Proprietary Neuromodulation product/platform originated at Univ. of Iowa and Univ. of Virginia

Addressing significant medical need for better patient outcomes through innovative technology & expertise

Focused on large and growing existing medical device markets with dynamic competitive factors

Led by experienced management, board and expert resources for capital-efficient business model

Established corporate partnership to accelerate development timelines and reduce capital needs

Currently raising $2M Seed round to fund key product development and regulatory milestones, Series A round
Chronic Pain Suffering

- Nearly 100 million Americans suffer from chronic pain\(^1\) more than cancer or heart disease individually and costing more than both combined.
- Low back pain alone costs the US $50 billion annually in healthcare and economic costs according to NIH.
- Spinal Cord Stimulation (SCS) for the treatment of chronic pain has been around for 40 years.

Medical Data International, Report 1620, Pain Management Products
SCS Market

• Current SCS market is ~$1.6 Billion in revenues and growing at ~8-10%

• Projected to grow to >$2.3 Billion by 2017

• Three leading medical devices companies dominate the market:
Current SCS Systems

• ALL current SCS devices are Extra-Dural (ExSCS)

Functional Access to Spinal Cord Pathways
Using Current Extra-Dural SCS Devices  < 1 %

Poor Activation Pattern = Suboptimal Results
< 50% of patients report > 50% pain relief
HSCMS Research Group

- **Human Spinal Cord Modulation System (HSCMS) Research Group**
  - Initiated in 2011 by Iowa Department of Neurosurgery
  - Internally funded, over ~$2.0M in direct departmental resources invested
  - Interdisciplinary and inter-institutional consortium established and ongoing

- University of Iowa: Neurosurgery, Anesthesiology & Pain, Pathology, Orthopedics, and Rehabilitation Medicine

- Iowa State University: Veterinary Research

- University of Virginia: Medical Physics and Biomedical Engineering

- **Goal:** design, develop and test a new spinal modulation system that overcomes all prior barriers to the direct delivery of electrical stimuli to targeted regions of the human spinal cord
HSCMS/Iowa-Patch (I-Patch) Innovation

- Novel electrode and lead body designed to enable safe, chronic direct stimulation of the spinal cord surface
- Potential to modulate >100x targeted axons vs. ex-SCS
Proprietary Features:
• Pial surface electrode array
• Intradural mobility
• Permanent dural seal
• Reliable fixation
• ABI predicate materials
**DSTI**

100% virtual company, consultants and partners contracted for developing technology and IP; exclusive license from UIRF

**Industry Partners**
Evergreen Medical Technologies
Cochlear Ltd

**HSCMS Research Partners**
University of Iowa
Iowa State University
University of Virginia

**Development & Business Advisors**
Todd Langevin, ex Medtronic Neuro GM; F(NM)
Martin Rossing, ex Medtronic; CVRx

**Clinical & Scientific Advisors**
Andres Lozano, MD/PHD, NS Chair U of Toronto
Ralph Dacey, MD, NS Chair, Wash U
Sean Grady, MD, NS Chair, U PENN
Andre Machado, MD, NS, Cleveland Clinic
Bob Grossman, MD, NS ex Chair, Baylor
DSTI Leadership - Board

**Matthew A. Howard, III, MD**
Co-Founder, Director DSTI
Professor and Chair, Department of Neurosurgery
Carver College of Medicine, University of Iowa
Co-founder, Director, Stereotaxis, Inc.
Inventor on >25 issued and 3 pending patents

**Daniel J. O’Connell**
Co-Founder, CEO, Director DSTI
Co-Founder, CEO, Functional Neuromodulation Ltd.
Co-Founder, Managing Partner, NeuroVentures
15 years venture investment and start-up experience with Neuro/CNS companies

**Wm. Andrew Steele, MD**
Director, Lead Investor Seed Round
Co-Founder, CEO, AMS; Oakstone
Industry Partners

NSW, Australia

*Providing DSTI with access to devices and regulatory filings*

[www.cochlear.com](http://www.cochlear.com)

St. Paul, MN
Leading medical device development firm. Neuromodulation experts

*Providing DSTI with product development and manufacturing*

[www.evergreenmedtec.com](http://www.evergreenmedtec.com)
DSTI / HSCMS I-Patch System

- 4 patents filed, exclusive license from UIRF
- Design Validation Complete
- 17 peer-reviewed papers published or in press
Risk Profile

• Typical for Standard Neurosurgical Procedures
UIHC Support for Phase I Human Pilot

- March 28, 2014 -- University of Iowa Hospitals and Clinics (UIHC) Letter of Support
- UIHC to fund clinical and surgical costs for First in Human pilot study
- 12 subjects up to $60k each
Next Steps

• Complete pre-GLP ovine testing
• Initiate design controls and manufacture systems
• Initiate GLP chronic ovine testing
• Analyze laboratory findings
• Prepare and submit IDE application
• Initiate human pilot trial
2H 2013
Seed Investment
$1M CLOSED

Establish Company, license IP, support development
Close partnership Pre-IDE FDA

1H 2014
Follow-on Seed
$1M OPEN

Device V&V
Chronic animal testing
FIH Protocol
IDE prep

2H 2014
Series A Round
$4M - $6M

GLP testing
File IDE
Approved IDE
FIH Pilot
Proof of Concept / Pilot Study
Seed Financing - Convertible Notes

- Round open up to $2M
- Terms are fixed through period
- 8% interest, maturing June 1, 2015
- Convertible into Series A PS at ≥$4M Raised, 20% discount to PS A price
- Closed on $1M Oct 2013
- Current cash $650K, monthly burn ~$30K
Milestones & Timeline

2014

Pre-Clinical Development & GLP Testing

Seed $2M

2015

Leveraging partnerships enables efficient and economic move into FIH clinical study

2016

Virtual team affords flexible burn rate and ability to tap non-dilutive funds both academic and SBIR/STTR

2017

2018

2019

2020

Phase I FIH

Proof of Concept

US/EU Pivotal

PMA

Launch

Strategic Options / M&A Exit

Series A $4-6M

Series B $40-50M

Direct Spinal Therapeutics Inc.
DSTI Summary

• Innovative product/platform opportunity
• Targeted at large unmet medical need
• Strong industry and research leadership
• Capital-efficient development plan with non-dilutive funding support
• First in human clinical study at UIHC enables fundamental proof of concept
• Growing strategic M&A and financing interest
Neuromod/SCS Therapy Landscape

current leaders

Medtronic  Boston Scientific  St. Jude Medical

emerging competitors

Axonics  NEVRO  Spinal Modulation  algostim  QiG group  Greatbatch Medical

Interested parties

Abbott  Cochlear  Johnson & Johnson  Covidien  Stryker
## Select Neuromodulation Transactions

<table>
<thead>
<tr>
<th>Year</th>
<th>Company</th>
<th>Deal</th>
<th>Market</th>
<th>Value</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Advanced Bionics</td>
<td>Acquired by Boston Scientific</td>
<td>SCS Pain / Auditory</td>
<td>$1.15b</td>
<td>$82m revs</td>
</tr>
<tr>
<td>2005</td>
<td>Advanced Neuromodulation Systems</td>
<td>Acquired by St. Jude Medical</td>
<td>SCS Pain</td>
<td>$1.3b</td>
<td>$145m revs</td>
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<tr>
<td>2005</td>
<td>Transneuronix</td>
<td>Acquired by Medtronic</td>
<td>PNS Obesity</td>
<td>$250m up front ~$500m contingent</td>
<td>$0 / Phase II</td>
</tr>
<tr>
<td>2006</td>
<td>Northstar Neuroscience</td>
<td>IPO</td>
<td>CS Stroke</td>
<td>$110m raised $450m mkt cap</td>
<td>$0 / Phase II</td>
</tr>
<tr>
<td>2007</td>
<td>Cyberonics</td>
<td>License to J&amp;J</td>
<td>VNS Obesity</td>
<td>$9.5m up front</td>
<td>$0 / Pilot</td>
</tr>
<tr>
<td>2007</td>
<td>Enteromedics</td>
<td>IPO</td>
<td>VNS Obesity</td>
<td>$40m raised $130m mkt cap</td>
<td>$0 / Phase II</td>
</tr>
<tr>
<td>2008</td>
<td>NDI Medical</td>
<td>IP acquired by Medtronic</td>
<td>PNS Urology</td>
<td>$42m</td>
<td>$0 / Phase II</td>
</tr>
<tr>
<td>2010</td>
<td>BioControl</td>
<td>Strategic deal with Medtronic</td>
<td>VNS HF</td>
<td>$70m investment (debt) M&amp;A option $550m / $350m</td>
<td>CE Mark / Phase II</td>
</tr>
<tr>
<td>2011</td>
<td>IntElect Medical</td>
<td>Acquired by Boston Scientific</td>
<td>DBS PD</td>
<td>~$80m</td>
<td>$0 / Phase II</td>
</tr>
<tr>
<td>2013</td>
<td>Spinal Modulation</td>
<td>Strategic deal with St. Jude Medical</td>
<td>SCS DRG</td>
<td>$40m investment M&amp;A option $300m</td>
<td>CE Mark / Phase II</td>
</tr>
</tbody>
</table>
Thank you

Q&A

Dan O’Connell, CEO
djo@neuroventures.com
Cell 434-242-0571
Current IP

• Exclusive License from UIRF for all I-Patch IP
• 4 patents filed
  – Core I-Patch Patent, Direct Cord Stimulation Device for
treatment of Pain and other nervous systems disorders
  – I-Patch device design and implantation/anchoring mechanism
  – I-Patch device and system for delivery of high-frequency
  neuromodulation therapy
  – On-board support struts for maintaining position of device on
the cord
• Attorneys: Kilpatrick Townsend (Mark Barrish)
  – Long standing device IP expertise
  – Prior art and FTO review clean