

## Curriculum Vitae

**Name:** Aaron DiAntonio

**Work Address:** Dept. of Developmental Biology  
Washington University School of Medicine  
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St. Louis, MO 63110

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### Current Position

Alan A. and Edith L. Wolff Professor of Developmental Biology  
Department of Developmental Biology  
Washington University School of Medicine 1999-present

### Education

Postdoctoral Fellow  
Advisor: Dr. Corey Goodman  
University of California, Berkeley, 1995-1999  
Genetic Analysis of Synaptic Homeostasis

Ph.D. in Molecular and Cellular Physiology awarded in 1995  
Stanford University Medical School  
Thesis Advisor: Dr. Thomas Schwarz  
Synaptic Transmission in *synaptotagmin* Mutants of *Drosophila*

M.D. awarded in 1995  
Stanford University Medical School

M.Phil. in Biochemistry awarded in 1989  
Emmanuel College, Cambridge University  
Thesis Advisor: Dr. Michael Wilcox

A.B. *summa cum laude* in Biochemistry and Molecular Biology  
awarded in 1988  
Harvard College  
Honors research directed by Dr. Guido Guidotti

### Honors and Awards

Alan A. and Edith L. Wolff Professorship, Endowed Chair, Washington University, 2014

Dean's Award Lecture in Neuroscience, LSU Health Sciences Center, 2012

Visiting Professor for Senior International Scientists, Chinese Academy of Sciences, 2011

Outstanding Faculty Mentor Award, Graduate Student Senate, Washington University, 2011

Outstanding Faculty Mentor Award, Postdoctoral Society, Washington University, 2008

Helen Hay Whitney Fellow

University of California, Berkeley, 1996-1998

Damon Runyon-Walter Winchell Fellow

University of California, Berkeley, 1996

Medical Scientist Training Program Fellow

Stanford University Medical School, 1989-1995

Hershel Smith Harvard Scholarship

Harvard College, 1988

Awarded to one graduating senior for the study of science at Cambridge University.

Phi Beta Kappa

Harvard College, 1988

## **Professional Experience**

### **Current Teaching:**

Instructor, Bio 5571: Molecular and Cellular Neuroscience, 2009-present

### **Recent University Service:**

Scientific Advisory Board, Children's Discovery Institute, 2013

MSTP Admissions Committee, 2009-2016

### **Entrepreneurship:**

Co-founder and co-chair of the Scientific Advisory Board of Disarm Therapeutics, biotechnology company seeking breakthrough treatments for neurological diseases by protecting axons from degeneration.

### **Recent Selected Invited Seminars:**

University of Southern California, Neuroscience seminar, 2018

University of Massachusetts Medical School, Neuroscience seminar, 2017

Temple University and Shriners Hospital, Neuroscience seminar, 2017

Drexel University, Neuroscience seminar, 2017

Scripts Florida, Neuroscience seminar, 2016  
Mt. Sinai, Neuroscience seminar, 2015  
Columbia University, Neuroscience seminar, 2015  
Thomas Jefferson, Neuroscience seminar, 2015  
University of Texas San Antonio, Physiology seminar, 2014  
UCLA, Neurosciences seminar, 2014  
The Fourth Military Medical University, Xi'an, China, 2013  
University of Michigan, Biology seminar, 2013  
Weill Cornell Medical College, Biochemistry seminar, 2013

**Recent Invited Meeting Speaker/Session Chair:**

Neural Development and Neurodegeneration, ASCB/EMBO Meeting, 2018  
Cell Biology of Neurons and Circuits, HHMI, Janelia Farms, 2017  
FASEB: NAD Metabolism and Signaling, New Orleans, 2017  
Kravitz Lecture in Neurobiology, Woods Hole Oceanographic Institution, 2016  
Foundation for Peripheral Neuropathy Research Symposium, Chicago, 2016  
Cell Biology of the Neuron, Gordon Conference, 2016  
Mechanisms of Neuronal Remodeling, EMBO, 2016

**Community Service:**

Board of Trustees, Edward Mallinckrodt Jr. Foundation, 2014-present  
Meeting Organizer, 6<sup>th</sup> Molecular Mechanisms of Axon Degeneration, Jackson Labs, 2016  
Meeting Organizer, Neurobiology of Drosophila, CSH, 2015  
National Research Council of the National Academies, member of panel  
studying how to foster independence of young investigators, 2004  
American Society for Cell Biology, Program Committee, 2002  
Peer reviewer: Nature, Science, Cell, Neuron, Journal of Neuroscience, Development, Current  
Biology, EMBO, Nature Neuroscience, Mechanisms of Development, J. Neurophysiology,  
Nature Genetics, BMC Neuroscience, P.N.A.S.

**Study sections:**

NIH Study Section:

1. SYN 2014-2016, Chair
2. SYN 2011-2017, full member
3. SYN 2006, 2008 (ad hoc)
4. Neuronal Oxidative Metabolism and Death, 2018 (ad hoc)
5. Molecular Neurogenetics, 2008 (ad hoc)
6. Neurodevelopment, 2008 (ad hoc)
7. Neurogenesis and Cell Fate, 2004 (ad hoc)
8. NSD-C, 2004 (ad hoc)
9. NINDS RFA panel, 2000.

NSF peer reviewer, 2002-2008

**Student Mentoring:**

**Current Graduate students:** Scott Karney-Grobe, Alex Russo, Hailun Li, Margaret Hayne, Lorenzo Lones

**Past Graduate students:** Lauren Walker PhD, 2016; Vera Valakh PhD, 2014; Jung Eun Shin PhD, 2012; Sarah Naylor PhD, 2012; Bradley Miller PhD, 2011; Sungsu Kim PhD, 2011; Richard Daniels PhD, 2008; Joseph Bloom, PhD, 2006; Natasha Viquez, PhD, 2006; Scott Marrus, PhD, 2004; Caroline Li, Masters, 2003

**Current Postdoctoral Fellows**

E.J. Brace, Daniel Gibson, Daniel Summers, Matthew Figley, Kwang Woo Ko

**Past Postdoctoral Fellows**

Catherine Collins, Associate Professor, University of Michigan  
Chunlai Wu, Associate Professor, LSU Medical School  
Ethan Graf, Assistant Professor, Amherst College  
Yogesh Wairkar, Assistant Professor, UT Galveston  
Martha Bhattacharya, Assistant Professor, University of Arizona  
Elisabetta Babetto, Assistant Professor, University of Buffalo

**Major Awards for Lab Trainees:**

O'Leary Award (best Neuroscience research at WUMS):

Richard Daniels, Predoctoral Award 2006  
Cathy Collins, Postdoctoral Award 2006  
Brad Miller, Predoctoral Award 2009

Olin Prize (outstanding student in biomedical sciences at WUMS)

Richard Daniels, 2008  
Brad Miller, 2009  
Jung Eun Shin, 2013

Philip Needleman Pharmacology Prize (outstanding achievement in pharmacology at WUMS)

Vera Valakh, 2014

Irv Boime Publication Award (best paper by a PhD student in the Dept. of Developmental Biology)

Vera Valakh, 2014

Jakschik Award (awarded to one, outstanding female graduate student at WUMS)

Jung Eun Shin, 2012

Elkins Award (national award for best graduate work in the area of Drosophila neurobiology)

Richard Daniels, 2007

Hope Center for Neurological Disorders Award (awarded outstanding research and presentation)

Lauren Walker, 2016  
Scott Karney-Grobe, 2018

Thach Award (awarded for the best oral presentation at the Neuroscience retreat)  
Alex Russo, 2017

**Selected research publications:**

DiAntonio, A., Parfitt, K.D., and Schwarz, T.L. (1993) Synaptic Transmission Persists in *synaptotagmin* Mutants of *Drosophila*. **Cell** 73: 1281-1290.

DiAntonio, A. and Schwarz, T.L. (1994) The Effect on Synaptic Transmission of *synaptotagmin* Mutations in *Drosophila*. **Neuron** 12: 909-920.

Petersen, S.A., Fetter, R.D., Noordermeer, J.N., Goodman, C.S., and DiAntonio, A. (1997) Genetic Analysis of Glutamate Receptors in *Drosophila* Reveals a Retrograde Signal Regulating Presynaptic Transmitter Release. **Neuron** 19: 1237-1248.

Wan, H.I., DiAntonio, A., Fetter, R.D., Bergstrom, K., Strauss, R., and Goodman, C.S. (2000) Highwire Regulates Synaptic Growth in *Drosophila*. **Neuron** 26: 313-329.

DiAntonio, A., Haghighi, A.P., Portman, S.L., Lee J.D., Amaranto, A.M., and Goodman, C.S. (2001) Ubiquitination-dependent Mechanisms Regulate Synaptic Growth and Function. **Nature** 412: 449-452.

Daniels, R.W., Collins, C.A., Chen, K., Gelfand, M.V., Featherstone, D.E., and DiAntonio, A. (2006) A Single Vesicular Glutamate Transporter is Sufficient to Fill a Synaptic Vesicle. **Neuron** 49: 11-16.

Collins, C.A., Wairkar, Y.P., Johnson, S.L., and DiAntonio, A. (2006) Highwire restrains synaptic growth by attenuating a MAP kinase signal. **Neuron** 51: 57-69.

Bloom, A.J., Miller, B.R., Sanes, J.R., and DiAntonio, A. (2007) The requirement for Phr1 in CNS axon tract formation reveals the corticostriatal boundary as a choice point for cortical axons. **Genes and Development** 21: 2593-2606.

Miller, R.B., Press, C., Daniels, R.W., Sasaki, Y., Milbrandt, J., and DiAntonio, A. (2009) A DLK-dependent axon self-destruction program promotes Wallerian degeneration. **Nature Neuroscience** 12: 387-389. PMC2696160

Graf, E.R., Daniels, R.W., Burgess, R.W., Schwarz, T., and DiAntonio, A. (2009) Rab3 Dynamically Controls Protein Composition at Active Zones. **Neuron** 64: 663-677. PMC2796257

Kim, S., Wairkar, Y.P., Daniels, R.W., and DiAntonio, A. (2010) The novel endosomal membrane protein Ema interacts with the class C Vps/HOPS complex to promote endosomal maturation. **Journal of Cell Biology** 188: 717-734. PMC2835942

Tian, X., Li, J., Valakh, V., DiAntonio, A., and Wu, C. (2011) *Drosophila* Rael controls the abundance of the ubiquitin ligase Highwire in post-mitotic neurons. **Nature Neuroscience** 14: 1267-75. PMC3183334

- Kim, S., Naylor, S.A., and DiAntonio, A. (2012) Drosophila Golgi membrane protein Ema promotes autophagosomal growth and function. **P.N.A.S.** 109: E1072-1081. PMC3344964
- Shin, J.E., Cho, Y., Beirowski, B., Milbrandt, J., Cavalli, V., and DiAntonio, A. (2012) Dual leucine zipper kinase is required for retrograde injury signaling and axonal regeneration. **Neuron** 74: 1015-1022. PMC3383631
- Shin, J.E., Miller, B.R., Babetto, E., Cho, Y., Sasaki, Y., Qayum, S., Russler, E.V., Cavalli, V., Milbrandt, J., and DiAntonio, A. (2012) SCG10 is a JNK target in the axonal degeneration pathway. **P.N.A.S.** 109: E3696-3705. PMC3535671
- Babetto, E., Beirowski, B., Russler, E.V., Milbrandt, J., and DiAntonio, A. (2013) The Phr1 ubiquitin ligase promotes injury-induced axon self-destruction. **Cell Reports** 5: 1422-1429. PMC3671584
- Gerdts, J., Summers, D.W., Sasaki, Y., DiAntonio, A., and Milbrandt, J. (2013) Sarm1-mediated axon degeneration requires both SAM and TIR interactions. **J. Neuroscience** 33: 13569-13580. PMC3742939
- Valakh, V., Walker, L.J., Skeath, J.B., and DiAntonio, A. (2013) Loss of the spectraplakins Short stop activates the DLK injury response pathway in Drosophila. **J. Neuroscience** 33: 17863-17873. PMC3818558
- Shin, J.E., Geisler, S., and DiAntonio, A. (2014) Dynamic regulation of SCG10 in regenerating axons after injury. **Experimental Neurology** 252: 1-11. PMC3947015
- Brace, E.J., Wu, C., Valakh, V., and DiAntonio, A. (2014) SkpA restrains synaptic terminal growth during development and promotes axonal degeneration following injury. **J. Neuroscience** 34: 8398-8410. PMC4061385
- Summers, D.W., DiAntonio, A., and Milbrandt, J. (2014) Mitochondrial dysfunction induces Sarm1-dependent cell death in sensory neurons. **J. Neuroscience** 34: 9338-9350. PMC4087211
- Frey, E., Valakh, V., Karney-Grobe, S., Shi, Y., Milbrandt, J., and DiAntonio, A. (2015) An *In Vitro* Assay to Study Induction of the Regenerative State in Sensory Neurons. **Experimental Neurology** 263: 350-363. PMC4266464.
- Valakh, V., Frey, E., Babetto, E., Walker, L.J., and DiAntonio, A. (2015) Cytoskeletal disruption activates the DLK/JNK pathway, which promotes axonal regeneration and mimics a preconditioning injury. **Neurobiology of Disease** 77: 13-25. PMC4402261.
- Gerdts, J., Brace, E.J., Sasaki, Y., DiAntonio, A., and Milbrandt, J. (2015) Sarm1 activation triggers axon degeneration locally via NAD<sup>+</sup> destruction. **Science** 348: 453-7. PMC4513950.
- Bhattacharya, M., Geisler, S., Pittman, S., Doan, R., Wehl, C., Milbrandt, J., and DiAntonio, A. (2016) TMEM184b promotes axon degeneration and neuromuscular junction maintenance. **J. Neuroscience** 36: 4681-4689. PMC4846669

Summers, D.W., Gibson, D.A., DiAntonio, A., and Milbrandt, J. (2016) SARM1-specific motifs in the TIR domain enable NAD<sup>+</sup> loss and regulate injury-induced SARM1 activation. **P.N.A.S.** 113: E6271-E6280. PMC5068253

Sasaki, Y., Nakagawa, T., Mao X., DiAntonio, A., and Milbrandt, J. (2016) NMNAT1 inhibits axon degeneration via blockade of SARM1-mediated NAD<sup>+</sup> depletion. **eLife** 2016; 5:e19749. PMC5063586

Geisler, S., Doan, R.A., Strickland, A., Huang, X., Milbrandt, J., and DiAntonio, A. (2016) Prevention of vincristine-induced peripheral neuropathy by genetic deletion of SARM1 in mice. **Brain** 139: 3092-3108.

Walker, L.J., Summers, D.W., Sasaki, Y., Brace, E.J., Milbrandt, J., and DiAntonio, A. (2017) MAPK Signaling Promotes Axonal Degeneration by Speeding the Turnover of the Axonal Maintenance Factor NMNAT2. **eLife** 2017; 6:e22540. PMC5241118

Essuman, K., Summers, D.W., Sasaki, Y., Mao, X., DiAntonio, A., Milbrandt, J. (2017) The SARM1 Toll/Interleukin-1 Receptor Domain Possesses Intrinsic NAD<sup>+</sup> Cleavage Activity that Promotes Pathological Axon Degeneration. **Neuron** 93: 1334-1343.

Essuman, K., Summers, D.W., Sasaki, Y., Mao X., Yim A.K.Y., DiAntonio, A., Milbrandt, J. (2018) TIR Domain Proteins Are an Ancient Family of NAD<sup>+</sup> Consuming Enzymes. **Current Biology** 28: 421-430. PMC5802418

Frey, E., Karney-Grobe, S., Krolak, T., Milbrandt, J., and DiAntonio, A. (2018) TRPV1 Agonist, Capsaicin, Induces Axon Outgrowth after Injury via Ca<sup>2+</sup>/PKA Signaling. **eNeuro** 5: 1-15. PMC5975717

Summers, D.W., Milbrandt, J., and DiAntonio, A. Palmitoylation enables MAPK-dependent proteostasis of axon survival factors. **P.N.A.S.** (2018) in press.

#### **Recent reviews:**

1. Gerdtts, J., Summers, D.W., Milbrandt, J., and DiAntonio, A. (2016) Axon self-destruction: new links among SARM1, MAPKs, and NAD<sup>+</sup> metabolism. **Neuron** 89: 449-460. PMC4742785

2. Brace, E.J. and DiAntonio, A. (2017) Models of axon regeneration in Drosophila. **Experimental Neurology** 287: 310-317. PMC5026866

#### **Patents issued:**

USPTO 8,754,060, Methods and compositions for inhibition of axonal degeneration by modulation of the DLK/JNK pathway. Issued June 17, 2014.