

## CURRICULUM VITAE

### PERSONAL DATA

Name: Nicholas Matthew Boulis

### EDUCATION

1984-1988 Yale University, New Haven, CT  
B.S., summa cum laude  
Majors in Intensive Biology and Philosophy, both awarded with distinction

1991-1992 Howard Hughes Research Fellowship for Medical Students  
Children's Hospital, Boston, MA

1989-1993 Harvard Medical School, Boston, MA  
M.D. magna cum laude

### POSTDOCTORAL TRAINING

1994-1995 Intern, Department of Surgery, University of Michigan Medical Center

1995-2001 Resident, Section of Neurological Surgery, University of Michigan Medical Center

1998-1999 Postdoctoral Fellowship, Department of Neurology and Department of Microbiology and Immunology: University of Michigan.

### ACADEMIC APPOINTMENTS

2001-2007 Associate Staff, Department of Neurosurgery, The Cleveland Clinic Foundation and Lerner Institute

2001-2007 Adjunct Assistant Professor, Department of Neurology, University of Michigan School of Medicine.

2004-2007 Assistant Professor, The Cleveland Clinic Lerner College of Medicine of Case Western Reserve University.

2007-2010 Assistant Professor, Department of Neurosurgery, Emory University

2010-pres Associate Professor, Tenure, Department of Neurosurgery, Emory University

### MILITARY SERVICE

1990-1998 Massachusetts Army National Guard  
Honorable Discharge at rank of Captain

### CERTIFICATION AND LICENSURE

National Board of Medical Examiners Diplomate - June 1995

Neurosurgical Boards; Written Examination, – May, 1999  
Oral Examination, – May 2006  
Ohio Medical License #35-07-9749-B (inactive)  
Georgia Medical License #059605 (active)

#### MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Association of Neurological Surgeons: Member 2001-pres  
Society for Neuroscience: Member 1987-pres  
American Society of Gene Therapy: Member 1999-pres  
Congress of Neurological Surgeons: Member 2001-pres;  
Scientific Program Committee: 2005-pres;  
New Science and Integrated Medical Learning Chair 2006  
Executive Committee: 2007-2009  
American Society for Stereotactic and Functional Neurosurgery, 2001-pres  
Executive Board 2004-2008  
Membership Director 2004-2006  
Parkinson's Study Group: Functional Neurosurgical Working Group 2007-pres  
Society of University Neurosurgeons 2011-pres  
Executive committee 2013-pres

#### HONORS AND AWARDS

1987 Angier Prize for best Psychological Senior Thesis at Yale.  
1988 Richter Fellowship for summer research, Yale University.  
1988 New York Hellenic Medical Society Lanzounis Research Fellowship.  
1990 Paul Dudley White Fellowship: International Health  
1990 National Guard Association Scholarship  
1990 New York Hellenic Medical Society: Medical Scholarship.  
1990 Peter Theodos Memorial Graduate Scholarship.  
1992 Howard Hughes Medical Institute Research Training Fellowship for Medical Students.  
1994 Harold Lampont Biomedical Research Prize, Harvard Medical School  
1996 Bronze Beeper, University of Michigan Medical Student Teaching Award  
2000 Young Investigator Award, Department of Surgery, University of Michigan  
2000 Michigan Association of Neurological Surgeons: Resident Award.  
2001 James W. Crudup Award, Department of Surgery, University of Michigan  
2001 American Neurological Association Travel Fellowship: Outstanding Scientific Abstract  
2002 Young Neurosurgeons Committee: Good Citizenship Citation.  
2004 David Kline Award for Peripheral Nerve Research  
2007 Distinguished Scholar Fund Recipient, Emory University  
2010 Philip J Bowen Award for contributions to ALS Research

#### CONSULTING ACTIVITIES/CLINICAL TRIAL EXPERIENCE

1989 Consultant for the Human Application of Experimental Alzheimer's Drugs  
1999 Consultant for the Development of a Human ALS Gene Therapy Protocol with AAV.EAAT2:  
ALS Therapy Development Foundation  
2000 Member of the Independent Data Monitoring Committee: Canavan Gene Therapy Clinical Study:  
Sponsor; NINDS  
2001 Consultant for the Human Prosavin Lentiviral Gene Therapy Trial for Parkinson's Disease: San  
Diego, Biomedica Corp.  
2001 Co-investigator: Stimulus-An Implantable Spinal Cord Stimulation Pain Management System:  
Advanced Bionics: IRB 6164.

- 2002 Co-Principal Investigator: (Svendsen and Boulis) Astrocytes Derived from Human Neural Stem Cells For the Treatment of Amyotrophic Lateral Sclerosis, Pre-IND Application submitted.
- 2005-7 Co-Investigator: Deep Brain Stimulation for Advanced Parkinson's Disease: IRB 7447
- 2006-7 Site PI: CERE-120, A Genetically Engineered Adeno-Associated Virus Serotype 2 (AAV2)-Based Vector to Deliver Human Neurturin.
- 2007-9 Steering Committee: Muscular Dystrophy Gene Therapy Trial: Asklepios and Muscular Dystrophy Association
- 2010-p Site PI: Phase I/II trial assessing the safety and efficacy of bilateral intraputaminial and intranigral administration of CERE-120 (Adeno-associated virus serotype 2-Neurturin) in subjects with idiopathic Parkinson's Disease.
- 2010-p Surgeon: A Double-Blind, Placebo-Controlled (Sham Surgery), Randomized, Multicenter Study Evaluating CERE-110 Gene Delivery in Subjects with Mild to Moderate Alzheimer's Disease
- 2010-13 Surgeon: A Phase I, Open-label, First in Human, Feasibility and Safety Study of Human Spinal Stem Cell Transplantation for the Treatment of Paraplegia or Respiratory Failure due to Amyotrophic Lateral Sclerosis.
- 2011-p Member of the Data Safety Monitoring Board; Miami Project Schwann Cell spinal core transplantation trial.
- 2012-14 Site-PI: Phase III ASUBIO FGF agonist Trial in Acute Spinal Cord Injury.
- 2013-p Member of the Data Safety Monitoring Board: Cox Pediatric Traumatic Brain Injury Stem Cell Trial.
- 2013-p Michael J Fox Foundation Advisory Committee on Deep Brain Stimulation Research.
- 2013-p Neurosurgery consultant for Emory University Psychiatry/Neurology Departments' Data & Safety Monitoring Board: Helen Mayberg trial
- 2014 Lead Surgeon: A Phase 2, Multicenter, Open-label, Study of Human Spinal Stem Cell Transplantation for the Treatment of ALS.

## INTERNATIONAL HEALTH AND HUMAN RIGHTS

- 1988 Delegate to León, Nicaragua for the León/New Haven Sister City Project during Contra Peace Talks and Honduran Border Crisis.
- 1989-90 Delegate with Harvard Medical School Health and Human Rights Group to Haiti: Assessed Public Health Conditions and Human Rights, Evaluated Medical Condition of Tortured Political Prisoners.
- 1990 Boston-Dominican Republic Project: June-August 1990. Work in Sabana Alta and Report
- 1997-07 Project Shunt Founder: Collaborative effort to treat hydrocephalus and spina bifida in underserved Latin American children
- 1997 – Leader, Fact-finding mission, Guatemala City
  - 1998 – Surgical Team Leader
  - 1999 – Surgical Team Leader
  - 2000 – Financial Secretary
  - 2001-2010 – Attending Surgeon
- 2010 Neurosurgeon and Chief Medical Officer of Medishare/University of Miami Field Hospital; Haitian Earthquake relief.
- 2014 Team Leader; Neurosurgical Support for Partners In Health Mirebalais Hospital, Haiti.

## RESEARCH AWARDS AND SUPPORT

- 1998-1999 NIH Training Grant T32 NS07222: Fellow: \$50,000
- 1998-1999 University of Michigan Basic Science Research Partnership: \$50,000  
Co-investigator/Grant Author.
- 1999-2001 The Amyotrophic Lateral Sclerosis Association: \$139,936  
Co-investigator/Grant Author
- 1999-2000 Hope for ALS: \$34,200 Principal Investigator
- 2000-2001 University of Michigan: Development and Feasibility Project Competitive Grant  
Program: \$50,000; Co-Investigator/Grant Author
- 2002-2007 NIH/NINDS 1 K08 NS43305-01: Mentored Clinical Scientist Development Award:  
Direct Budget: \$739,941
- 2002-2003 The American Association of Neurological Surgeons:  
Young Clinician Investigator Award: Phage Display and In Vivo Biopanning for Small  
Neurotropic Peptides  
Principal Investigator \$40,000
- 2002-2004 The Amyotrophic Lateral Sclerosis Association Research Grant:  
Targeted Lentiviral Gene Based Neuroprotection for Amyotrophic Lateral Sclerosis  
Principal Investigator \$118,800
- 2002-2004 The American Paralysis Association/Christopher Reeves Foundation:  
Targeted Adeno-Associated Virus Gene Delivery in Spinal Cord Injury  
Principal Investigator \$130,245

2003-2004	Diabetes Association of Greater Cleveland: Targeted Lentiviral Gene Based Neuroprotection for Diabetic Neuropathy. Principal Investigator	\$47,000
2004-2007	The Amyotrophic Lateral Sclerosis Association Research Grant: Motor Neuron Protein and Gene Delivery Through a Novel Neurotropic Peptide Principal Investigator	\$217,000
2005-2006	AANS/CNS Joint Section for Peripheral Nerve Surgery Targeted Adeno-associated Viral Gene Delivery to Motor and Dorsal Root Ganglia Neurons to Peripheral Nerve Regeneration Principal Investigator	\$15,000
2005-2006	Fight SMA Spinal Cord Mapping for Targeted Stem Cell Transplant Principal Investigator	\$45,000
2004-2008	The Amyotrophic Lateral Sclerosis Association Foundation Initiated Grant: Preclinical assessment of intraparenchymal AAV.IGF-I (CERE-130) Therapy. Principle Investigator	\$185,000
2005-2007	Ceregene; Multicenter, Randomized, Double-Blind, Sham Surgery-Controlled Study of CERE-120 Delivery in Subjects With Idiopathic Parkinson's Disease. Site Principle Investigator	\$371,500
2007-2012	Howard Hughes Medical Institute Early Career Award Gene-Based Neuromodulation Principle Investigator	\$375,000
2008-2009	Sangamo: Spinal Cord VEGF Upregulation with AAV Zinc Finger Protein Gene Expression for Motor Neuron Protection. Principle Investigator	\$134,000
2008-2013	NIH/NINDS 1 K02 NS05941-01A1 Gene-based Neuromodulation: A New Paradigm for Functional Neurosurgery Principle Investigator	\$790,382
2008-2010	Coulter Foundation: Testing of a Polyketal Calpain Inhibitor for Treatment of ALS Co-PI:	\$100,000
2008-2009	NeuralStem: Preclinical Safety and Toxicity of Spinal Cord Derived Human Neural Progenitor cells. Co-PI	\$31,100
2009-2011	Muscular Dystrophy Association: Remote therapeutic gene delivery for SMA Coinvestigator with PI: Jakob Reiser Emory Subaward Budget	Federal Drug Administration \$127,000
2008-2009	ALS Association: Drug, Discovery, and Development: Preclinical optimization of injection parameters and immunosuppression of GDNF secreting Neural Progenitor Spinal cord Transplants. Principle Investigator	\$246,000
2009-2010	Hanah's Hope Fund: Gene Therapy for Giant Axonal Neuropathy Principle Investigator	\$65,000

2009-2011	NIH/NINDS 1R21NS064351-01A1 Adeno-associated Viral Vector Modification for Targeted Motor Neuron Therapy Principle Investigator	\$375,000
2009-2010	Nederlander Fund: C3 Gene Expression Increases Axonal Sprouting in Embryonic Stem Cell Derived Motor Neurons. Principle Investigator	\$30,000
2010-2011	Ceregene: Phase I/II trial assessing the safety and efficacy of bilateral intraputaminial and intranigral administration of CERE-120 (Adeno-associated virus serotype 2-Neurturin) in subjects with idiopathic Parkinson's Disease. Site Principle Investigator	\$560,000
2010-2011	Atlanta Clinical and Translational Science Institute Award: Enhanced Motor Neuron Axonal Growth in SOD1 mutant animals with C3 gene expression. Investigator	\$19,725
2010-2011	Virginia Gentlemen Foundation Hope Grant: Thymidine Kinase expression as a means for stem cell elimination and control of cell related complications. Principle Investigator	\$120,000
2011-2013	Taubman Scholar Award: Safety in Spinal Cord Transplantation Principle Investigator	\$450,000
2010-2015	RO1NS062097 Transplantation of Pre-conditioned Bone Marrow Mesenchymal Stem Cells after Ischemia Co-Investigator	\$339,063/year
2011-2014	DOD CDMRP Overcoming the Practical Barriers to Spinal Cord Cell Transplantation for ALS Principle Investigator	\$2 million
2011-2012	Virginia Gentlemen Foundation: Designer Stem Cells for Motor Neuron Replacement Principle Investigator	\$100,000
2012-2015	ALS Association Nanoparticle Identification of Spinal Cord Stem Cell Transplants Co-PI	\$250,000
2012-2013	Cox Foundation IGF-1 secreting neural progenitors for ALS PI	\$300,000
2013-2017	RO1NS077982-01 Phase 1B Trial of Stem Cells in ALS Co-PI	\$2.8 million
2012-2013	Regenerative Engineering and Medicine Center at Emory and GA Tech Magnetic Resonance-Guided, Minimally Invasive, Percutaneous, Targeted Delivery of Cellular and Molecular Therapeutics to the Human Spinal Cord Co-Investigator	\$50,000

2013-2014	Virginia Gentlemen Foundation Interventional MRI Spinal Cord Transplantation PI	\$100,000
2013-2015	R21NS085553-01 Intrathecal delivery of gene therapy for ALS PI	\$390,000
2014-2015	Regenerative Engineering and Medicine Center MRI-guided Robotic Targeting System for Cellular Therapeutic Injections in the Human Spinal Cord Co-Investigator	\$69,826
2014-2017	DOD/Surgical Critical Care Institute Rational decision making in the treatment of traumatic brain injury Co-Investigator	\$632,000

#### TEACHING ACTIVITIES

1993	Senior Teaching Fellow, Neurobiology, Harvard College
1995-2001	Undergraduate Research Opportunity Program: Instructor mentored 13 undergraduates: University of Michigan
1997-2001	Biology 300 Instructor: University of Michigan
2002-2007	Neurosurgery Residency Academic Niche Development Program
2002-2004	CCF/Lerner College of Medicine, Neuroscience Curriculum Development Committee; Problem Based Learning Author.
2004-2007	Cleveland Clinic Lerner College of Medicine, Neuroscience Instructor for Years 1.
2003-2006	CCLCM Summer Research Preceptor Program
2008	Summer Research Opportunity Program, Emory University
2008-pres	Faculty: Neuroscience Graduate Training Program, Emory University
2012-pres	Faculty; Biomedical Engineering, Georgia Tech and Emory University
2012-pres	Paideia High School Midterm Neurobiology Course Director and Seimens Award Advisor

#### EDITORIAL BOARDS, GRANT REVIEW COMMITTEES, AND NATIONAL LEADERSHIP

2005-pres	ALSA Grant Review
2005-2008	NINDS NSD-K ad hoc Reviewer.
	Ad Hoc Reviewer: Neurosurgery, Journal of Neurosurgery, Human Gene Therapy, Gene Therapy, Experimental Neurology, Molecular Brain Research, Stroke, Molecular Basis of Disease, Journal of Neuroscience, Journal of Neuroscience Research, Annals of Neurology, Neurobiology of Disease, Briefings in Functional Genomics and Proteomics, Molecular Therapy, Journal of Gene Medicine, Stem Cell Research.
2004-2006	American Society for Stereotactic and Functional Neurosurgery: Membership Director.
2004-2008	American Society for Stereotactic and Functional Neurosurgery: Executive Committee.
2005-2010	CPC Editor: <i>Neurosurgery</i> .
2010-pres	Editorial Board: <i>Neurosurgery</i> .
2005-2010	Scientific Program Committee, Congress of Neurological Surgeons.
2006	Chair, New Science Committee, Integrated Medical Learning Committee: 2007 CNS Meeting
2006-pres	Editorial Board: <i>Congress of Neurological Surgeons Quarterly</i>
2007-2009	Executive Committee: Congress of Neurological Surgeons.

2008-pres	NINDS NSD-K: Study Section Member
2010-pres	Emory Stem Cell Oversight Committee
2010-2012	Regenerative Medicine Charter Committee
2010-2011	Emory Clinical Trials Task Force
2011-2014	Senior Specialty Consultant for Science: World Neurosurgery.
2012-2017	NINDS K12; National Advisory Committee Member.
2012-14	American Society for Gene and Cell Therapy; Neuroscience Chair

## PATENTS

- a. In vivo Production of a Clostridial neurotoxin Light Chain Peptide.
- b. Neuron Targeting Peptides.
- c. Floating Spinal Cannula and Method of Use
- d. Stabilized Spinal Cord Instrumentation & Therapeutics Delivery Platform

## ORAL PRESENTATIONS

1. New Jersey Junior Science Symposium (1984)
2. Wood's Hole Nerve Net Conference (1987)
3. Gordon Research Conference (1987)
4. Soma Weiss Research Conference (1993)
5. Howard Hughes Fellows Conference (1993)
6. Michigan Association of Neurological Surgeons (1997)
7. First Shanghai Medical University, Department of Neurobiology: Invited Lecturer (1998)  
Applications of viral gene transfer to spinal cord injury.
8. HuaShan Hospital, Department of Neurosurgery, Shanghai, China: Invited Lecturer (1998).
9. Peripheral Nerve Society, La Jolla, CA (1999).
10. Michigan Association of Neurological Surgeons (2000)
11. Cleveland Clinic Department of Neurosurgery: Invited Speaker Grand Rounds (2000) Department of Neurosurgery, University of Wisconsin: Invited Speaker Grand Rounds (2000)
12. Department of Neurosurgery, University of California San Francisco: Invited Speaker (2000)
13. Neurosurgery, Science, and Management Conference: Platform presentation; Rapid Correction of Warfarin Coagulopathy in Intracerebral Hemorrhage (2000)
14. Division of Neurosurgery, University of North Carolina: Invited Speaker Grand Rounds (2000)
15. Department of Neurosurgery, University of Washington: Invited Speaker Grand Rounds (2000)
16. Department of Neurosurgery, Cedar Sinai Medical Center: Grand Rounds (2000)
17. Department of Neuroscience, Cleveland Clinic Foundation: Seminar (2001)
18. Congress of Neurological Surgeons: Parkinson's Disease, Dystonia, and Movement Disorders Seminar (2001)
19. Department of Neurology, Cleveland Clinic Foundation: Neuroscience Grand Rounds: Gene-Based Neuromodulation (Feb 2002).
20. Department of Surgery, Cleveland Clinic Foundation: Grand Rounds (May 2002).
21. General Motors; Sigma Psi Chapter: Surgical Treatment of Movement Disorders (May 2002).
22. Cleveland Clinic Health Outreach:
  - A. Toledo Parkinson's Disease Pt. Group: (January 2002)
  - B. Cleveland Area: Airport Marriott (May 2002)
23. Cleveland Clinic International Center Minisymposium: Peripheral Nervous System; Restoration and Regeneration (May, July 2002)
24. Neuromodulation 2002; Defining the Future, Aix-Les-Bains, France: Gene Based Functional and Restorative Neurosurgery (June 2002)
25. Department of Neurology, Cleveland Clinic Foundation: Neuroscience Grand Rounds. Peripheral Nervous System Neurorestoration (Sep 2002)
26. ALS Gene Therapy Workshop: New York: Phage Display for the Development of Neurotropic rAAV vectors (Oct 02).
27. Young ALS Investigators Workshop: Lafayette, PA; Gene-Based Motor Neuron Protection (Oct 02).



28. Department of Neurosurgery, Cleveland Clinic Foundation: Grand Rounds: Update on Gene-Based Neuroprotection and Neuromodulation (Mar 03).
29. Surgical Treatment of Movement Disorders Course, Cleveland: DBS Complications-What to Look For (Mar 03).
30. Parkinson's Disease Surgery, Hillcrest Hospital: Community Council Leadership Meeting (April 03)
31. Gene-Based Neuromodulation: Grand Rounds, Dept of Neurosurgery, Cleveland Clinic Foundation (Mar 03)
32. Advances in Surgical Management of Parkinson's Disease. Symposium: Parkinson's Disease 2003, Facing the Challenges. Sponsored by; The Ohio Parkinson's Foundation and The Medical College of Ohio. At Bowling Green State University (May 03).
33. "Resident Academic Career Development." In Luncheon Seminar; Career Transitions: Options, Challenges, and Decisions. At Congress of Neurological Surgeons Annual Meeting (Oct 03).
34. "Neurological Aspects of Biological and Chemical Terrorism." In Management of Neurological and Neurosurgical Emergencies. Cleveland Clinic Course (Oct 03).
35. "Project Shunt; A model for collaborative neurosurgical relief efforts in the developing world." In The Sixth Annual Update in Neuroscience Nursing. Cleveland Clinic Course (Nov 03).
36. Gene and Infusion Therapies for Parkinson's Disease. In The Movement Disorder Practical Course, American Association of Neurological Surgeons Meeting (April 04).
37. Mechanisms of Deep Brain Stimulation. In The Movement Disorder Practical Course, American Association of Neurological Surgeons Meeting (April 04).
38. Molecular Approaches to Neuropathy. In The Diabetes Summit: Preventing Complications. (May 04)
39. Gene Therapy and Neuromodulation: Current Application and Future Prospects – AASFN (Oct. 04) Annual Meeting.
40. Surgical Management of Movement Disorders – CNS (Oct. 04)
41. "Targets and Gene Therapy for Parkinson's Disease" in Parkinson's Disease: Basic Mechanisms and Therapies Meeting – The Banbury Center, Cold Spring Harbor, NY (Jan. 05)
42. "Third World Neurosurgical Relief for Spina Bifida: Defying Conventional Wisdom." Process of Discovery Lecture, Cleveland Clinic Lerner College of Medicine, (Jan. 05)
43. Tertiary Neurocare in the Developing World – Cleveland Clinic Foundation Dept. of Neurology, Grand Rounds (Feb. 2005)
44. Technology and Future Applications of Gene-based Neuromodulation – MetroHealth Medical Center-Rammelkamp Center for Education and Research (March 2005)
45. "Gene-Based Neuromodulation." Visiting Professor Grand Rounds, University of Michigan Dept. Neurosurgery (March 2005).
46. Visiting Professor, Clinica Aleman, Santiago, Chile (May 2005):
  - "Neuromodulation: State of the Art"
  - "Deep Brain Stimulation for Parkinson's Disease"
  - "Deep Brain Stimulation for Tremor and Dystonia"
  - "Gene Therapy for Neurodegenerative and Functional Diseases of the Nervous System"
  - "Stem Cell Neurorestoration"
47. "Development of Gene-Based Approaches to Synaptic Inhibition." Department of Neuroscience, CCF (May 2005).
48. "Stem Cell Therapy for Neurodegenerative Diseases." Dept Neurosurgery Grand Rounds, CCF (June 2005)
49. Festschrift- Department of Neurosurgery, University of Michigan: "Progress toward Molecular and Cellular Therapies for Motor Neuron Disease." (July 05)
50. "Neurosurgical Challenges for Invasive Therapies for ALS." Banbury Meeting, Cold Spring Harbor, Maine (Sep 05)
51. "Molecular Mechanisms of Pain." Plenary Session Lecture, Congress of Neurological Surgeons, Boston (Oct 05)
52. "Gene-based Synaptic Inhibition." Mini-symposium on gene therapy, Case Western Reserve University School of Medicine, Cleveland, OH (Nov 05)
53. "Gene-based approaches to synaptic control." Rammelkamp Center for Education & Research, MetroHealth Medical Center, Cleveland, OH (Nov 05)
54. "Novel therapeutics for spinal cord degenerative diseases." Convection Enhanced Delivery Symposium, Cleveland, OH (Feb 06)

55. "Electrophysiologically targeted spinal cord transplant and viral vector injection." Johns Hopkins Department of Neurology and Pathology, Baltimore, MA (Jun 06).
56. "Molecular and cellular approaches to degenerative and functional spinal cord disease." Waisman Center, Madison, Wisc (Jun 06).
57. "Gene Based Neuromodulation." Cleveland Clinic Dept Neurosurgery Grand Rounds (Jul 06)
58. "Molecular and Cellular Approaches to Spinal Cord Degeneration." McGillicuddy Festschrift- Department of Neurosurgery, University of Michigan: (Aug 06)
59. "Invasive and noninvasive approaches to molecular and cellular spinal cord neurorestoration." Stanford Medical School, Neuroscience Grand Rounds/Visiting Professor (Sep 06).
60. "The relevance of molecular targeting and therapeutics to neurosurgical practice (RNAi)." Plenary Session Lecture, Congress of Neurological Surgeons, Chicago (Oct 06).
61. "Decision making in the management of trigeminal neuralgia." Luncheon Seminar, Congress of Neurological Surgeons, Chicago (Oct 06).
62. "Peripheral Nerve Surgery," Neuroscience Nursing Conference, Cleveland, OH (Nov 06)
63. "Neurosurgical Interventions in the Developing World." AMSA Regional Conference, Case Western Reserve, Cleveland, OH (Nov 06)
64. "Molecular and Cellular Spinal Cord Neurorestoration." Emory Dept. of Neuroscience, Atlanta (Nov06)
65. "Molecular and Cellular Neuromodulation." Grand Rounds, Dept of Neurosurgery, Emory, Atlanta (Nov06)
66. "Stem Cells and Gene Therapy Neuromodulation Strategies." North American Neuromodulation Society, Las Vegas (Dec 06)
67. "Challenges and Opportunities for Gene Therapy of ALS." The Will Rogers Institute Respiratory Symposium, Orange County, CA (Jan 07).
68. "Mechanisms of Deep Brain Stimulation." Movement Disorder Surgery Course; American Association of Neurological Surgeons Meeting (April 07).
69. "Surgical Delivery of Therapeutics in SMA." FightSMA Researcher Conference, Washington D.C (April 07).
70. "Neuroethics" Joint lecture with Paul Ford, Hiram College, OH (May 07)
71. "Clinical Translation of Spinal Cord Neural Progenitor Transplantation." American Society for Neural Transplant and Repair, Tampa, FL (May 07)
72. "Convection Enhanced Delivery for the Treatment of Neurodegenerative Diseases." 3<sup>rd</sup> International Symposium on Convection Enhanced Delivery. Cleveland, OH. (May 07)
73. "Decision-making in the Treatment of Facial Pain" and "Stimulation for the treatment of Facial Pain." North American Skull Base Society Meeting, Chicago, IL (May 07).
74. "What the Neuromuscular Neurologist Needs to Know About Peripheral Nerve Surgery." Neuromuscular Diagnosis and Decision-making. Cleveland, OH (Jun 07).
75. "Frontiers in Movement Disorder Surgery." Congress of Neurological Surgeons Practical Course, San Diego, CA (Sep 07).
76. "The Peripheral Nerve as a Conduit for the Treatment of ALS, SMA, and Neuropathy." David Kline Festschrift, Louisiana State University, New Orleans, LA (Oct 07)
77. "Pitfalls in Motor Neuron Gene Delivery," NIH/NINDS Workshop on Gene Therapy for the Nervous System, Bethesda, MD (Nov 07)
78. "Biological Therapies for Spinal Cord Degenerative and Functional Diseases." International Brain Conference, University of Central Florida, Orlando, FL (Jan 08).
79. "Neurosurgical Treatment of Terminal Pain." Palliative Care Conference, Dept of Anesthesia, Emory, Atlanta, GA (Jan 08).
80. "Past and Future of Nerve Repair." Grand Rounds, Shepherd Rehabilitation Center, Atlanta (Mar 08).
81. "Surgical Approaches to Spinal Muscular Atrophy." FightSMA Annual Meeting, Wash DC (Apr 08).
82. "Mechanisms of Deep Brain Stimulation." Movement Disorder Surgery, Techniques, Decision Making, Complication Avoidance. Practical Clinic, American Assoc Neurol Surg, Chicago (April 08)
83. "Gene Therapy Approaches to the Spinal Cord and Peripheral Nervous System: ALS, Neuropathy, and Spinal Cord Injury." Advances in Neuro-Gene Therapy Symposium, AANS, Chicago (April 08).
84. "Public and Private Funding Opportunities for Clinical Research." Congress of Neurol Surgeons meeting, Orlando, FLA (Sep 08).

85. "Gene Therapy for Spinal Cord Injury." Spinal Cord Injury Conference, Case Western Reserve, Cleveland, OH (Oct 08)
86. "Collaborations to Deliver Tertiary Care in the Developing World." Emory Dept of Neurol, Atlanta (Oct 08).
87. "Spinal Cord Stem Cell Transplants: Surgical Technique and ALS Trial Design." Stem Cell Research in ALS: From Bench to Bedside International Workshop Invited Lecturer, Neurothon, Rome, Italy (Dec 08).
88. "Human Spinal Cord Surgery for Neural Progenitor Transplant in Motor Neuron Disease." FightSMA Annual Meeting, Wash DC (Apr 09).
89. "Complications of DBS surgery and their management." American Assoc Neurol Surg, San Diego (April 08)
90. Cellular and Molecular Therapies for Motor Neuron Diseases. Annual Meeting of the American Society for Gene Therapy, San Diego, CA (May 09)
91. "Deep Brain Stimulation for Minimally Conscious States." World Federation of Neurological Surgeons Meeting, Boston (Aug 09)
92. "Integrated Medical Learning; The science of Practice." Congress of Neurological Surgeons, New Orleans (Oct 09).
93. "Academic Career Development in Neurosurgery." Congress of Neurological Surgeons, New Orleans (Oct 09).
94. "Neuromodulation for Movement Disorders." North American Neuromodulation Society, Las Vegas (Dec 09).
95. "Human Fetal Stem Cell Transplantation: The First U.S. Clinical Trial for ALS." Society of University Neurosurgeons, Miami (Mar10).
96. "Project Shunt; A model for collaborative neurosurgical relief in the developing world." International Medical Volunteerism Conference, Atlanta (Apr 10).
97. "Pitfalls in Deep Brain Stimulation Surgery." American Association of Neurological Surgeons Meeting, Philadelphia (May 10)
98. "Human Fetal Neural Stem Cell Transplantation for ALS: A Phase I Safety Trial." American Society for Stereotactic and Functional Neurosurgery. New York (Jun 10).
99. "Molecular Therapy for Spinal Muscular Atrophy," Visiting Professor, Genzyme, Boston (Sep10).
100. "Treating Degenerative and Functional Diseases of the Spinal Cord." Visiting Prof, Medical College of South Carolina, Charleston (Sep10).
101. "Translation of molecular and cellular spinal cord therapies." Institute for Bioengineering & Bioscience, Georgia Tech (Oct 10).
102. "Spinal Cord Surgery for ALS." Motor Neuron Disease Association Annual Meeting, Orlando, Fla (Dec 10)
103. "Surgical Nuances of Spinal Cord Stem Cell Transplantation." International Consortium of Stem Cell Networks/Motor Neuron Disease Assoc., New York (Jan 11).
104. "Practical Considerations in Human Spinal Cord Stem Cell Transplantation." Muscular Dystrophy Association National Meeting, Las Vegas, NV (Mar 11)
105. "A Phase I, Open-label, First in human, feasibility and safety study of Human Spinal Cord Stem Cell transplantation." Regenerative Medicine; Innovations for Clinical Application, GTEC, Hilton Head, SC (Mar 11).
106. "Neuroscience, Consciousness, and Spirituality." Atlanta Friends Meeting, Decatur, GA (Mar 11).
107. "Development of Rational Strategies for Spinal Cord Stem Cell Transplantation." in Stem Cell Therapy for Neurological Disorders; Overcoming the Barriers to Clinical Translation. Los Angeles, CA (May 11)
108. "Development of Rational Strategies for Spinal Cord Stem Cell Transplantation." in Stem Cell Therapy for Neurological Disorders; Overcoming the Barriers to Clinical Translation. Los Angeles, CA (May 11)
109. "Surgical and Minimally Invasive Approaches to Motor Neuron Diseases." Cedar Sinai Department of Neurosurgery Grand Rounds, Visiting Professor, Los Angeles (May 11).
110. "Intrathecal AAV9 SMN replacement for the treatment of SMA." Hellenic Neurosurgical Meeting, Athens, Gr (Jun 11).
111. "Phase I First in human stem cell transplantation for ALS." American Society for Gene and Cell Therapy, Seattle, WA (Jun 11)

112. "Spinal Cord Regenerative Gene Therapy." Georgia Regenerative Medicine Institute Retreat, Stone Mt, GA (Sep 11).
113. "Stem Cell Spinal Cord Surgery." HeLa Women's Health Conference, Morehouse School of Medicine, Atlanta, GA (Sep 11).
114. "Conflict of Interest in 2011." Congress of Neurological Surgeons, Wash DC (Oct 11).
115. "Radial Nerve Entrapment." Congress of Neurological Surgeons, Wash,DC (Oct 11).
116. "Rehabilitation of the ALS Spinal Cord." American College of Rehab Medicine, Atlanta, GA (Oct 11)
117. "Gene therapy for Motor Neuron Disease." Short Course 1: Gene Vector Design and Application to Treat Nervous System Disorders, Wash, DC, (Nov 11).
118. "Pitfalls of Spinal Cord Stem Cell Transplantation." Stem Cells on the Mesa, La Jolla/Salk Inst, CA (Nov 11).
119. "Molecular and Cellular Spinal Cord Therapies." Southeastern Clinical Club, Atlanta, GA (Mar 12)
120. "Gene Based Neuromodulation." Soc of University Neurosurgeons Meeting, Atlanta, GA (Mar 12)
121. "Whose Risk is it Anyway?" TEDmed, Washington DC (Apr 12)
122. "Advances in Tremor Surgery." American Ass of Neurological Surgeons, Miami, FLA (Apr 12)
123. "Spinal Cord Surgery in SMA." Fight SMA, Washington, DC (Apr 12).
124. "Surgery for Trigeminal Neuropathic Pain." Brazilian Congress of Stereotactic Neurosurgery, Sao Paulo, Brazil (May 12)
125. "Peripheral and field stimulation for chronic pain." Brazilian Congress of Stereotactic Neurosurgery, Sao Paulo, Brazil (May 12)
126. "Gene Therapy for Parkinson's Disease." Brazilian Congress of Stereotactic Neurosurgery, Sao Paulo, Brazil (May 12)
127. "Molecular and Cellular Spinal Cord Surgery." Soc of Neurological Surgeons, Atlanta, GA (May 12).
128. "Mapping the spinal cord." International Brain Mapping Society, Toronto, CA (Jun 12).
129. "Molecular Neuromodulation of the Nervous System." American Soc for Stereotactic and Functional Neurosurgery, San Francisco, CA (Jun 12).
130. "Molecular and Cellular Spinal Cord Surgery." International College of Surgeons; Neurosurgery and Orthopedics meeting. Atlanta, GA (Jun 12).
131. "Nanoparticle Stem Cell Labeling." Congress of Neurol Surgeons Meeting, Chicago, IL (Oct 12).
132. "Pearls in Becoming a Neurosurgeon Clinician Scientist." K12 Meeting, Bos, MA (Nov 12)
133. "Molecular and Cellular Therapy for ALS." Stanford University, Palo Alto, CA (Mar 13).
134. "Cervical Spinal Cord Stem Cell Transplantation; Surgical Safety Results." Hilton Head, SC (Mar13).
135. "Gene-Based Approaches to Craniofacial Pain Management." Dept of Physiology, University of Kentucky, Lexington, KY (May 13).
136. "Spinal Cord Neurosurgery for ALS." Dept of Neurosurgery, University of Kentucky, Lexington, KY (May 13).
137. "Spinal Cord Surgery for Stem Cell Transplantation." International Society of Stem Cell Research, Boston, MA (Jun13).
138. "Cervical Transplantation for ALS." Society of University Neurosurgeons, Malaga, Spain (Jun13).
139. "Our Path into Spinal Cord Stem Cell Transplantation Surgery." California Institute for Regenerative Medicine, Washington, D.C. (Sept 13).
140. "Intracellular Targeting of Neuromodulatory Transgenes." Academy of Neurosurgery, Newport Beach, CA (Sept 13).
141. "Advances in Spine and Spinal Cord Technology; cellular and molecular therapies." Congress of Neurological Surgeons, San Francisco, CA (Oct 13).
142. "Stem Cell Therapy and Trials in ALS." Congress of Neurological Surgeons, San Francisco, CA (Oct 13).
143. "Stem Cells and Neurosurgery; Advances in Neuro-Regeneration." Current Techniques in Treatment of Cranial and Spinal Disorders, Boulder, Col (Oct 13)
144. "Movement Disorder Surgery." Stereotactic and Functional Neurosurgery Hands on Workshop, Atlanta, GA (Nov 13)
145. "Peripheral Nerve Stimulation," North American Neuromodulation Society, Las Vegas, NV (Dec 13)
146. "Molecular Neuromodulation," Gene Therapy in the Nervous System Fusion Conference, Cancun, Mexico (Jan 14)
147. "Spinal Cord Transplantation for ALS." Philadelphia Neurological Society, Philadelphia, PA (Mar 14).

148. "Treatment of CRPS 2 following failed Carpal Tunnel Release," and "Spinal Cord Stem Cell Therapy." American Association of Neurological Surgeons, San Francisco, CA (Apr 14).
149. "Cellular and Molecular ALS Therapy." Sicilian ALS Society, Palermo, It (June 14)
150. "Translational Motor Neuron Therapies." Voyager Therapeutics, Cambridge, MA (July 14)
151. "Spinal Cord Surgery for Motor Neuron Diseases." University of Massachusetts, Worcester, MA (Aug 11)

#### Visiting Professorships

1. Stanford September 2006
2. Medical University of South Carolina; September 2010
3. University of Calgary; February 2011
4. Cedar Sinai Hospital, Los Angeles; May 2011
5. University of Michigan; June 2011
6. Stanford March 2013
7. University of Kentucky 2013
8. University of Pennsylvania 2014
9. University of Massachusetts 2014

#### Completed Publications in Peer-Reviewed Journals

1. **Boulis NM**, and Sahley C (1988) A behavioral analysis of habituation and sensitization of shortening in the semi-intact leech. *J. Neuroscience* **8**: 4621-4627
2. Davis M, Commissaris R, Yang C, Wagner A, Kehne J, Cassella J, and **Boulis NM** (1989) Spinal vs. supraspinal sites of action of the  $\alpha_2$ -adrenergic agonists clonidine and ST-91 on the acoustic startle reflex. *Pharmacology, Biochemistry, and Behavior* **33**: 233-240
3. Altemus M, Wexler B, and **Boulis NM** (1989) Neuropsychological correlates of menstrual mood changes. *J of Psychosomatic Med.* **51**: 329-336
4. Altemus M, Wexler B, and **Boulis NM** (1989) Changes in perceptual asymmetry with the menstrual cycle. *Neuropsychologia* **27**: 233-240
5. **Boulis NM** and Davis M (1989) Foot-shock induced sensitization of electrically elicited startle reflexes. *Behavioral Neuroscience* **103**: 504-508
6. **Boulis NM**, Miserendino M, Kehne J, and Davis M (1990) Differential blockade of early and late components of acoustic startle following intrathecal infusion of CNQX or AP-5. *Brain Research* **520**: 240-246
7. **Boulis NM** and Davis M (1990) Blockade of the spinal excitatory effects of cAMP on the startle reflex by intrathecal administration of the isoquinolinesulfonamides H-8: Comparison to the protein kinase C inhibitor H-7. *Brain Research* **525**: 198-203
8. Kehne J, **Boulis NM**, and Davis M (1991) The effects of the phosphodiesterase inhibitor rolipram on the acoustic startle response. *Psychopharmacology* **105**: 27-36
9. Ehrlich J, **Boulis NM**, Karrer T, and Sahley C (1992) Differential effects of serotonin depletion on sensitization and dishabituation in the leech *Hirudo medicinalis*. *J. Neurobiology* **23**(3):270-279
10. **Boulis NM**, Sathi S, Schwartz R, DeGirolami U, and Black P McL. (1994) Neuro-glial hamartoma of the suprasellar cistern. *Surgical Neurology* **41**:494-7

11. Schwalb JM, **Boulis NM**, Gu M-F, Winicoff J, Irwin N, Jackson PS, and Benowitz LI (1995) Two factors secreted by cells of the goldfish optic nerve induce retinal ganglion cells to regenerate axons in culture. *J Neuroscience* **15**(8): 5514-5525
12. Sahley CL, **Boulis NM**, Schurman B. (1994) Associative learning modifies the shortening reflex in the semi-intact leech *Hirudo medicinalis*: Effects of Pairing, predictability, and CS preexposure. *Behavioral Neuroscience* **108**(2):340-346
13. Sahley CL, Modney BK, **Boulis NM**, Muller KJ (1994) The S cell: An interneuron essential for sensitization and full dishabituation of leech shortening. *J Neuroscience*, **14**(11):6715-6721
14. Schwalb JM, Gu M-F, Stuermer C, Bastmeyer M, Hu G-F, **Boulis N**, Irwin N, and Benowitz LI. (1996) Optic nerve glia secrete a low molecular weight factor that stimulates retinal ganglion cells to regenerate axons in goldfish. *Neuroscience* **72**(4):901-910
15. **Boulis NM**, Bhatia V, Brindle TI, Holman HT, Krauss DJ, Blaivus M, Hoff JT. (1999) Adenoviral nerve growth factor and b-galactosidase transfer to spinal cord: A behavioral and histological analysis. *J Neurosurgery (Spine 1)* 90:99-108
16. **Boulis NM** (1998) On Rabbit's Feet and Reason. *Lancet* 352: 1640
17. **Boulis NM**, Armstrong WA, Chandler W, Orringer M. (1999) Epidural abscess following esophageal stenting for benign disease. *Annals of Thoracic Surgery* 68:568-70
18. **Boulis NM**, Turner DE, Dice JA, Bhatia V, Feldman EL. (1999) Characterization of adenoviral gene expression in spinal cord following remote vector delivery. *Neurosurgery* 45: 131-138
19. **Boulis NM**, Bobek MP, Schmaier A, Hoff JT. (1999) Use of factor IX complex in warfarin-related intracranial hemorrhage. *Neurosurgery* 45(5): 1113-1118
20. **Boulis NM**. Sisyphus and the outpatients. (2000) *Lancet* 356: 350
21. Gong C, **Boulis NM**, Jun G, Turner DE, Hoff JT, Keep RF. (2001) Intracerebral Hemorrhage-induced neuronal death. *Neurosurgery* 48(4):875-82
22. **Boulis NM**, Mian F, Rodriguez DJ, Cho EJ, Hoff JT. (2001) Urinary retention in postoperative neurosurgical routine spine procedures. *Surgical Neurology* 55(1):23-7
23. **Boulis NM**, Noordmans AJ, Barkan A, Hassing J, Chandler WF (2000). Somatotropinoma infarction during Octreotide therapy leading to bilateral cavernous sinus syndrome. *Pituitary* 3:185-188
24. Turner DE, Noordmans AJ, Feldman EL, **Boulis NM** (2001). Remote adenoviral gene delivery to the spinal cord: contralateral delivery and reinjection. *Neurosurgery* 48(6):1309-1317
25. **Boulis NM**, Turner DE, Imperiale MJ, Feldman EL. (2002) Neuronal survival following remote adenoviral gene delivery. *J Neurosurg:( Spine 2)* 96: 212-219.
26. Song D, **Boulis NM**, McKeever, Quint D. (2002) Angiotropic large cell lymphoma presenting with imaging characteristics of CNS vasculitis. *American Journal of Neuroradiology* 23(2):239-42.
27. Rubin AD, Hogikyan ND, Sullivan K, **Boulis N**, Feldman EL. (2001) Remote delivery of rAAV-GFP to the rat brainstem through the recurrent laryngeal nerve. *The Laryngoscope* 111(11 Pt 1):2041-5.
28. **Boulis NM**. (2001) There was a young surgeon who swallowed a flea. *Canadian Medical Association Journal* 165(12): 1613-1614.

29. **Boulis NM**, Willmarth NE, Song DK, Feldman EL, Imperiale MJ. (2003) Intraneural colchicine inhibition of adenoviral and adeno-associated viral vector remote spinal cord gene delivery. *Neurosurgery* 52(2):381-387.
30. Rubin A, Hogikyan N, Bell K, Sullivan K, **Boulis NM**, Feldman EL. (2003) Remote delivery of an adenoviral vector to the crushed recurrent laryngeal nerve. *Laryngoscope* 113: 985-989.
31. Noordmans AJ, Parent N, Bhatia V, Garrity-Moses M, **Boulis NM**. (2003) Rigid postoperative fixation for pedicled cranial flaps: A case comparison. *J of Orthotics and Prosthetics* 15(1):27-30.
32. **Boulis NM**, Noordmans AJ, Song DK, Rubin A, Leone P, During M, Feldman EL, Imperiale MJ. (2003) Adeno-associated Viral Vector Gene Expression in the Adult Rat Spinal Cord Following Remote Vector Delivery. *Neurobiology of Disease* 14(3): 531-541.
33. Noordmans AJ, Song DK, Noordmans CJ, During MJ, Fitzsimons H, Imperiale MJ, **Boulis NM**. (2004) Adeno-associated viral glutamate decarboxylase expression in the lateral nucleus of the rat hypothalamus reduces feeding behavior. *Gene Therapy* 11: 797-804.
34. Tanase D, Teng Q, Krishnaney AA, Liu JK, Garrity-Moses ME, Mazarakis N, **Boulis NM**. (2004) Cervical spinal cord delivery of a rabies G protein pseudotyped lentiviral vector in the SOD-1 transgenic mouse. *J Neurosug (Spine 1)* 1: 128-136.
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36. Vincent A, Feldman E, Song D, Jung V, Schild A, Zhang W, Imperiale M, **Boulis NM**. (2004) Adeno-associated Viral-mediated Insulin-like Growth Factor Delivery Protects Motor Neurons In Vitro. *NeuroMolecular Medicine* 6(2/3): 79-85.
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42. Salazar F, Machado A, Stevens G, Murthy S, **Boulis NM**. (2005) Thoracoscopically Guided Transaxillary Resection of Adjoining Intercostal Plexiform Neurofibromas; Review of Mosaicism in Neurofibromatosis. *Neurosurgery* 57(4)(Operative Neurosurgery Supp 4): E407.
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50. Federici T, Liu JK, Teng Q, Yang J, **Boulis NM**. (2007) Tet1, a means for targeting therapeutics to peripheral nervous system neurons with axon damage. *Neurosurgery* 60(5): 911-918.
51. Steinmetz MP, Krishnaney A, **Boulis NM**, Benzel EC. (2007) Clinical Problem Solving; An invasion of the Atlas. *Neurosurgery* 60(6): 1083-7.
52. Ford PJ, **Boulis NM**, Montgomery EB, Rezai AR. (2007) A patient revoking consent during awake craniotomy; An ethical challenge. *Neuromodulation* 10(4): 259-262.
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54. Lotto M and **Boulis NM**. (2007) Intrathecal opioids for control of chronic low back pain during deep brain stimulation procedures. *Anesthesia and Analgesia* 105: 1410-1412.
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57. Riley J, Butler J, Baker KB, McClelland S III, Teng Q, Yang J, Garrity-Moses M, Federici T, **Boulis NM**. (2008) Targeted spinal cord therapeutics delivery: stabilized platform and MER guidance validation. *Stereotactic and Functional Neurosurgery* 86: 67-74.
58. McClelland S III, Bethoux FA, **Boulis NM**, Sutliff MH, Stough DK, Schwetz KM, Gogol DM, Harrison M, Piore EP (2008). Intrathecal baclofen for spasticity-related pain in ALS: Efficacy and factors associated with pain relief. *Muscle and Nerve*, 37(3): 396-398.
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61. Rezai A, Machado A, Deogaonkar M, Azmi H, Kubu C, and **Boulis NM**. (2008) Surgery for Movement Disorders. *Neurosurgery* 62(2): Supp809-839. in Surgery of the Human Cerebrum.
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65. Ranalli NJ, Zager EL, McGarvey M, **Boulis NM**, Kline DG. (2008) Clinical Problem Solving: Brachial Plexus Closed Injury and Reconstruction. *Neurosurgery*, 62(6): 1330-9.
66. Spiotta AM, Bain MA, Deogaonkar M, Hammert W, **Boulis NM**, Rezai A. (2008) Methods of scalp revision for deep brain stimulator hardware; the Good, the Bad, and the Ugly. *Neurosurgery* 62(3 Supp 1): 249-50.
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69. Federici T, Riley J, Park J, Bain M, **Boulis NM**. (2009) Preclinical safety and validation of a stabilized viral vector direct injection approach to the cervical spinal cord. *Clinical and Translational Science* 2 (2): 165-7.
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