



# Redefining the Treatment of Spinal Cord Injury

(Nasdaq: NVIV)  
Corporate Overview

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March 2023



# Forward looking statements

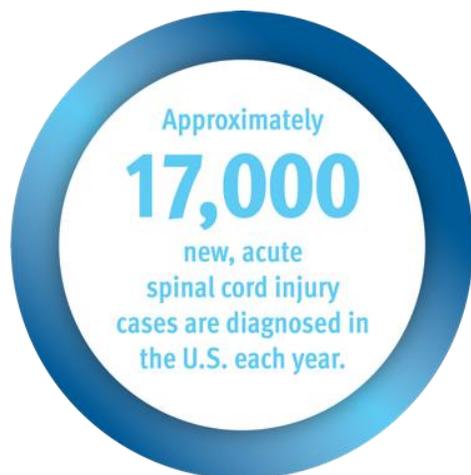
Any statements in this presentation about future expectations, plans and prospects for InVivo Therapeutics Holdings Corp. (the “Company”), including statements regarding the safety and effectiveness of the *Neuro-Spinal Scaffold*<sup>™</sup>, the anticipated value of the second pivotal study, the expected timing for the Company’s data read-outs, medical publications and presentations, the establishment of the *Neuro-Spinal Scaffold*<sup>™</sup> as the first and foundation of spinal cord injury (“SCI”) treatments, the status of the clinical program, and other statements containing the words “believes,” “anticipates,” “targets,” “plans,” “expects,” “estimates,” and similar expressions, constitute forward-looking statements within the meaning of The Private Securities Litigation Reform Act of 1995. Actual results may differ materially from those indicated by such forward-looking statements as a result of various important factors, including risks and uncertainties relating to the Company’s ability to raise capital and to initiate, conduct and complete its clinical trials; the Company’s ability to submit an HDE application and receive regulatory approval for the *Neuro-Spinal Scaffold*; the impact of the COVID-19 pandemic on the Company’s operations, the impact of achieving the Objective Performance Criterion on the U.S. Food and Drug Administration (the “FDA”) approval process; the Company’s ability to commercialize its products; the Company’s ability to develop, market and sell products based on its technology; the expected benefits and efficacy of the Company’s products and technology in connection with the treatment of spinal cord injuries; the availability of substantial additional funding for the Company to continue its operations and to conduct research and development, clinical studies and future product commercialization and other factors discussed in the “Risk Factors” section of our most recent annual report on Form 10-K filed with the Securities and Exchange Commission (the “SEC”) and in the Company’s other filings from time to time with the SEC. In addition, the forward-looking statements included in this presentation represent the Company’s views as of the date hereof and should not be relied upon as representing the Company’s views as of any date subsequent to the date hereof. The Company anticipates that subsequent events and developments will cause the Company’s views to change. However, while the Company may elect to update these forward-looking statements at some point in the future, the Company specifically disclaims any obligation to do so.

# Redefining the Treatment of Spinal Cord Injury (SCI)

- **Developing the Investigational Neuro-Spinal Scaffold™ for Acute SCI**
  - Technology licensed from MIT (Robert Langer's lab)
  - Unmet medical need: no treatment options available for acute SCI patients
  - Completed pivotal probable benefit study: INSPIRE 1.0; Second active pivotal study: INSPIRE 2.0
- **INSPIRE 1.0: Key Observations**
  - Demonstrated surgical feasibility of acute Neuro-Spinal Scaffold™ implantation
  - Reported AIS conversion rate that exceeds published natural history rates and Objective Performance Criterion; observed delayed conversions at 12 and 24 months
  - Applied learnings from INSPIRE 1.0 to mitigate risk in INSPIRE 2.0
- **INSPIRE 2.0: Pivotal Study of the Neuro-Spinal Scaffold™: Completion of Enrollment Achieved; Awaiting Top-line Results**
  - Encouraging data from single-arm INSPIRE 1.0 study supported follow-on study
  - 20-patient (two-arm, 10 subjects in each study arm) randomized, controlled trial designed to provide clinical data that will supplement the existing INSPIRE 1.0 clinical results
  - Company completed enrollment into study in June 2022 and anticipates top-line results in late Q1-2023
- **Desire to Expand Pipeline beyond the Neuro-Spinal Scaffold with Technologies that align with InVivo's Core Competencies**
  - Ongoing Joint Research Collaboration with Q Therapeutics, Inc.: Aims to evaluate the preclinical safety and feasibility of the Neuro-Spinal Scaffold™ with stem cells
- **\$16.4M in cash and cash equivalents at December 31, 2022; no debt**
  - Estimated that these cash resources will fund company operations into the first quarter of 2024



# Spinal Cord Injury: An Unmet Medical Need



- **Underserved patient population**

- Approximately 17,000 new cases of acute SCI per year in US<sup>1</sup>
- Patients affected by loss of motor, sensory and autonomic (bowel, bladder and sexual) function
- Only small percentage of patients ever regain function<sup>3</sup>
- Approximately 285,000 currently live with chronic SCI in US<sup>2</sup>
  - Chronic SCI: >6 months after injury

- **Direct cost of spinal cord injury**

- Cost of care for the first year post-SCI: \$350K - \$1.0M+<sup>2</sup>
- Net present value of the cost for a quadriplegic injured at 25 for life: \$4.8M+<sup>2</sup>

- **We seek to establish the Neuro-Spinal Scaffold™ as the foundation of the standard of care for acute SCI**

- To achieve greater gains, we expect a multi-disciplinary approach will be required, with the scaffold serving as a foundation for complementary technologies

1. Neurosurgeon & Payer Interviews; NSCISC 2017 Annual Report; Selvarajah *et al.*, *J. Neurotrauma* (2014); Outside Consultant Analysis.

2. National Spinal Cord Injury Statistical Center, Facts and Figures at a Glance. Birmingham, AL: University of Alabama at Birmingham, 2017.

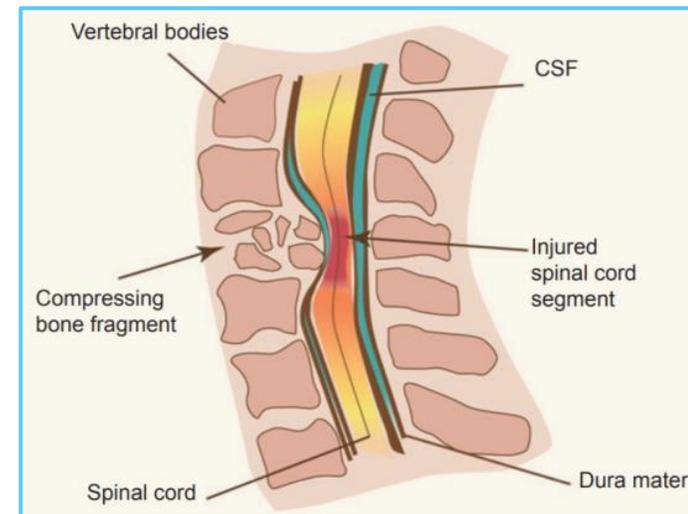
3. Guidelines for the conduct of clinical trials for spinal cord injury as developed by the ICCP panel: spontaneous recovery after spinal cord injury and statistical power needed for therapeutic clinical trials. *Spinal cord* (2007).

# Acute Management of Spinal Cord Injury

*Despite significant advances in surgical repair to the spinal column over recent decades, modern day acute management of SCI does not address repair of the spinal cord*

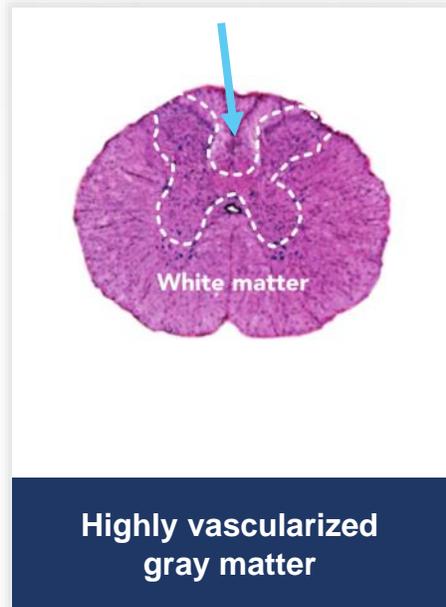
- **Currently available acute management of SCI:**

- Non-surgical management
  - Traction and bedrest to prevent additional trauma
- Surgical Management
  - Bony decompression and spinal column alignment and stabilization
  - Minimizes secondary injury and provides support to the spine
- Standard of care (SOC)
  - Early decompressive surgery that attempts to remove ongoing spinal cord compression

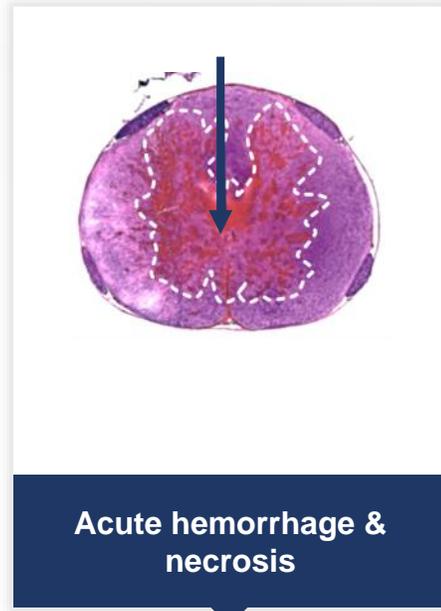


# Progression of Acute Spinal Cord Injury

## Healthy Spinal Cord



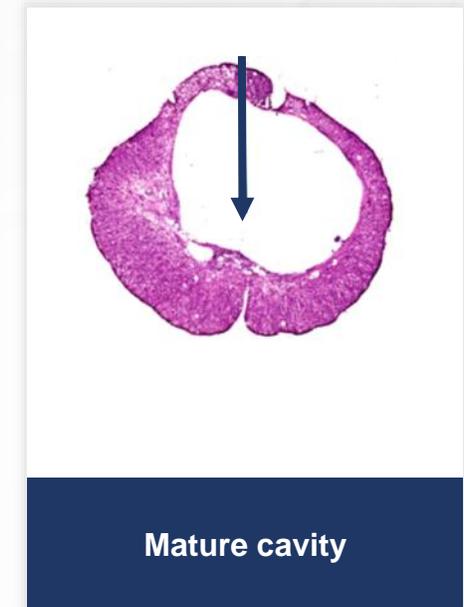
## Irreversible necrosis occurs shortly after injury



2 hours after SCI



24 hours after SCI

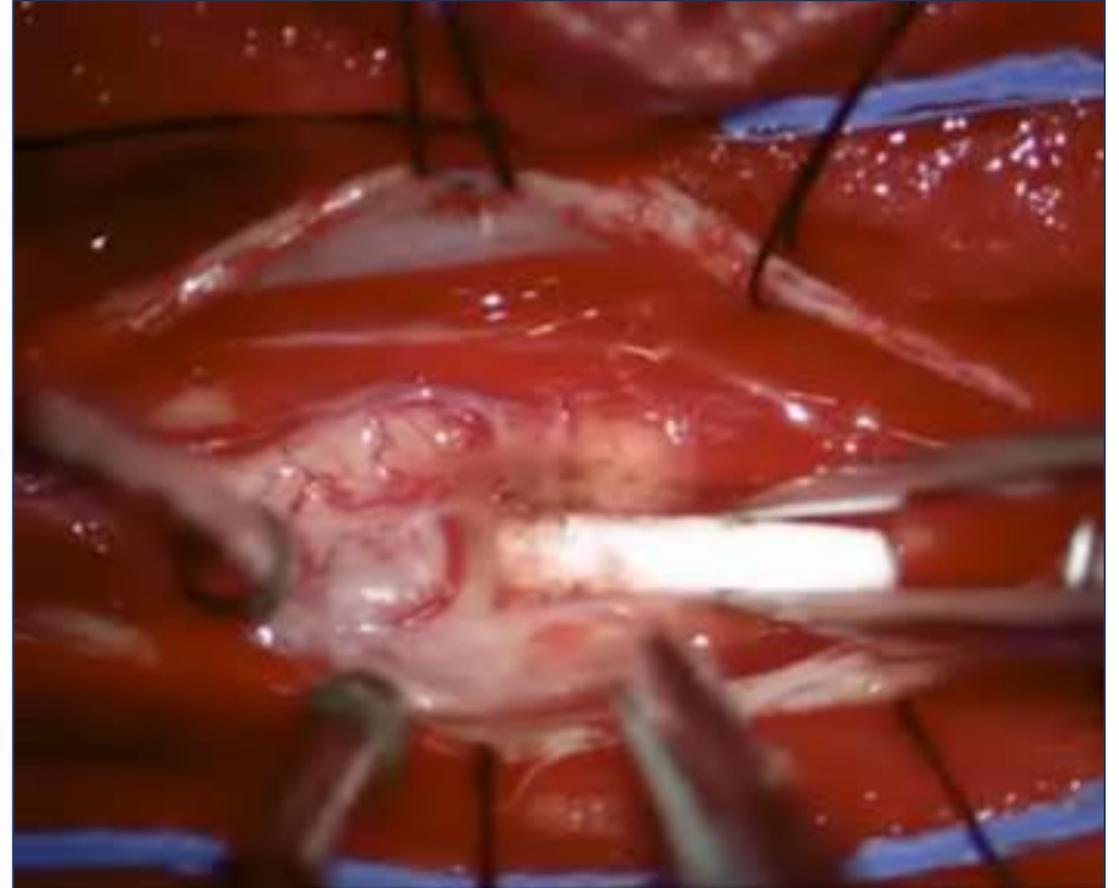
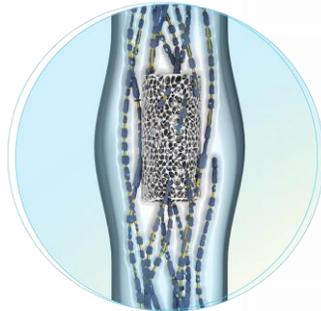
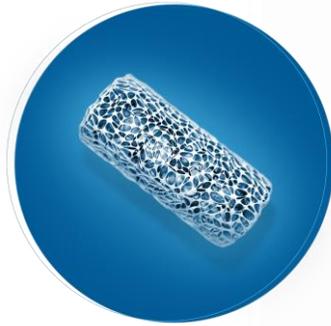


12 weeks after SCI

# Neuro-Spinal Scaffold™: InVivo's Approach for Acute SCI

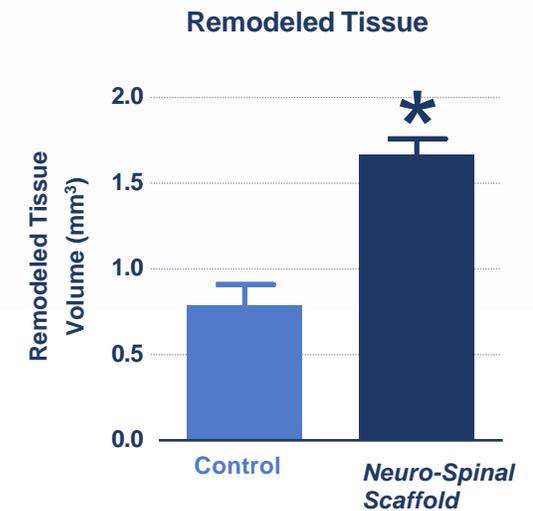
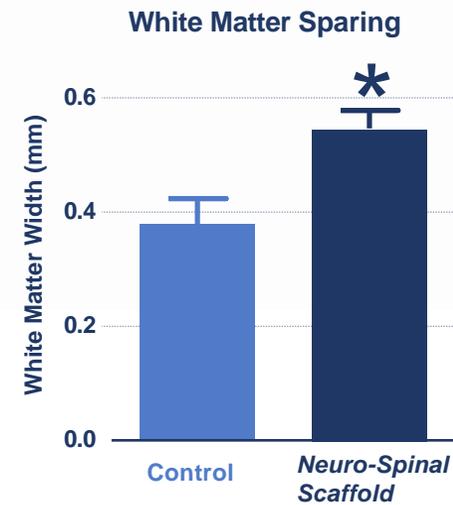
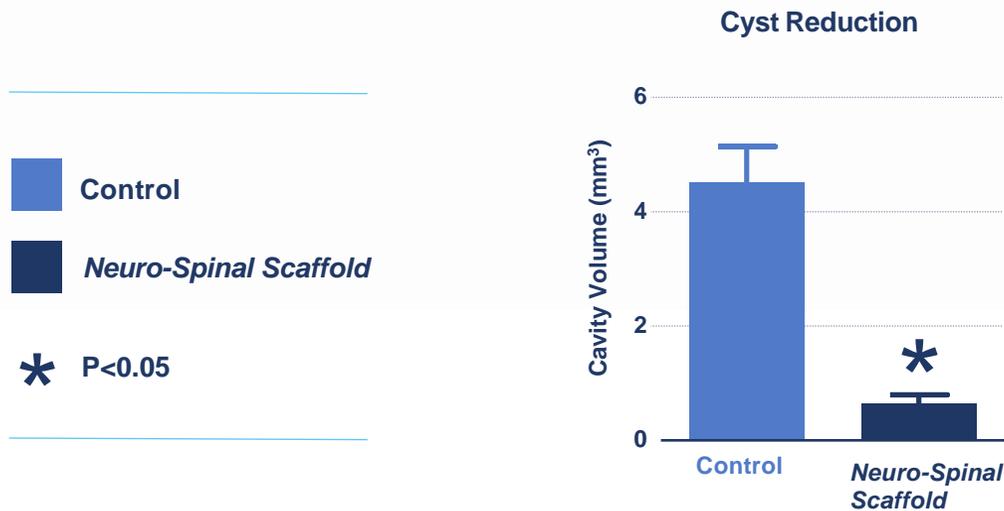
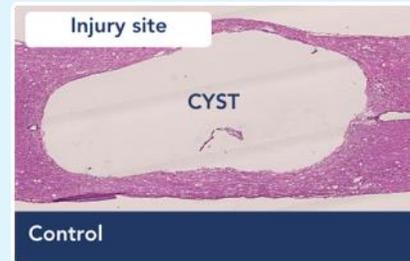
# Our Investigational Neuro-Spinal Scaffold™

- **Proprietary, highly porous PLGA-PLL biopolymer**
  - PLGA is the biodegradable skeleton along which cells can grow
  - Poly-L-Lysine promotes cellular adhesion
- **Scaffold is surgically implanted lengthwise into cavity created by SCI**
- **Issued patents covering the Neuro-Spinal Scaffold licensed from MIT and Boston Children's Hospital (expires 2027)**
- **InVivo introduced a novel surgical approach compared to the standard of care in connection with its Neuro-Spinal Scaffold implantation**



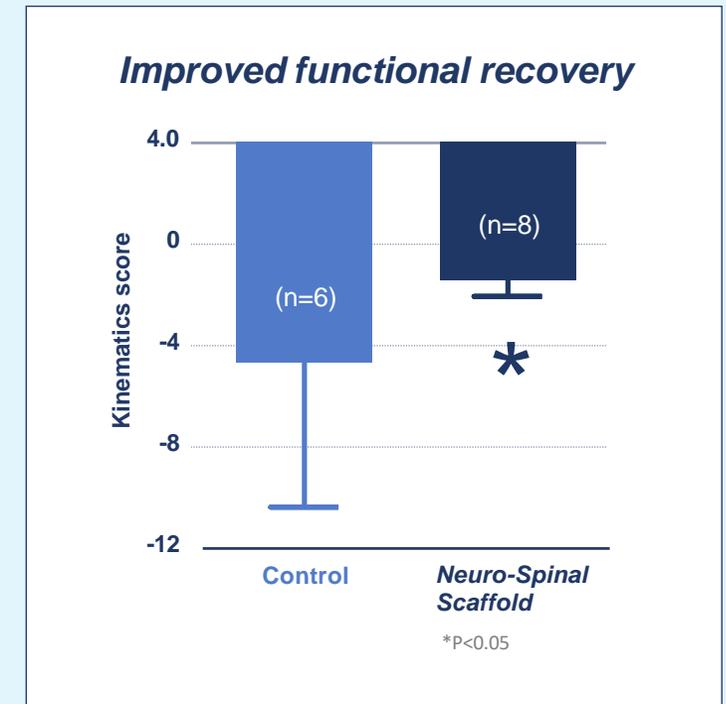
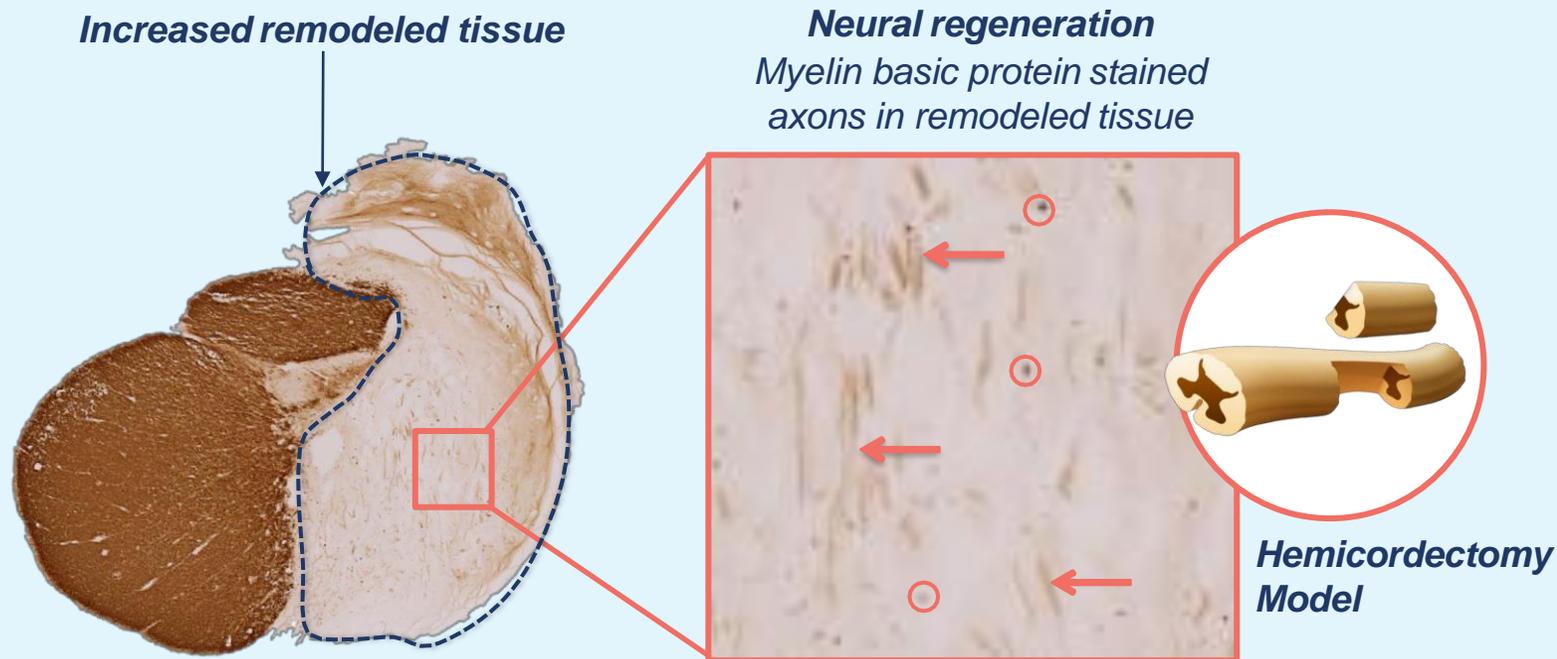
# Neuro-Spinal Scaffold™: Preservation of Macroscopic Spinal Cord Architecture in a Rat Model

Visualizing improvement: Rat model of acute spinal cord contusion injury (at 12 weeks)



# Neuro-Spinal Scaffold™: Aims to Promote Neural Regeneration and Functional Recovery

## Primate Hemicorpectomy Model (at 3 Months)

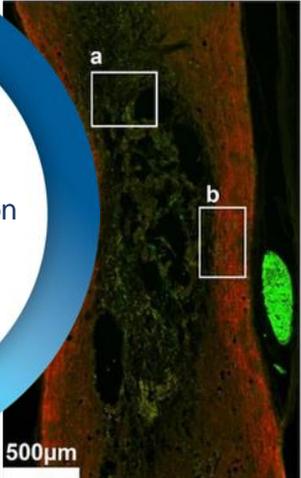


# Neuro-Spinal Scaffold™: Mechanism of Action

## Remyelination with Schwann Cells after Neuro-Spinal Scaffold™ Implantation\*

**Preservation**  
of white matter and reduction of cyst formation via appositional healing (i.e., spinal cord architecture)

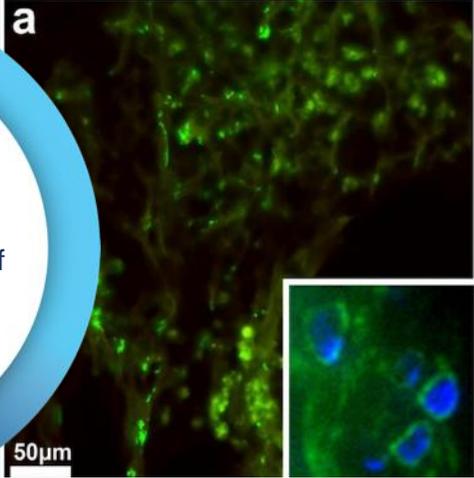
*Contusion Injury*



Central epicenter (a) and white matter (b)

**Neural regeneration**  
through the formation of neuro-permissive remodeled tissue

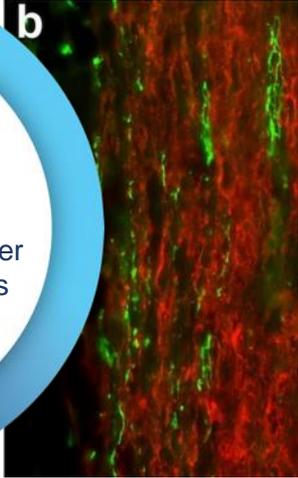
*Epicenter*



Schwann Cells aid neural regeneration

**Remyelination**  
of segmentally demyelinated white matter axons by Schwann cells

*White Matter*

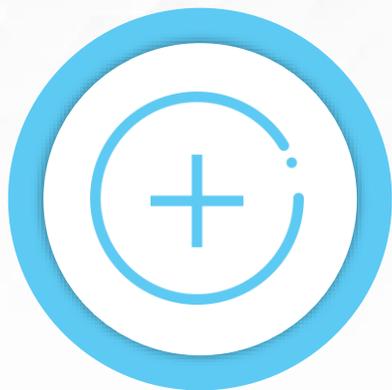


Schwann Cells restores signal transduction

\* Rat Acute Spinal Cord Contusion injury (at 12 weeks)

# Neuro-Spinal Scaffold™: Clinical and Regulatory Development Pathway

# Regulatory Pathway: Humanitarian Device Exemption (HDE)



## Benefit

- Provides less burdensome regulatory process (lower approval threshold)
- Demonstrate safety and probable benefit (rather than effectiveness)



## Market Advantage

- Eligible to be sold for profit for adult and pediatric patients (defined as patients age 21 and under)
- Device is intended for the treatment of a condition that occurs in and is labeled for use in pediatric patients or in a pediatric subpopulation



## 21st Century Cures Act

- InVivo's initial Humanitarian Use Device population: thoracic and cervical SCI patients with complete paralysis (AIS A)\*
- May allow InVivo to take advantage of the HDE pathway for patients with incomplete paralysis (AIS B and AIS C)\*
- Would require applying for expanded HUD and conducting a separate study

- As required by the Cures Act, the FDA published draft guidance that further defines the criteria for establishing "probable benefit" in June 2018
  - We reviewed this against our current clinical plan and believe that our plans remain appropriate and consistent with the draft guidance

# Neuro-Spinal Scaffold™ Foundational Study: INSPIRE 1.0

- **Trial Design:**

- 20-patient, single arm trial, evaluating whether the Scaffold is safe and demonstrates probable benefit for the treatment of AIS A T2-T12/L1 spinal cord injury (within 96 hrs. of injury)

- **Primary Endpoint:**

- Improvement in ASIA Impairment Scale (AIS) grade from baseline at 6 months

- **Trial Success Criterion (Objective Performance Criterion):**

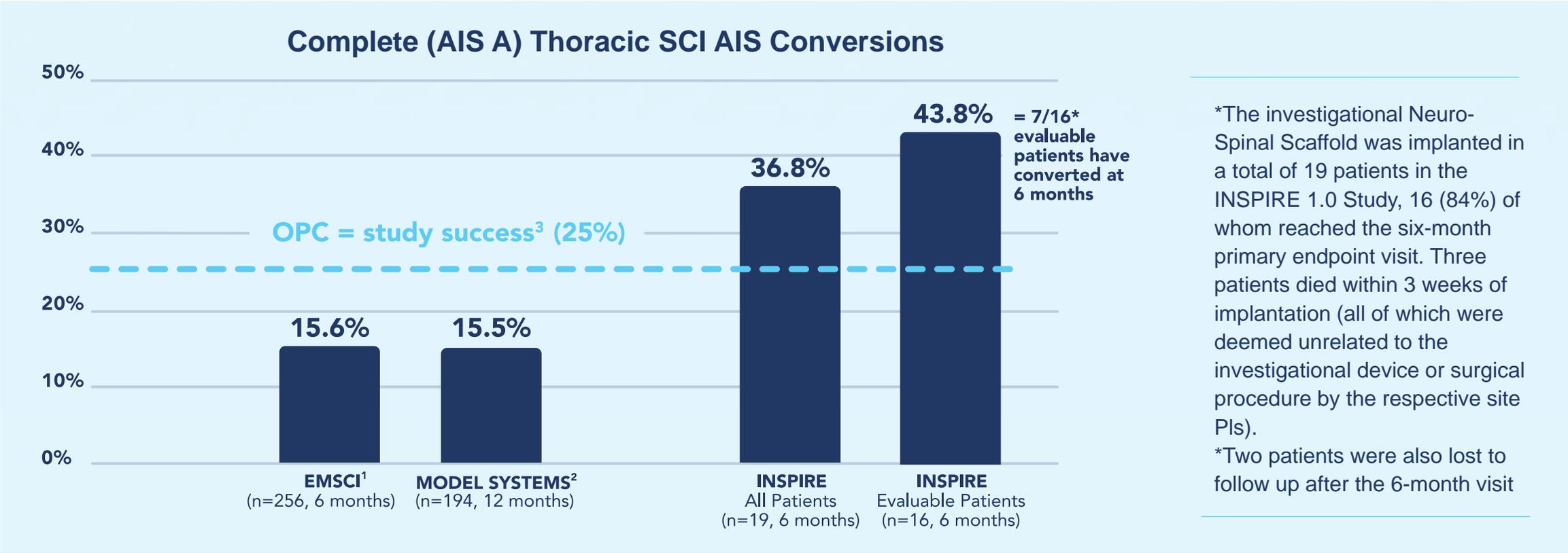
- At least 25% of subjects convert at least one AIS grade from baseline (AIS A)

## American Spinal Injury Association Impairment Scale (AIS)

Grade	Description
A	<b>Complete</b> — No motor or sensory function preserved in sacral segments (S4-5)
B	<b>Sensory Incomplete</b> — Sensory but no motor function preserved below level of injury and includes sacral segments
C	<b>Motor Incomplete</b> — Motor function preserved below level of injury; voluntary anal contraction OR sparing of motor function 3 levels below injury
D	<b>Motor Incomplete</b> — Similar to AIS but with at least half of key muscles below injury functioning against gravity
E	<b>Normal</b>

# INSPIRE 1.0: AIS Conversion Rate vs. Objective Performance Criterion for Evaluable Patients at 6 Months (Primary Endpoint)

Published historical benchmarks for AIS conversion rates were used to establish the OPC



1. Zariffa et al., Spinal Cord (2011); European Multicenter Study about Spinal Cord Injury (EMSCI)  
 2. Lee et al., J. Spinal Cord Med (2014); Spinal Cord Injury Model System (US)  
 3. Approval is not guaranteed if the OPC is met and HDE approval may still be obtained if OPC is not met if probable benefit outweighs the risk.

# Current Clinical Study: INSPIRE 2.0

## • Study Status

- Enrollment completed in June 2022
- Top-line data expected in Q1-2023

## • Study Design

- Subjects **randomized** to two treatment arms – Scaffold Arm and Comparator Arm (standard of care spine stabilization without dural opening/myelotomy)
  - **Single blind** – subjects and assessors blinded to treatment assignment
  - Plan to enroll 20 subjects (10 in each treatment arm) across US clinical sites
  - **Primary endpoint:** Improvement in ASIA Impairment Scale (AIS) grade at 6 months
  - Assessments at hospital discharge, 3, 6 (primary endpoint), 12 and 24 months
- ## • Definition of Success (per the protocol):
- Proportion of subjects with AIS grade improvement assessed at 6 month follow-up timepoint

## INSPIRE 2.0 Clinical Sites



% Scaffold Arm subjects  
w/AIS grade improvement



% Comparator Arm subjects  
w/AIS grade improvement

≥ 20% = SUCCESS

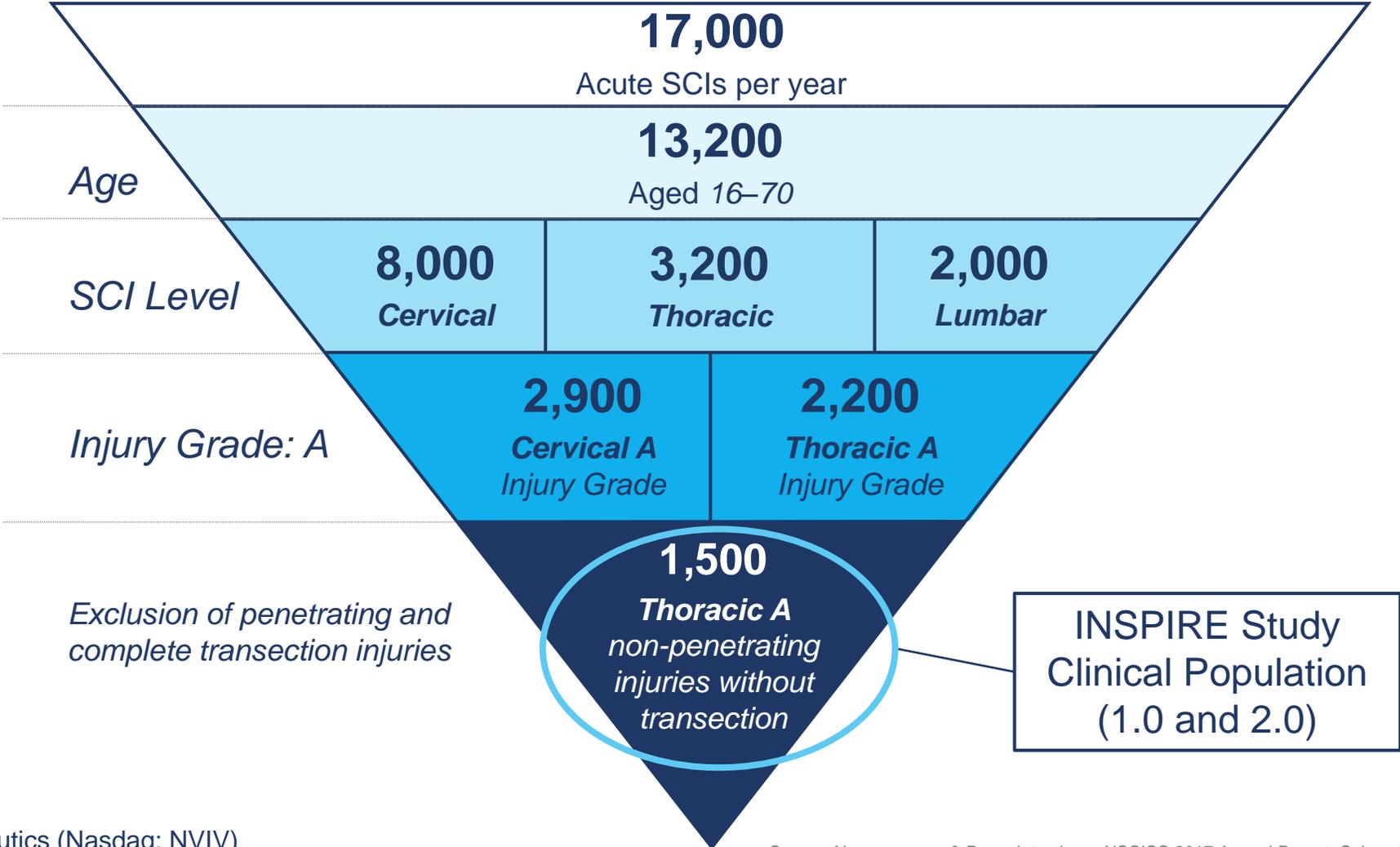
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# Recent and Anticipated INSPIRE 1.0 and 2.0 Milestones

2021	Q1	<ul style="list-style-type: none"> <li>• <a href="#">Publication</a> of six-month data in <i>Journal of Neurosurgery: Spine</i> (INSPIRE 1.0)</li> <li>• Submission of updated preclinical module (Mod. 1)</li> </ul>
	Q2	<ul style="list-style-type: none"> <li>• FDA acceptance of preclinical module (Mod. 1)</li> </ul>
	Q3	<ul style="list-style-type: none"> <li>• Joint submission for publication of 12 and 24-month data (INSPIRE 1.0)</li> </ul>
	Q4	<ul style="list-style-type: none"> <li>• Submission of manufacturing module (Mod. 2)                             <ul style="list-style-type: none"> <li>• <i>Working through feedback received from FDA in June 2022</i></li> </ul> </li> </ul>
2022	Q2	<ul style="list-style-type: none"> <li>• Acceptance of <a href="#">publication</a> of 12 and 24-month data (INSPIRE 1.0)</li> </ul>
2023	Q1	<ul style="list-style-type: none"> <li>• Late Q1: Anticipated top-line results from INSPIRE 2.0 Study</li> </ul>

# Neuro-Spinal Scaffold™: Epidemiology and Development Plans

# INSPIRE Study Clinical Population Patient Distribution



# Neuro-Spinal Scaffold™: Potential Synergies with Other Technologies

- Our goal is to improve the quality of life for spinal cord injury patients
- To achieve greater gains, we expect a multi-disciplinary approach will be required, with the scaffold serving as a foundation for complementary technologies
- We are exploring the potential to use our learnings gained from the scaffold in conjunction with stem cells, electrical stimulation or therapeutics
  - Established Joint Research Collaboration with Q Therapeutics evaluating the preclinical safety and feasibility of the Neuro-Spinal Scaffold™ with stem cells



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