# Regeneration of neural progenitors after spinal cord injury

Yan Zhou, Kimberly Arena, Bruce Appel
Department of Pediatrics, Section of Developmental Biology, University of Colorado Anschutz Medical Campus

Developmental Biology
SCHOOL OF MEDICINE
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

## Introduction

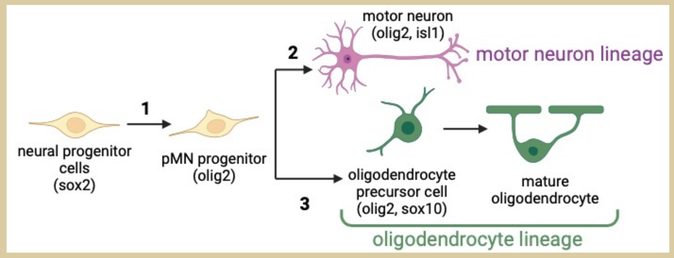
**Spinal cord injury (SCI) is costly:**

- About **299,000** people in the US suffer from SCI with an average **age of 43.**
- The lifetime cost of SCI healthcare is **$1.2 million - 5.0 million** per person.

**Objective**:

- We aim to identify the molecular and cellular mechanisms that can promote spinal cord repair.

**Spinal cord motor neurons and oligodendrocytes arise from common progenitors:**



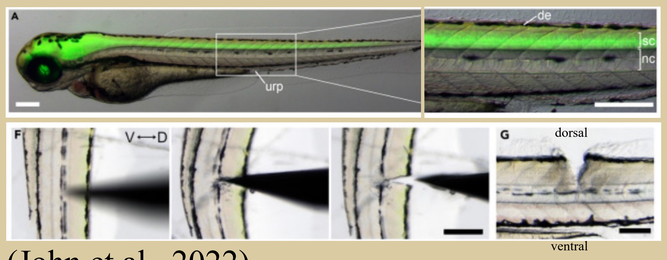

**Hypothesis:**

- Increasing the number of neural and pMN progenitor cells will promote motor neuron and oligodendrocyte regeneration, therefore contributing to SCI repair.

## Methods

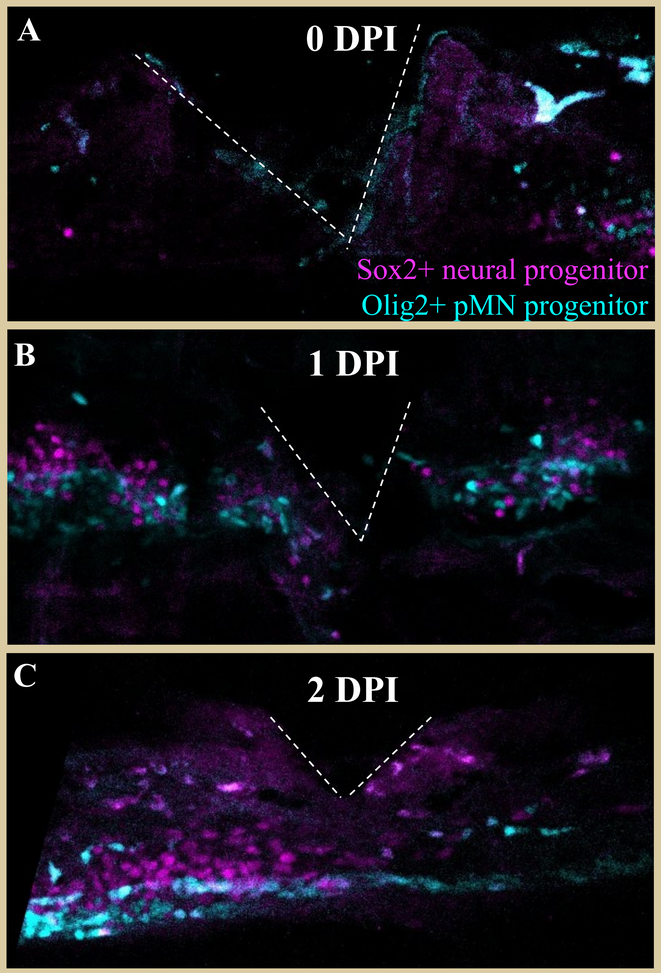
**Animal**: Zebrafish at the age of 5 days post fertilization (dpf)

**Spinal cord injury model**: Complete spinal cord transection.

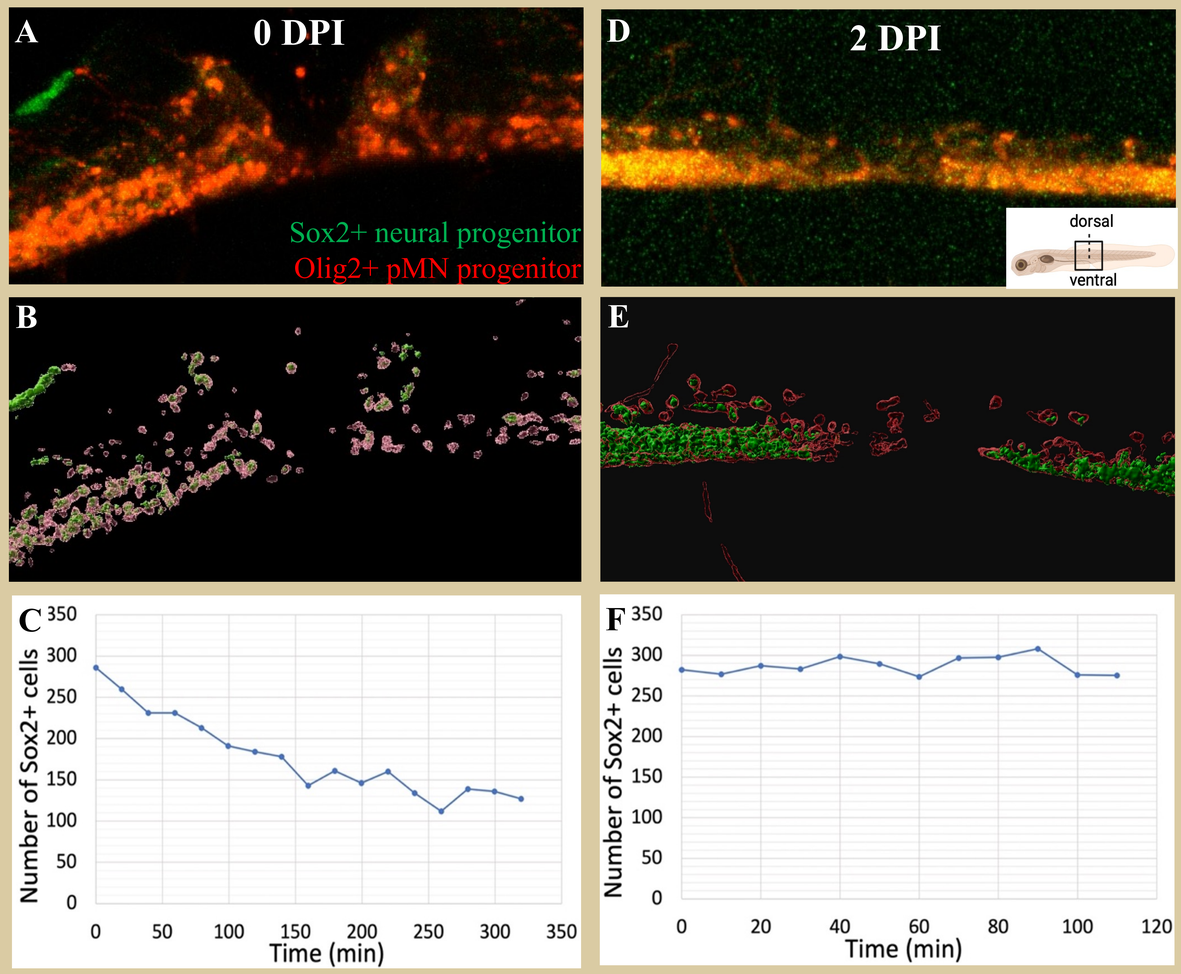



(John et al., 2022)

## The number of progenitors increases from day 0 to day 2 post-injury




## SCI results in progenitor cell death immediately after injury followed by a repopulation of progenitors by day 2 post-injury




## Conclusions

- Spinal cord injury initially causes progressive death of neural progenitors and pMN progenitors.
- The lost progenitors are then replenished at the injury site.
- The number of new progenitors reaches a steady point by two days after injury.
- Together, these findings indicate a potential post-injury repair mechanism driven by the regeneration of neural progenitors and pMN progenitors that can differentiate into motor neurons and oligodendrocytes.

## Future directions

- Use bulk RNA sequencing technique to study changes in gene expression at 0 DPI vs. 2 DPI.
- Use in situ RNA hybridization to further study the expression patterns of the genes identified by RNA sequencing, particularly those related to neural and pMN progenitors, motor neurons, and oligodendrocytes.
- Manipulate the identified genes and investigate their functions in SCI recovery.