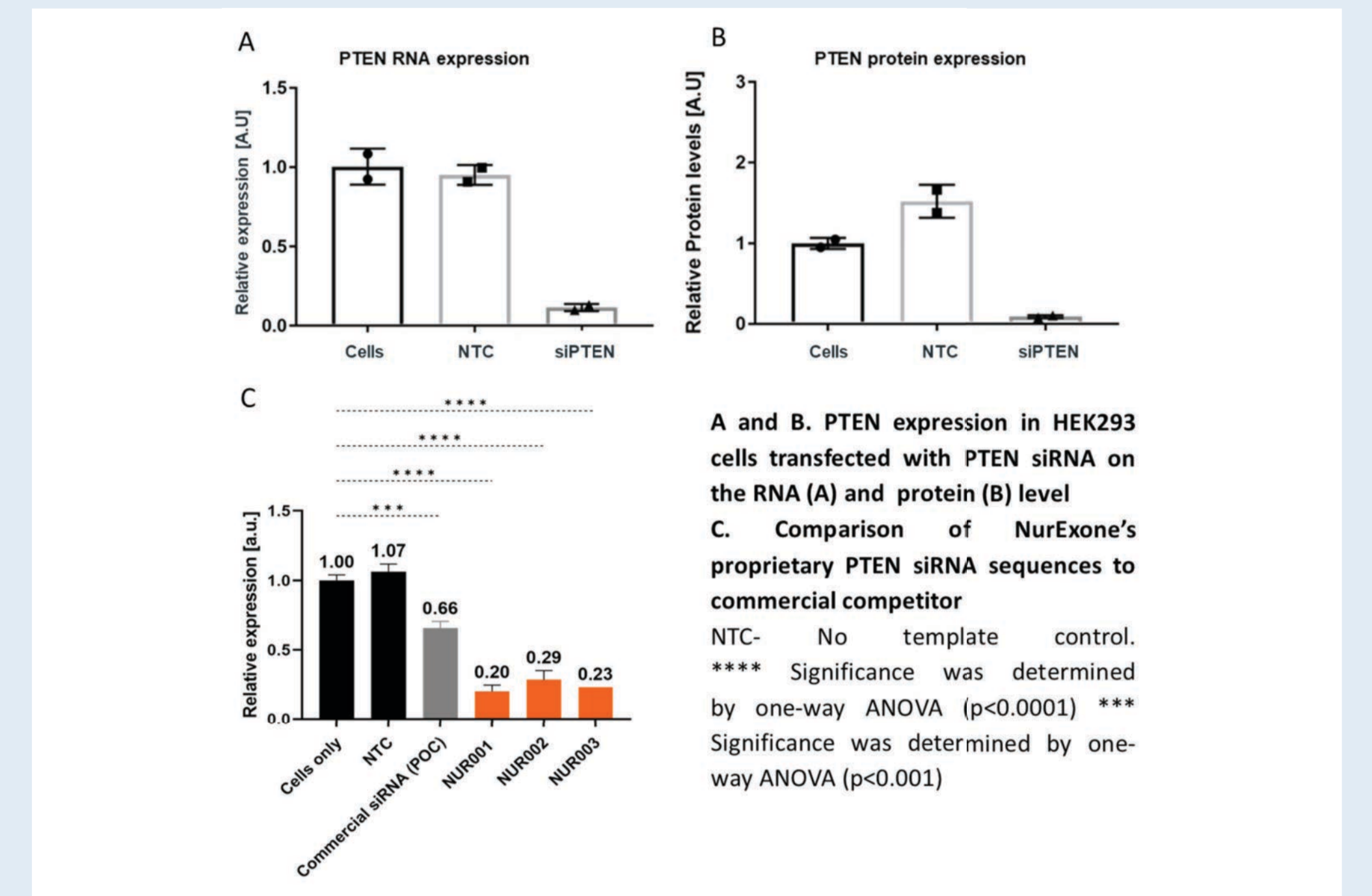
Intranasal ExoPTEN treatment induces locomotor, sensory, and bladder recovery.

## RESULTS

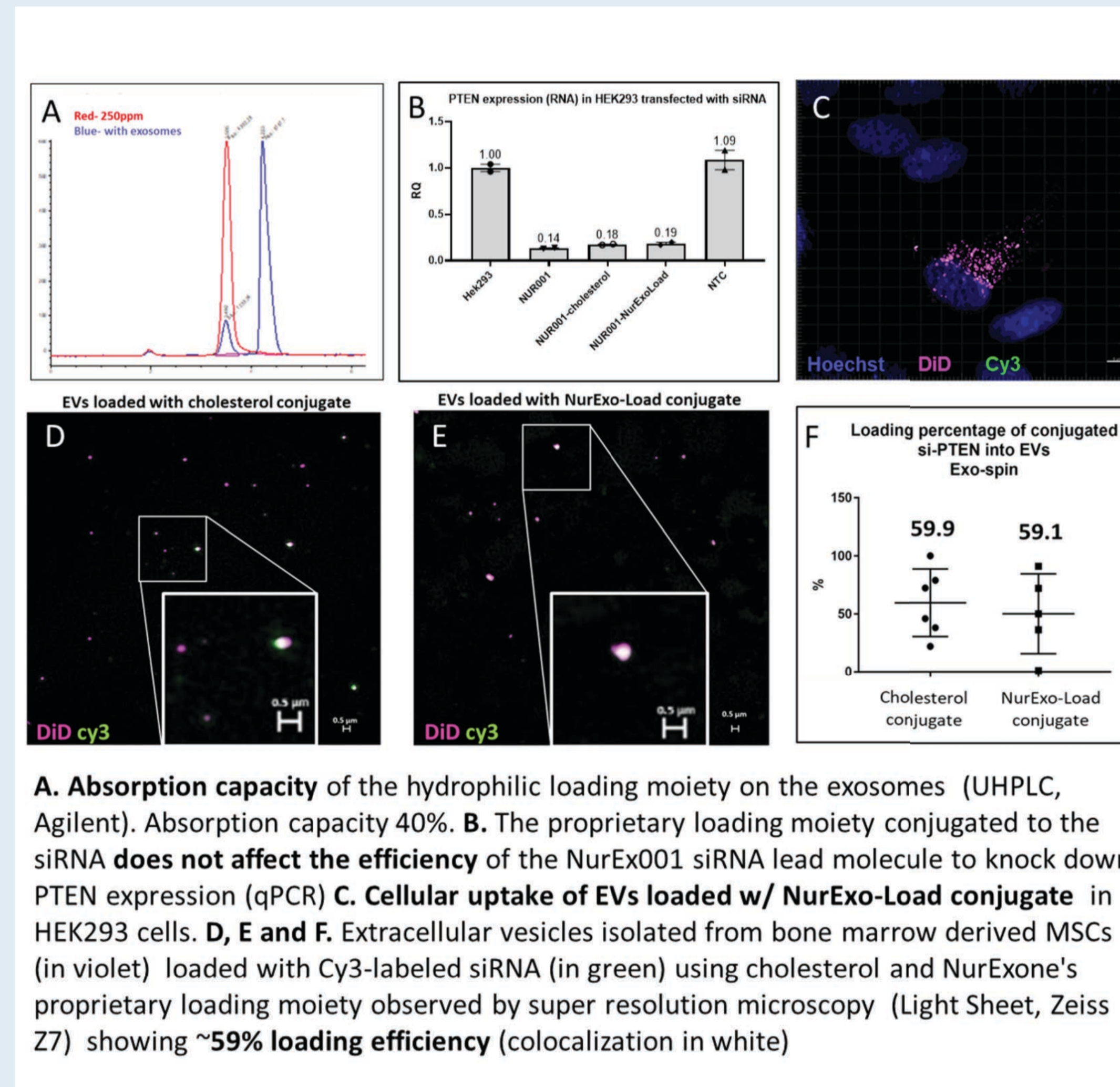
### NurExone Biologic's ExoTherapy for spinal cord Injury



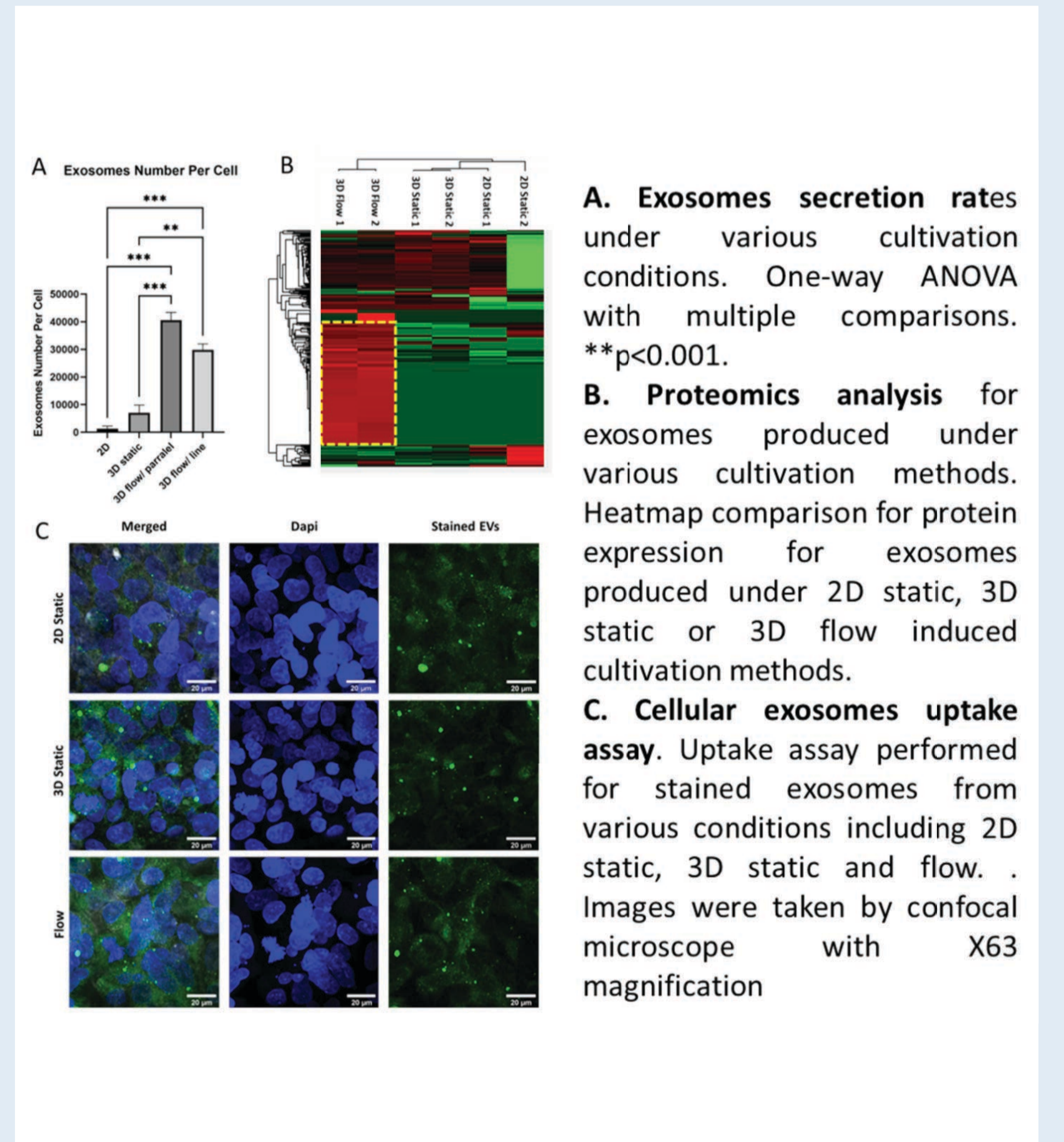
### Development of a new proprietary siRNA against PTEN



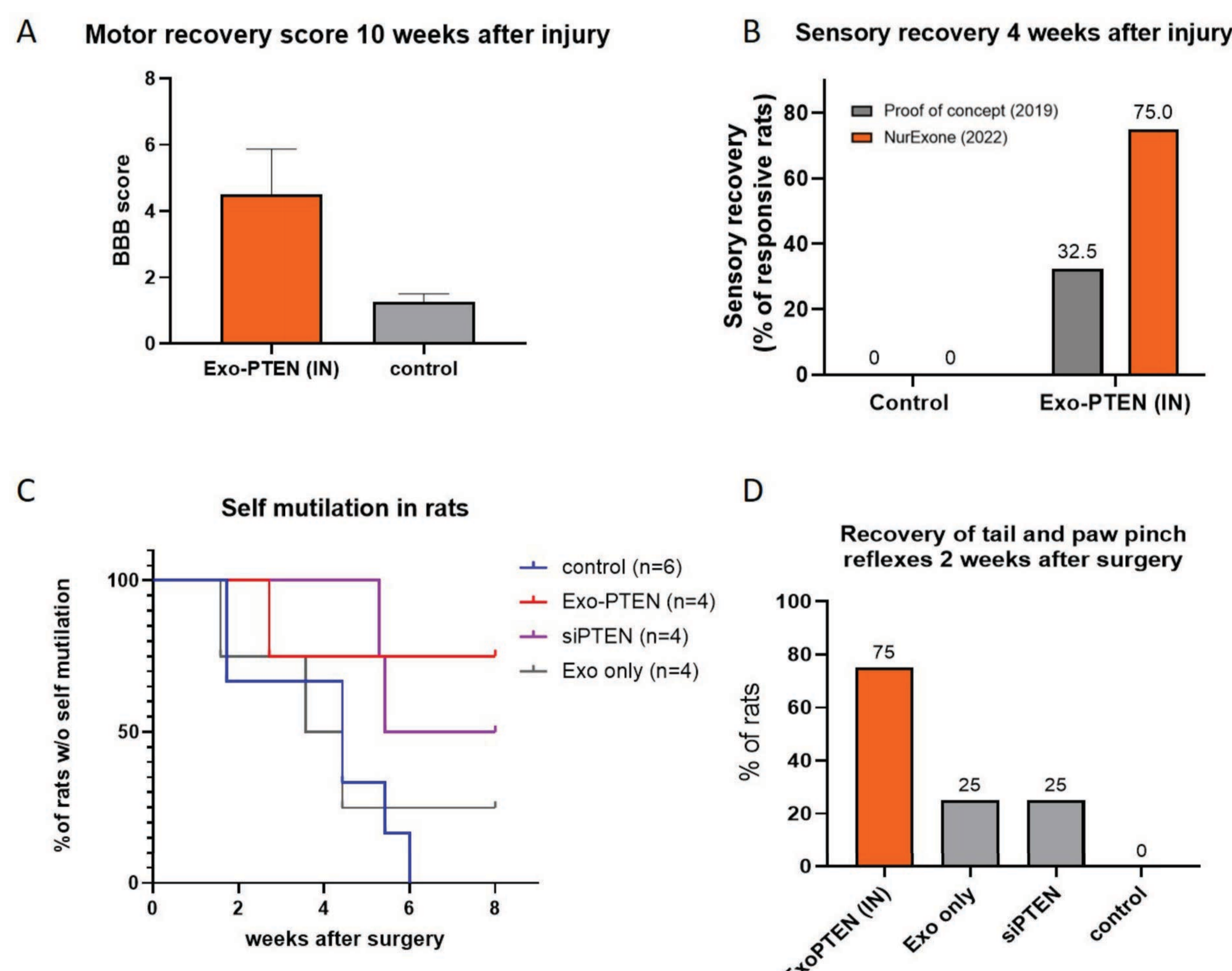
### Development of a new proprietary loading moiety



### Development of a new proprietary 3D bioprocess



### Preclinical studies in rats with NurExone's proprietary Exo-PTEN for the treatment of spinal cord injury



Intranasal ExoPTEN treatment improves locomotor, sensory, reflexes recovery and well being in injured rats. Results of *in vivo* studies of spinal cord injury (full transection) in rats following intranasal proprietary ExoPTEN treatment

- A. Motor rehabilitation assessed by the evaluation of the BBB score
- B. Improvement of the sensory recovery evaluated with Von Frey filaments
- C. Decrease of self-eating tendency
- D. Recovery of tail and paw pinch reflexes

Our product includes a complete bioprocess, starting with isolation from 3D cultured BM-derived mesenchymal stem cells with an increased yield, followed by loading of the exosomes with PTEN-siRNA and intranasal administration in rats for *in vivo* studies. These results have significant clinical therapeutic application for SCI and other neurological diseases with neuroinflammation.