

# Jennifer Natalie Dulin

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## RESEARCH INTERESTS

My research focuses on cellular and molecular approaches to reconstruct neural circuitry and restore neurological function after spinal cord injury.

## EDUCATION

2012 **Ph.D., Neuroscience**, University of Texas Health Science Center – Houston  
2005 **B.S., Biochemistry**, Texas A&M University

## PROFESSIONAL EXPERIENCE

2017 - present **Assistant Professor**, Department of Biology, Texas A&M University  
2012 - 2017 **Postdoctoral Fellow**, Department of Neurosciences, University of California, San Diego (Advisor: Mark Tuszynski, M.D., Ph.D.)  
2008 - 2012 **Graduate Student**, University of Texas Health Science Center – Houston (Advisor: Raymond Grill, Ph.D.)  
2009 **NINDS Spinal Cord Injury Research Training Program**, Ohio State University  
2007 - 2008 **Research Assistant II**, Department of Anesthesiology and Pain Medicine, MD Anderson Cancer Center (Advisor: Howard Gutstein, M.D.)  
2005 - 2006 **Research Assistant**, Department of Developmental Biology, UT Southwestern Medical Center (Advisor: Q. Richard Lu, Ph.D.)  
2002 - 2005 **Research Assistant**, Department of Medical Biochemistry and Genetics, Texas A&M University (Advisor: J. Martin Scholtz, Ph.D.)

## HONORS & AWARDS

2018 Southeastern Conference (SEC) Faculty Travel Grant  
2017 College of Science Travel Award, Texas A&M  
2017 TIRR Foundation Fellow  
2012 3<sup>rd</sup> place, McGovern Award for Presentation Skills, UT Houston  
2011 Dean's Research Award, UT Houston

## RESEARCH SUPPORT

### **Current Support:**

Connectivity Mapping of Neural Stem Cells for Restoring Locomotor Function

Paralyzed Veterans of America Research Foundation 04/01/18 – 03/31/20 (\$145,498)

Major Goals: To address the gap in our current understanding of the mechanisms by which spinal cord neural stem cell grafts can promote motor functional recovery following spinal cord injury.

Role: PI

Neural Stem Cells for Mitigating Pain after Spinal Cord Injury

Craig H. Neilsen Foundation 07/31/18 – 07/30/20 (\$299,135)

Major Goals: To test the hypothesis that spinal cord neural stem cells grafted into sites of spinal cord injury will restore inhibitory inputs onto dorsal horn pain-processing neurons at and below the site of injury, thereby attenuating hyperactive nociceptive signaling.

Role: PI

Chemogenetic Silencing of Nociceptors to Enhance Motor and Sensory Outcomes following SCI

TIRR Foundation 12/01/17 – 12/31/19 (\$50,000)

Major Goals: To test the hypothesis that silencing nociceptor activity during the acute phase of spinal cord injury will (1) attenuate the development of enhanced mechanical reactivity and pain-associated behaviors, and (2) enhance recovery of motor function.

Role: PI

**Completed or Declined Support:**

Optimizing Neural Progenitor Cell Grafts for Motor and Sensory Outcomes  
VA Career Development Award (CDA-2) 07/01/17 – 06/30/22 (\$960,625)  
*Award recommended for funding but declined.*

Major Goals: To identify the specific classes of graft-derived neurons that best support the formation of new circuitry and to examine their ability to improve functional recovery. This project will establish a new framework for understanding the most functionally important types of graft-derived neurons for motor and sensory outcomes, and will use new approaches to generate human spinal cord grafts enriched for these cell types.

Role: PI

Corticospinal Tract Regeneration via NF- $\kappa$ B Inhibition  
Craig H. Neilsen Foundation Postdoctoral Fellowship 01/01/15 – 12/31/16 (\$138,908)

Major Goals: To investigate the role of NF- $\kappa$ B signaling in promoting regeneration of injured corticospinal axons into neural stem cell grafts transplanted into sites of spinal cord injury.

Role: Fellow (Mentor: Mark Tuszynski)

Investigating P-glycoprotein Modulation by Inflammation in Spinal Cord Injury  
NIH CTSA TL1RR024247 04/01/10 – 03/31/12 (\$65,000)

Major Goals: To identify mechanisms driving P-glycoprotein-mediated multidrug resistance at the blood-spinal cord barrier following spinal cord injury, and reverse this drug resistance to achieve greater blood-to-spinal cord penetration of neuroprotective drugs after injury.

Role: Trainee (Mentor: Raymond Grill)

**JOURNAL ARTICLES**

**MyBibliography:** <https://www.ncbi.nlm.nih.gov/sites/myncbi/1z11drgg1CvQ8/bibliography/51235691/>

**Google Scholar:** <https://scholar.google.com/citations?user=U9lqWAQAAAAJ>

1. Koffler J, Zhu W, Qu X, Platoshyn O, **Dulin JN**, Brock J, Graham L, Lu P, Sakamoto J, Marsala M, Chen S, Tuszynski MH. Biomimetic 3D-printed scaffolds for spinal cord injury repair (2019). *Nature Medicine*. Online.
2. Poplawski GHD, Lie R, Hunt M, Kumamaru H, Kawaguchi R, Lu P, Schäfer MKE, Woodruff G, Robinson J, Canete P, **Dulin JN**, Geoffroy CG, Menzel L, Zheng B, Coppola G, Tuszynski MH (2018). Adult rat myelin enhances axonal outgrowth from neural stem cells. *Science Translational Medicine* 10(442): eaal2563. PMID: 29794059.
3. Patel A, Li Z, Canete P, Strobl H, **Dulin J**, Kadoya K, Gibbs D, Poplawski GHD (2018). AxonTracer: A novel ImageJ plugin for automated quantification of axon regeneration in spinal cord tissue. *BMC Neuroscience* 19(1): 8. PMID: 29523078.
4. **Dulin JN\***, Adler AF\*, Kumamaru H, Lee-Kubli C, Poplawski G, Strobl H, Gibbs D, Kadoya K, Lu P, Fawcett JW, Tuszynski MH (2018). Injured adult motor and sensory axons regenerate into appropriate organotypic domains of neural progenitor grafts. *Nature Communications* 9(1):84. PMID: 29311559. \*Co-first authors. [10 citations]
5. Rocca CJ, Goodman SM, **Dulin JN**, Haquang JH, Gertsman I, Blondelle J, Smith JLM, Heyser CJ, Cherqui S (2017). Transplantation of wild-type mouse hematopoietic stem and progenitor cells ameliorates deficits in a mouse model of Friedreich's Ataxia. *Science Translational Medicine* 9(413): eej2347. PMID: 29070698. [5 citations]
6. Kadoya K, Lu P, Nguyen K, Lee-Kubli C, Kumamaru H, Yao L, Knackert J, Poplawski G, **Dulin JN**, Strobl H, Takashima Y, Biane J, Conner J, Zhang S-C, Tuszynski MH (2016). Spinal cord

reconstitution with homologous neural grafts enables robust corticospinal regeneration. *Nature Medicine* 22(5): 479-87. PMID: 27019328 [79 citations]

7. **Dulin JN**, Moore ML, Grill RJ (2013). The dual cyclooxygenase/5-lipoxygenase inhibitor licofelone attenuates P-glycoprotein-mediated drug resistance in the injured spinal cord. *Journal of Neurotrauma* 30(3): 211-26. PMID: 22947335 [12 citations]
8. **Dulin JN**, Karoly ED, Wang Y, Strobel HW, Grill RJ (2013). Licofelone modulates neuroinflammation and attenuates mechanical hypersensitivity in the chronic phase of spinal cord injury. *Journal of Neuroscience* 33(2): 652-64. PMID: 23303944 [35 citations]
9. **Dulin JN**, Moore ML, Gates KW, Queen JH, Grill RJ (2011). Spinal cord injury causes sustained disruption of the blood-testis barrier in the rat. *PLoS ONE* 6(1): e16456. PMID: 21298060 [17 citations]
10. Bockhorst K, Narayana P, **Dulin J**, Liu R, Rea H, Hahn K, Wosik J, Perez-Polo J (2010). Normobaric hyperoximia increases hypoxia-induced cerebral injury: DTI study in rats. *Journal of Neuroscience Research* 88(5): 1146-56. PMID: 19885827 [12 citations]
11. Wang SZ, **Dulin J**, Wu H, Hurlock E, Lee SE, Jansson K, Lu QR (2006). An oligodendrocyte-specific zinc-finger transcription regulator cooperates with Olig2 to promote oligodendrocyte differentiation. *Development* 133(17): 3389-98. PMID: 16908628 [104 citations]

## REVIEW ARTICLES

1. Van Niekirk EA, Tuszynski MH, Lu P, **Dulin JN** (2016). Molecular and cellular mechanisms of axonal regeneration after spinal cord injury. *Molecular and Cellular Proteomics* 15(2):394-408. Invited review for Special Issue: Focus on Neuroproteomics. PMID: 26695766 [22 citations]
2. **Dulin JN**, Antunes-Martins A, Chandran V, Costigan M, Lerch JK, Willis DE, Tuszynski MH (2015). Transcriptomic approaches to neural repair. *Journal of Neuroscience* 35(41): 13860-13867. Invited review for 2015 SfN annual meeting issue. PMID: 26468186 [13 citations]
3. **Dulin JN** and Lu P (2014). Bridging the injured spinal cord with neural stem cells. *Neural Regeneration Research* 9(3): 229-231. Minireview. PMID: 25206804 [11 citations]

## BOOK CHAPTER

1. Conner JM, Bain GL, **Dulin JN**. Intraspinal and intracortical delivery of AAV vectors for intersectional circuit tracing in non-transgenic species. In M. Castle (Ed.), *Adeno-Associated Virus: Methods and Protocols*. Springer. In press.

## OTHER

1. Vita SM, **Dulin JN** (2018). In Memoriam: Ray Grill (1966–2018). *Neural Regeneration Research* 13(8): 1488.

## INVITED TALKS

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|------|--|
| 2018 | Combating Pain Signaling to Boost Functional Outcomes after Spinal Cord Injury, <i>TIRR Foundation meeting</i> , Houston, TX.  |
| 2018 | Optimizing Neural Progenitor Cell Grafts to Restore Function after Spinal Cord Injury, <i>Thomas Jefferson University</i> , Philadelphia, PA.  |
| 2017 | Characterizing New Connections between the Injured Spinal Cord and Neural Stem Cell Grafts, <i>Mission Connect Scientific Meeting</i> , Houston, TX.   |
| 2017 | Cellular Mechanisms of Axon Regeneration into Neural Stem Cell Grafts following Spinal Cord Injury, <i>Interdisciplinary Center for Neurosciences (IZN) Lecture Series</i> , Heidelberg University, Germany. |
| 2015 | Speaker and mini-symposium coordinator, Society for Neuroscience 2015 “Transcriptomic Approaches to Neural Repair”, Chicago, IL  |

2014 Invited speaker, UCSD HeadNorth Neural Injury and Regeneration Symposium

### **CLASSES TAUGHT**

BIOL 644 / NRSC 644 Neural Development  
BIOL 489 / NRSC 489 Neural Development

### **PROFESSIONAL SERVICE**

**Ad-hoc journal review:** *PLoS ONE, Journal of Neurotrauma, eNeuro, EBioMedicine*

#### **Grant review committees:**

2019 Ad hoc panel member, Career Development Award panel (Winter 2018),  
Rehabilitation Research & Development, Department of Veterans Affairs  
2018 Reviewer, Clinical Research Panel (PVA19), Paralyzed Veterans of America

#### **Departmental and University service:**

2019 Member, Graduate Diversity Fellowship Committee, *College of Science*  
2018 – Microbiology/Developmental Biology Faculty Search Committee, *Department of Biology*  
2018 – Member, Undergraduate Program Committee, *Texas A&M Institute for Neuroscience*  
2018 Judge, Scientific Symposium Poster Session, *Mission Connect*  
2018 Judge, Student-Postdoc Research Conference, *Department of Biology*  
2018 – Seminar Series Committee, *Department of Biology*  
2018 Support Staff Award Committee, *Department of Biology*  
2018 Spinal Cord Injury Faculty Search Committee, *Texas A&M University*

### **PROFESSIONAL AFFILIATIONS**

Texas Brain and Spine Institute, 2018 – present  
Texas A&M ADVANCE Science Scholars, 2018 – present  
Texas A&M Institute for Neuroscience, 2018 – present  
Society for Neuroscience, 2008 – present  
Mission Connect, 2008 – 2012 (student member), 2017 – present (member)