Barclay Morrison III, Ph.D.

Associate Professor of Biomedical Engineering

Curriculum Vitae

Prepared September 29, 2016

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Work Address
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A. Field of Specialization

Traumatic Brain Injury Biomechanics, Prevention, and Treatment

Traumatic brain injury results in approximately 50,000 deaths and 85,000 permanently disable persons per year in the United States with an estimated primary care cost of $76 billion per year. The clinical situation is quite dire as there are no drug treatments which target the underlying pathobiology of TBI. This profound need for improvements in the prevention and treatment of TBI is the driving force behind my research. My long term goal is to understand the consequences of mechanical forces on the most complex system of the human body, the brain, and to develop strategies to mitigate and perhaps reverse these injurious effects. My research explores the specific cellular, molecular, and metabolic effects of injury on brain cells in response to precisely controlled biomechanical stimuli. My research program has three main focus areas:

1) Improvement of prevention strategies through development of critical biomechanical data for the living brain
2) Identification of novel treatment options by understanding the post-traumatic pathobiology in greater detail
3) Engineering new research tools to enhance studies in the first two areas

B. Academic Training

B.1 Educational Background

1988 -1992 Johns Hopkins University, Baltimore, MD
B.S., Biomedical Engineering

1992-1994 University of Pennsylvania, Philadelphia, PA
M.S.E., Bioengineering

1994-1999 University of Pennsylvania, Philadelphia, PA
Ph.D., Bioengineering

Dissertation: "Differential Genomic Expression after Mechanical Injury of Organotypic Brain Slice Cultures: An *In Vitro* Model of Traumatic Brain Injury" (Published)

Sponsor: Tracy K. McIntosh, Ph.D.

B.2 Academic Honors and Fellowships

1993-1997 Ashton Fellowship, University of Pennsylvania, Philadelphia, PA

1999 The S.R. Pollack Award for Excellence in Graduate Bioengineering Research, University of Pennsylvania, Philadelphia, PA

1999 Biomedical Engineering Society Graduate Student Research Award

1999 First Place, National Neurotrauma Society Student Competition

2006 The Kim Award for Student-Faculty Involvement, Fu Foundation School of Engineering and Applied Science, Columbia University, New York, NY

C. Teaching Experience

C.1 Courses Taught

2003 Spring

BMEN E6002 Advanced Quantitative Physiology II: Enrollment **33**

BMEN E3910 Biomedical Engineering Design
Advisor Helmet Project, **4** students

2003 Fall

ENGI E1102 Gateway Lab (Advisor, **8** students)

BMEN E3810 BME Laboratory I: Enrollment **66**

BMEN E3998 Undergraduate Independent Research: Enrollment **1**

2004 Spring

ENGI E1102 Gateway Lab (Advisor, **13** students, 2 groups)

BMEN E3910 Biomedical Engineering Design
Advisor: Helmet Project, **5** students
Advisor: Neuron Electrode Array Project, **4** students

BMEN E4002 Quantitative Physiology II: Enrollment **77**
BMEN E6002 Advanced Quantitative Physiology II: Enrollment **42**
BMEN E9100 Masters Research: Enrollment **1**

2004 Summer

Summer Undergraduate Research Fellowship Advisor (**2** students)
Intel Science Talent Search Advisor (**1** student)

2004 Fall

ENGI E1102 Gateway Lab (Advisor, **5** students)
BMEN E3810 BME Laboratory I: Enrollment **70**
Student Evaluation: 3.46 / 5.0
BMEN E3998 Undergraduate Independent Research: Enrollment **9**

2005 Spring

ENGI E1102 Gateway Lab (Advisor, **6** students)
BMEN E3910 Biomedical Engineering Design
Advisor: Helmet Project, **4** students
Advisor: Protective Athletic Cup Project, **6** students
Advisor: Automated Slide Locator, **4** students
BMEN E4002 Quantitative Physiology II: Enrollment **88**
Student Evaluation: 3.97 / 5.0
BMEN E6002 Advanced Quantitative Physiology II: Enrollment **41**
Student Evaluation: 3.51 / 5.0
BMEN E9100 Masters Research: Enrollment **1**

2005 Summer

Summer Undergraduate Research Fellowship Advisor (**1** student)
Intel Science Talent Search Advisor (**1** student)

2005 Fall

ENGI E1102 Gateway Lab (Advisor, **4** students)
BMEN E3910 Biomedical Engineering Design
Advisor: Helmet Project, **5** students
BMEN E3998 Undergraduate Independent Research: Enrollment **1**
BMEN E9100 Masters Research: Enrollment **2**
BMEN E9500 Doctoral Research: Enrollment **1**

2006 Spring

BMEN E3920 Biomedical Engineering Design
Advisor: Helmet Project, **5** students
BMEN E3998 Undergraduate Independent Research: Enrollment **2**
BMEN E4002 Quantitative Physiology II: Enrollment **73**
Student Evaluation: 4.09 / 5.0
BMEN E6002 Advanced Quantitative Physiology II: Enrollment **28**
Student Evaluation: 3.59 / 5.0
BMEN E9100 Masters Research: Enrollment **1**

BMEN E9500 Doctoral Research: Enrollment **1**

2006 Summer

BMEN E9100 Masters Research: Enrollment **1**

2006 Fall

BMEN E3910 Biomedical Engineering Design
Faculty Advisor: Helmet Project, **6** students

BMEN E3998 Undergraduate Independent Research: Enrollment **1**

BMEN E9500 Doctoral Research: Enrollment **2**

2007 Spring

BMEN E3920 Biomedical Engineering Design
Faculty Advisor: Helmet Project, **6** students

BMEN E4002 Quantitative Physiology II: Enrollment **70**
Student Evaluation: 4.26 / 5.0

BMEN E9100 Masters Research: Enrollment **1**

BMEN E9500 Doctoral Research: Enrollment **2**

2007 Fall

BMEN E3910 Biomedical Engineering Design
Faculty Advisor: Gravity Neutral Orthotic, **4** students

BMEN E6002 Computational Modeling of Physiological Systems: Enrollment **26**
Student Evaluation: 3.60 / 5.0

BMEN E9100 Masters Research: Enrollment **1**

BMEN E9500 Doctoral Research: Enrollment **1**

2008 Spring

BMEN E3920 Biomedical Engineering Design
Faculty Advisor: Gravity Neutral Orthotic, **3** students

BMEN E3998 Undergraduate Independent Research: Enrollment **1**

BMEN E4002 Quantitative Physiology II: Enrollment **92**
Student Evaluation: 4.14 / 5.0

BMEN E9100 Masters Research: Enrollment **1**

BMEN E9500 Doctoral Research: Enrollment **1**

2008 Fall

BMEN E3820 Biomedical Engineering Laboratory II: Enrollment **53**
Neurophysiology Module (New Module)

BMEN E3910 Biomedical Engineering Design
Faculty Advisor: Gravity Neutral Orthotic, **5** students

BMEN E3998 Undergraduate Independent Research: Enrollment **2**

BMEN E6003 Computational Modeling of Physiological Systems: Enrollment **16**
Student Evaluation: 4.13 / 5.0

BMEN E9100 Masters Research: Enrollment **1**

BMEN E9500 Doctoral Research: Enrollment **1**

2009 Spring

BMEN E3920 Biomedical Engineering Design
Faculty Advisor: Gravity Neutral Orthotic, **5** students
BMEN E3998 Undergraduate Independent Research: Enrollment **1**
BMEN E4002 Quantitative Physiology II: Enrollment **74**
Student Evaluation: 4.07 / 5.0
BMEN E9100 Masters Research: Enrollment **1**
BMEN E9500 Doctoral Research: Enrollment **2**

2009 Fall

BMEN E3820 Biomedical Engineering Laboratory II: Enrollment **44**
Neurophysiology Module
BMEN E3998 Undergraduate Independent Research: Enrollment **3**
BMEN E6003 Computational Modeling of Physiological Systems: Enrollment **33**
Student Evaluation: 3.38 / 5.0
BMEN E9500 Doctoral Research: Enrollment **2**

2010 Spring

BMEN E3998 Undergraduate Independent Research: Enrollment **1**
BMEN E4002 Quantitative Physiology II: Enrollment **62**
Student Evaluation: 3.89 / 5.0
BMEN E9100 Masters Research: Enrollment **1**
BMEN E9500 Doctoral Research: Enrollment **2**

2010 Summer

Summer Undergraduate Research Fellowship Advisor (**1** student)
Amgen Undergraduate Research Fellowship Advisor (**1** student)

2010 Fall

BMEN E1001 Engineering in Medicine: Enrollment **72**
Guest Lecturer
BMEN E3820 Biomedical Engineering Laboratory II: Enrollment **33**
Neurophysiology Module
BMEN E3998 Undergraduate Independent Research: Enrollment **3**
BMEN E6003 Computational Modeling of Physiological Systems: Enrollment **52**
Student Evaluation: 4.09 / 5.0
BMEN E9100 Masters Research: Enrollment **3**
BMEN E9500 Doctoral Research: Enrollment **1**

2011 Spring

BMEN E3820 Biomedical Engineering Laboratory II: Enrollment **37**
Neurophysiology Module
BMEN E3998 Undergraduate Independent Research: Enrollment **1**
BMEN E4002 Quantitative Physiology II: Enrollment **65**
Student Evaluation: 4.14 / 5.0
BMEN E9100 Masters Research: Enrollment **4**

2011 Fall

BMEN E1001 Engineering in Medicine: Enrollment **78**
Guest Lecturer

BMEN E6003 Computational Modeling of Physiological Systems: Enrollment **39**
Student Evaluation: 3.77 / 5.0

BMEN E9100 Masters Research: Enrollment **1**

BMEN E9500 Doctoral Research: Enrollment **2**

BMEN E3910 Biomedical Engineering Design
Faculty Advisor: Absorbable Suture,**4** students

2012 Spring

BMEN E3820 Biomedical Engineering Laboratory II: Enrollment **46**
Neurophysiology Module

BMEN E3998 Undergraduate Independent Research: Enrollment **1**

BMEN E4002 Quantitative Physiology II: Enrollment **66**
Student Evaluation: 4.19/5.0

BMEN E9100 Masters Research: Enrollment **1**

BMEN E9500 Doctoral Research: Enrollment **2**

2012 Fall

BMEN E6003 Computational Modeling of Physiological Systems: Enrollment **40**
Student Evaluation: 4.13/5.0

BMEN E9500 Doctoral Research: Enrollment **2**

BMEN E3910 Biomedical Engineering Design
Faculty Advisor: Cerebral Perfusion, **4** students

2013 Spring

BMEN E3820 Biomedical Engineering Laboratory II: Enrollment **44**
Neurophysiology Module

BMEN E4002 Quantitative Physiology II: Enrollment **72**
Student Evaluation: 4.33/5.0

BMEN E9500 Doctoral Research: Enrollment **2**

Fall 2013:

BMEN E6003 Computational Modeling of Physiological Systems: Enrollment **31**
Student Evaluation: 4.23/5.0

BMEN E9500 Doctoral Research: Enrollment **2**

BMEN E3910 Biomedical Engineering Design
Faculty Advisor: Mobility Device for Seniors, **4** students
Faculty Advisor: Concussion Detection, **4** students

Spring 2014:

BMEN E3820 Biomedical Engineering Laboratory II: Enrollment **41**
Neurophysiology Module

BMEN E3998 Projects in Biomedical Engineering: Enrollment **1**

BMEN E4002 Quantitative Physiology II: Enrollment **56**
Student Evaluation: 4.34/5.0
BMEN E9500 Doctoral Research: Enrollment **2**

Fall 2014:

BMEN E3998 Projects in Biomedical Engineering: Enrollment **1**
BMEN E6003 Computational Modeling of Physiological Systems: Enrollment **41**
Student Evaluation: 4.27/5.0
BMEN E9100 Masters Research: Enrollment **2**
BMEN E9500 Doctoral Research: Enrollment **1**
BMEN E3910 Biomedical Engineering Design
Faculty Advisor: Dehydration Sensor,**4** students

Spring 2015:

BMEN E3820 Biomedical Engineering Laboratory II: Enrollment **41**
Neurophysiology Module
BMEN E3998 Projects in Biomedical Engineering: Enrollment **2**
BMEN E4002 Quantitative Physiology II: Enrollment **73**
Student Evaluation: 4.37/5.0
BMEN E9100 Masters Research: Enrollment **2**

Fall 2015:

BMEN E3998 Projects in Biomedical Engineering: Enrollment **1**
BMEN E6003 Computational Modeling of Physiological Systems: Enrollment **41**
Student Evaluation: 4.07/5.0
BMEN E9100 Masters Research: Enrollment **2**
BMEN E3910 Biomedical Engineering Design
Faculty Advisor: Resource Constrained Medical Devices, **4** students

Spring 2016:

BMEN E3820 Biomedical Engineering Laboratory II: Enrollment **48**
Neurophysiology Module
BMEN E4002 Quantitative Physiology II: Enrollment **57**
Student Evaluation: pending/5.0
BMEN E6003 Computational Modeling of Physiological Systems: Enrollment **39**
Student Evaluation: pending/5.0
BMEN E9500 Doctoral Research: Enrollment **2**
BMEN E3910 Biomedical Engineering Design
Faculty Advisor: Resource Constrained Medical Devices, **4** students

C.1.c CourseWorks Evaluation

(Online student evaluation system was not implemented until the fall of 2004)

Year	Course	Enrollment	Avg. Rating / 5.0
2004	BMEN E3810	70	3.46
2005	BMEN E4002	87	3.97
	BMEN E6002	41	3.51
2006	BMEN E4002	73	4.19
	BMEN E6002	27	3.29
2007	BMEN E4002	69	4.26
	BMEN E6002	26	3.60
2008	BMEN E4002	91	4.14
	BMEN E6003	16	4.10
2009	BMEN E4002	75	4.07
	BMEN E6003	33	3.38
2010	BMEN E4002	62	3.89
	BMEN E6003	52	4.09
2011	BMEN E4002	65	4.14
	BMEN E6003	38	3.77
2012	BMEN E4002	66	4.19
	BMEN E6003	40	4.13
2013	BMEN E4002	72	4.33
	BMEN E6003	31	4.23
2014	BMEN E4002	56	4.34
	BMEN E6003	41	4.27
2015	BMEN E4002	73	4.37
	BMEN E6003	43	4.07
2016	BMEN E4002	57	pending
	BMEN E6003	39	pending

C.2 Research Training and Mentoring

Summary			
	Total	*Completed*	*In Progress*
Masters[a]	*7*	*7*	*0*
As Sponsor	*1*	*1*	*0*
As Supervisor	*6*	*6*	*0*
Doctoral	*33*	*26*	*7*
As Sponsor	*11*	*7*	*4*
As Reader	*22*	*19*	*3*

Undergraduates	*63*	*60*	*3*
High School	*7*	*7*	*0*

([a]Masters students are defined as those in the terminal M.S. program. Doctoral students are defined as those in the M.S. leading to Ph.D. program.)

Post-Doctoral Research Fellows Sponsored

1. Cezar Goletiani, 2008 – 2010
   (Ph.D. from Georgian Academy of Sciences, Georgia. Subsequent position: Post-doc, New York Medical College)
2. John D. Finan, 2010 – 2012
   (Ph.D. from Duke University. Current position: Research Scientist, NorthShore Hospital System)
3. Patricia Washington, 2014 –
   (Ph.D. from Georgetown University)

Post-Doctoral Research Fellows Self-sponsored

1. John D. Finan, 2012 – 2014
   (Charles H. Revson Senior Fellowship in the Biomedical Sciences, Ph.D. from Duke University, Current position: Research Scientist, NorthShore Hospital System)

Doctoral Students Sponsored

1. Zhe Yu, 2004 – 2009
   "Experimental Mild TBI Causes Functional Alterations of the Developing Hippocampus & Development of Electrophysiology Research Platforms"
   (Current position: Associate Professor, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences)
2. Ben S. Elkin, 2004 – 2010, with distinction
   "Biomechanics and Biological Consequences of Traumatic Brain Injury"
   (Current position: Biomechanist, MEA Forensic Engineers & Scientists)
3. Melissa J. Simon, 2005 – 2010
   "Delivery to Brain Cells using Cell-Penetrating Peptides: Evaluation of the TAT Peptide and Development of Techniques for Identifying Novel Peptides"
   (Current position: Analyst, Insight Strategy Advisors)
4. Charles R. Haggart, 2010 (Co-sponsored with Dr. Jeff Holmes)
   "Mechanical Regulation of Myocyte Growth and Remodeling in Cultured Rat Right Ventricular Papillary Muscles"
   (Current position: NRSA Postdoctoral Trainee, University of Virginia)
5. Michael R. Lamprecht, 2007 – 2014
   "A Potential Combination Therapy for Traumatic Brain Injury: 17β-Estradiol and Memantine"
   (Current position: Research Scientist, EpiBone)
6. Woo Hyeun Kang, 2008 – 2014
   "Reducing the Societal Costs of Traumatic Brain Injury: Astrocyte-Based Therapeutics and Functional Injury Tolerance of the Living Brain"
   (Current position: Consultant, ClearView Healthcare Partners)

7. Christopher D. Hue, 2010 – 2015
   "Blood-Brain Barrier Dysfunction and Repair after Blast-Induced Traumatic Brain Injury"
   (Current position: Medical School Student, University of Toronto)
8. Gwen Effgen, 2010 –
9. Edward Vogel, 2011 –
10. Sowmya Sundaresh, 2014 –
11. Sonali Ahuja, 2014 –

Doctoral Student Thesis Committee Membership

1. Kristi Hultman, 2007 (Applied Physics)
2. Johnathan Lai, 2007 (Biomedical Engineering)
3. Matt Neimark, 2007 (Biomedical Engineering)
4. Shan Gao, 2009 (Chemical Engineering)
5. James Choi, 2009 (Biomedical Engineering)
6. Wei Yuan, 2009 (Biomedical Engineering, *City College of NY*)
7. Michael Albro, 2009 (Biomedical Engineering)
8. Peng Shi, 2009 (Biomedical Engineering)
9. Guanglei Li, 2010 (Biomedical Engineering, *City College of NY*)
10. Gregory Fomovsky, 2010 (Biomedical Engineering)
11. Melinda Kutzing, 2011 (Biomedical Engineering, *Rutgers University*)
12. Stanley Huang, 2011 (Biomedical Engineering)
13. Parisa Saboori, 2011 (Biomedical Engineering, *City College of NY*)
14. Rudy Cloots, 2011 (Materials Technology, *Eindhoven University of Technology*, Netherlands)
15. Jean-Pierre Dolle, 2012 (Biomedical Engineering, *Rutgers University*)
16. Yao-Sheng Tung, 2012 (Biomedical Engineering)
17. Brenda Chen, 2012 (Biomedical Engineering)
18. Maged Elwassif, 2013 (Biomedical Engineering, *City College of NY*)
19. Gesthimani Samiotaki, 2014 (Biomedical Engineering)
20. Kate M. O'Neill, expected 2016 (Biomedical Engineering, *Rutgers University)*
21. John Molina, expected 2017 (Biological Sciences, *Columbia University*)
22. Marilena Karakatsani, expected 2019 (Biomedical Engineering)

Masters Student Research Sponsored

1. Shamik Chaudhuri, 2006 – 2008

Masters Student Research Supervised

1. Patricia Park, 2003 – 2004
2. Mariel Kozberg, 2009
3. Bridget Matikainen, 2009 – 2010

4. Kai-Roy Wang, 2010-2011
5. Elise Gill, 2011
6. Ryan Van Echo, 2013

Undergraduate Student Research Supervised

1. Joshua Lennon, 2003 – 2004; 2. Shira Katseff, 2003 – 2004; 3. Christina Fan, 2003 – 2005; 4. Lawrence David, 2003 – 2005; 5. Weng Si Ho, 2004; 6. Eric Chang, 2004; 7. Rene Choi, 2004; 8. Barry Whol, 2004; 9. Tim Chou, 2004 – 2005 ; 10. Gidon Ofek, 2004 – 2005; 11. Zafeer Baber, 2004 – 2005 ; 12. Kristin Olsen, 2004 – 2007; 13. Hyun Choi, 2005 – 2006 ; 14. Pravin Chottera, 2005 – 2006; 15. Kartik Kesavabhotla, 2007 – 2008; 16. Nina Xu, 2007; 17. Steve Xu, 2007; 18. Ashok Ilankovan, 2007 – 2009; 19. Mohammed Shaik, 2008 – 2011; 20. Vikrum Thimmappa, 2008 – 2009; 21. Hsuan Lai, 2008; 22. Chris Nguyen, 2009 – 2010; 23. Chris Puleo, 2009 – 2010; 24. Gwen Effgen, 2009 – 2010; 25. Patrick Fox, 2009 – 2011 ; 26. Anthony Assad, 2010; 27. Jessica Chen, 2010 – 2011; 28. Erica Pearson, 2011; 29. Irene Kalbian, 2011; 30. Deryn Jakolev, 2011; 31. Kimberly Lynch, 2011 – 2013; 32. Josh Muniz, 2011 – 2012; 33. Victoria Silva, 2011 – 2012; 34. Kiet Vo, 2011 – 2012; 35. Mayra Velazquez, 2011 – 2012 ; 36. Christian Carter, 2011 – 2012; 37. Meredith Venerus, 2011; 38. Syed Haider, 2012; 39. Chris So, 2012-2013; 40. Daniel Campo, 2012; 41. Shruthi Nammalwar, 2012 – 2015; 42. Tiffany Ong, 2012-2015; 43. Siqi Cao, 2012 – 2014; 44 Elena Ripp, 2012; 45. Zafirah Baksh, 2012; 46. Akaljot Singh, 2013; 47. Ayelet Lobel, 2012 – 2014; 48. Thanh Nguyen, 2012 -2013; 49. Morgan Caglianone, 2013-2014; 50. Tighe Costa, 2013-2014; 51. Leonard Ash, 2013; 52. Frances Cho, 2013-2015; 53. Jessica Villacorta, 2013; 54. John Brady, 2013-2015; 55. Andrea Ortuno, 2013-2015; 56. Cosmas Sibindi, 2014; 57. Samuel Weinreb, 2014; 58. Steve Rwema, 2015-2016; 59. Thalia Matos 2015; 60. Jehelia Odidi, 2015; 61 Stephanie Yang, 2015- ; 62. Nathalie Morales, 2015-2016; 63. Daniel Soltis, 2016-;

High School Students Supervised

1. Sarah Goldman, 2004 – 2005; 2. Stephanie David, 2006, 3. Aaron Huang, 2012 – 2013; 4. Charles Levin, 2012; 5. Lamia Ateshian, 2013; 6, Jessica Lang, 2013; 7, Zoe Ross, 2014

D. Positions Held since Final Degree

1999-1999	Post-doctoral Fellow, Department of Neurosurgery, University of Pennsylvania, Philadelphia, PA **Mentor**: Tracy K. McIntosh, Ph.D.
2000-2002	Post-doctoral Fellow, Clinical Neurosciences Department, Southampton University, UK **Mentor**: Lars E. Sundstrom, Ph.D.
2003-2008	Assistant Professor of Biomedical Engineering, Columbia University, NY
2004-	Director, Neurotrauma and Repair Laboratory, Columbia University, NY
2008-2012	Associate Professor (untenured),Biomedical Engineering, Columbia University, NY
2012-	Associate Professor (tenured), Biomedical Engineering, Columbia University, NY
2012-2014	Vice Chair, Biomedical Engineering, Columbia University, NY

2014- Vice Dean of Undergraduate Programs, Fu Foundation School of Engineering and Applied Science, Columbia University, NY

E. Publications

(indicates Morrison as corresponding author; underline indicates Morrison's mentees;* ***bold number*** *indicates published while at Columbia; in Morrison's field, the senior author is either first or last; T publication derived from thesis; R undergone stringent editorial review by peers; I invited and carries special prestige and recognition; S published with a student; P published with a post-doc; C published with faculty colleagues; as of March 30, 2016, ISI citation metrics: total citations 1612, h index 22; Google Scholar citation metrics: total citations 2774, h index 28)*

E.1 Doctoral Thesis

"Differential Genomic Expression after Mechanical Injury of Organotypic Brain Slice Cultures: An *In Vitro* Model of Traumatic Brain Injury", (1999), *University of Pennsylvania*

E.2 Full-length, Peer Reviewed Publications

1. (TR) **Morrison III, B.**, Meaney, D.F., and McIntosh, T.K., *Mechanical characterization of an in vitro device to quantitatively injure living brain tissue.* Ann.Biomed.Eng., 1998. **26**: p. 381-90.
2. (TR) **Morrison III, B.**, Saatman, K.E., Meaney, D.F., and McIntosh, T.K., *In vitro central nervous system models of mechanically induced trauma: A review.* J.Neurotrauma, 1998. **15**: p. 911-28.
3. (TR) O'Dell, D.M., Raghupathi, R., Crino, P.B., **Morrison III, B.**, Eberwine, J.H., and McIntosh, T.K., *Amplification of mRNAs from single, fixed, TUNEL-positive cells.* BioTechniques, 1998. **25**: p. 566-8.
4. (TR) **Morrison III, B.**, Eberwine, J.H., Meaney, D.F., and McIntosh, T.K., *Traumatic injury induces differential expression of cell death genes in organotypic brain slice cultures determined by complementary DNA array hybridization.* Neurosci., 2000. **96**: p. 131-9.
5. (TR) **Morrison III, B.**, Meaney, D.F., Margulies, S.S., and McIntosh, T.K., *Dynamic mechanical stretch of organotypic brain slice cultures induces differential genomic expression: Relationship to mechanical parameters.* J.Biomech.Eng., 2000. **122**: p. 224-30. (*Best Paper Award in the journal for that year*)
6. (R) **Morrison III, B.**, Pringle, A.K., McManus, T., Ellard, J., Bradley, M., Signorelli, F., Iannotti, F., and Sundstrom, L.E., *L-arginyl-3,4-spermidine is neuroprotective in several in vitro models of neurodegeneration and in vivo ischaemia without suppressing synaptic transmission.* Brit.J.Pharm., 2002. **137**: p. 1255-68.
7. (R) Cater, H.L., Chandratheva, A., Benham, C.D., **Morrison III, B.**, and Sundstrom, L.E., *Lactate and glucose as energy substrates during, and after, oxygen deprivation in rat hippocampal acute and cultured slices.* J.Neurochem., 2003. **87**: p. 1381-90.
8. (RC) ***Morrison III, B.**, Cater, H.L., Wang, C.B., Thomas, F.C., Hung, C.T., Ateshian, G.A., and Sundstrom, L.E., *A tissue level tolerance criteria for living brain developed with an*

in vitro model of traumatic mechanical loading. Stapp Car Crash J., 2003. **47**: p. 93-105. (*Best paper award in the journal for that year*)

9. (R) Pringle, A.K., **Morrison III, B.**, Bradley, M., Iannotti, F., and Sundstrom, L.E., *Characterisation of a novel class of polyamine-based neuroprotective compounds* Naunyn-Schmiedeberg's Arch.Pharm., 2003. **368**: p. 216-24.
10. (R) Sundstrom, L., **Morrison III, B.**, Bradley, M., and Pringle, A., *Organotypic cultures as tools for functional screening in the CNS.* Drug Discov.Today, 2005. **10**: p. 993-1000.
11. (R) *Cater, H.L., Sundstrom, L.E., and **Morrison III, B.**, *Temporal development of hippocampal cell death is dependent on tissue strain but not strain rate.* J.Biomech., 2006. **39**: p. 2810-8.
12. (R) ***Morrison III, B.**, Cater, H.L., Benham, C.D., and Sundstrom, L.E., *An in vitro model of traumatic brain injury utilising two-dimensional stretch of organotypic hippocampal slice cultures.* J.Neurosci.Meth., 2006. **150**: p. 192-201.
13. (RC) Cater, H.L., Gitterman, D.P., Davis, S.M., Benham, C.D., **Morrison III, B.**, and Sundstrom, L.E., *Stretch-induced injury in organotypic hippocampal slice cultures reproduces in vivo post-traumatic neurodegeneration: Role of glutamate receptors and voltage-dependent calcium channels.* J.Neurochem., 2007. **101**: p. 434-47.
14. (RSC) *Elkin, B.S., Azeloglu, E.U., Costa, K.D., and **Morrison III, B.**, *Mechanical heterogeneity of the rat hippocampus measured by AFM indentation.* J.Neurotrauma, 2007. **24**: p. 812-22.
15. (RS) *Elkin, B.S. and **Morrison III, B.**, *Region-specific tolerance criteria for the living brain.* Stapp Car Crash J., 2007. **51**: p. 127-38.
16. (RS) *Yu, Z., McKnight, T.E., Ericson, M.N., Melechko, A.V., Simpson, M.L., and **Morrison III, B.**, *Vertically aligned carbon nanofiber arrays record electrophysiological signals from hippocampal slices.* Nano Lett., 2007. **7**: p. 2188-95.
17. (RC) Ateshian, G.A., Costa, K.D., Azeloglu, E.U., **Morrison III, B.**, and Hung, C.T., *Continuum modeling of biological tissue growth by cell division, and alteration of intracellular osmolytes and extracellular fixed charge density.* J.Biomech.Eng., 2009. **131**: p. 101001.
18. (RSC) Gao, S., Simon, M.J., **Morrison III, B.**, and Banta, S., *Bifunctional chimeric fusion proteins engineered for DNA delivery: Optimization of the protein to DNA ratio.* Biochim.Biophys.Acta, 2009. **1790**: p. 198-207.
19. (RSC) Graudejus, O., Yu, Z., Jones, J., **Morrison III, B.**, and Wagner, S., *Characterization and application of an elastically stretchable microelectrode array to neural field potential recordings.* J.Electrochem.Soc., 2009. **156**: p. P85-P94.
20. (R) Margulies, S.S., Hicks, R.R., Ansel, B., Bullock, R., Clifford, D., Clifton, G., Conwit, R., Dash, P., Diaz-Arrastia, R., Dietrich, W.D., et al., *Combination therapies for traumatic brain injury - prospective considerations.* J.Neurotrauma, 2009. **26**: p. 925-39.
21. (RSC) *Simon, M.J., Gao, S., Banta, S., and **Morrison III, B.**, *TAT-mediated intracellular protein delivery to primary brain cells is dependent on glycosaminoglycan expression.* Biotechnology and Bioengineering, 2009. **104**: p. 10-9.
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E.3 Manuscripts under Review

E.4 Refereed Conference Proceedings

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E.5 Book Chapters

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E.6 Refereed Abstracts

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E.7 Popular Press Articles

(I) **Morrison III, B.**, The brain injury epidemic, Technology Review, January 2007
http://www.technologyreview.com/Biotech/17996/

(IC) **Morrison III, B.**, Meaney, D.F., Bass, C.R., Fundamental insights into blast TBI, in The Challenge: The Future of Research, Summer 2013
http://www.biausa.org/LiteratureRetrieve.aspx?ID=125697

E.8 Press Releases and Quotations

10/21/2005	"SEAS' Banta, Morrison Receive Brain Trust Award" from Columbia University http://www.columbia.edu/cu/news/05/10/brain_trust.html
9/6/2005	"Four Leading Medical Research Philanthropies Announce 2005 Brain Trust Awards" from the Brain Trust http://www.brain-trust.org/html/award_release.html
9/1/2006	Quoted in "2006 Technology Review Young Investigator Awards: Stephanie Lacour", Technology Review, September 2006 http://www.technologyreview.com/tr35/Profile.aspx?Cand=T&TRID=471
12/1/2006	Quoted in "Elastic Electrodes" from ScienceLine, New York University's Science, Health, and Environmental Reporting Program http://scienceline.org/2006/12/01/tech_peck_strech/
4/6/2007	"Deflecting damage: Flexible electronics aid brain injury research" from Princeton University http://www.eurekalert.org/pub_releases/2007-04/pues-ddf040607.php
7/24/2007	"Plugging into the brain with carbon nanofibers" from NanoWerk http://www.nanowerk.com/spotlight/spotid=2264.php
8/2007	"Carbon nanofibres: On the brain", Nature Nanotechnology 2(8): 465, 2007 http://www.nature.com/nnano/journal/v2/n8/full/nnano.2007.245.html
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9/2009	"Preventing traumatic brain injury", featured in Engineering News - the Columbia University's School of Engineering and Applied Sciences (SEAS) newsletter http://engineering.columbia.edu/web/newsletter/fall_2009/preventing_traumatic_brain_injury
4/19/2010	"Ultrathin silk-based electronics make better brain implants" http://www.wired.com/wiredscience/2010/04/silk-brain-computer-interface/
6/9/2010	Portilla, L.M. and B. Alving, Reaping the benefits of biomedical research: partnerships required. Sci.Transl.Med., 2010. 2(35): p. 35cm17. http://stm.sciencemag.org/content/2/35/35cm17.full
6/8/2011	"Imaging method reveals hidden brain injuries" http://www.technologyreview.com/biomedicine/37722/
10/16/2012	"Understanding the biomechanics of brain injury to find treatments for injured soldiers, athletes", featured in The Record, Columbia University
3/11/2015	"Steroids rapidly restore blood-brain barrier function after blast" http://engineering.columbia.edu/steroids-rapidly-restore-blood-brain-barrier-function-after-blast-0
9/23/2015	"Prof. Barclay Morrison lecture underscores advances in brain injury research" http://engineering.columbia.edu/prof-barclay-morrison-lecture-underscores-advances-brain-injury-research

F. Research funding

F.1 Current Funding

(The % numbers indicate effort dedicated to the project)

PI: Morrison III, B. 10% 9/15-8/17

Research Initiatives in Science & Engineering (RISE) Total: $160,000
Columbia University

"Novel edema therapy"

The purpose of this grant is to test the efficacy of anti-edema treatments to control brain swelling after traumatic brain injury in the mouse.

58155-LS-MUR PI: Meaney, D.F. (Penn) 9/10-12/16

Co-PI: Morrison III, B. 20%

Co-PI: Bass, C.R. (Duke)

DoD: Multi University Research Initiative (MURI) Total: $5,952,269; Morrison: $1,724,000

"Blast Induced Threshold for Neural Networks (BITNeT)"

The purpose of this grant is to determine thresholds for brain tissue to blast-induced injury and neuronal dysfunction.

5R01EB009041 PI: Konofagou, E.E. 9/14-8/19

Co-I: Morrison III, B. 10%

NIBIB Total: $3,041,154; Morrison $250,000

"Optimization of ultrasound-facilitated blood-brain barrier opening"

The purpose of this competitive renewal grant is to optimize ultrasound parameters for non-invasive opening of the BBB.

W81XWH-15-1-0550 PI: Arancio, O. (Columbia) 9/15-8/18

Co-I: Morrison III, B. 10%

CDMRP Total: $728,713; Morrison $209,553

"TBI-Induced formation of toxic Tau and its biological similarities to Tau in AD brains"

The purpose of this grant is to determine whether blast exposure can modify Tau protein into toxic Tau found in Alzheimer's disease.

F.2 Pending Funding

PI: Meaney, D.F. (UPenn) 9/16-8/19

Co-PI: Morrison III, B. 10%

Co-PI: Bass, C.R. (Duke)

Department of the Army Total: $750,000; Morrison $250,000

"Multiscale mechanisms and tolerance from complex blast overpressure loading"

The purpose of this grant is to explore mechanisms behind primary blast injury at multiple scales, from single cell to whole animal.

PI: Morrison III, B. 4% 1/17-12/18

Department of the Army Total: $732,151

"Long term potentiation deficits after repetitive primary blast"

The purpose of this grant is to determine tolerance criteria to repetitive primary blast in organotypic brain slice cultures.

F.3 Completed Funding

PI: Morrison III, B. 10% 7/15-6/16

Co-PI: Noble J. M.

Columbia-Coulter Translational Research Partnership Total: $53,000

"Transmitted Electroencephalogram Activity Monitor (TEAM) Helmet"

The purpose of this grant is to build prototypes of sports helmets that monitor brain waves on the field.

R43 NS086118 PI: Graudejus, O. 7/14-12/16

Co-I: Morrison III, B. 10%

NIH: NINDS Total: $550,480; Morrison $128,416

"Lab-To-Marketplace: Commercialization of a stretchable microelectrode array"

The purpose of this grant is to develop a commercially viable process for producing stretchable microelectrode arrays so that they may be sold for research purposes.

R01AG038961 PI: Konofagou, E.E. (Columbia) 8/11-5/16

Co-I: Morrison III, B. 10%

National Institutes of Health Total:$1,434,000; Morrison: $150,000

"Assessment of ultrasound-facilitated neurotherapeutics"

The purpose of this grant is to use ultrasound to transiently open the blood brain barrier and to deliver therapeutic compounds in sufficient quantity to reduce Alzheimer's disease symptoms in a mouse model.

W81XWH-11-MRPRA-TRA PI: Arancio, O. (Columbia) 9/12-8/15

Co-I: Morrison III, B. 10%

Telemedicine and Advanced Technology Research Center Total: $800,000; Morrison $235,000

"The role of PP2A methylation in susceptibility and resistance to TBI and AD-induced neurodegeneration"

The purpose of this grant is to explore the molecular mechanisms that underlie the cognitive decline and mental health problems resulting from blast-induced traumatic brain trauma.

PI: Morrison III, B. 0% 6/14-5/15

DoD: Defense University Research Instrumentation Program (DURIP) Total: $285,000

"Multi-user high-speed 3D optical imaging system dedicated to engineering research and education"

The purpose of this equipment grant is to obtain a high-speed, 3D imaging system to support brain injury activities.

PI: Arancio, O. (Columbia) 7/12-12/13
Co-I: Morrison III, B. 4%

National Football League Charities Total: $100,000; Morrison $8,000

"The role of PP2A methylation in Chronic Traumatic Encephalopathy Susceptibility and Recovery"

The purpose of this grant is to explore the molecular mechanisms that underlie the cognitive decline and mental health problems resulting from repetitive traumatic brain injuries.

PI: Morrison III,B. 0% 11/12-10/13

CUMC Center for Injury Epidemiology and Prevention Total: $10,000

"Molecular mechanisms of repetitive, mild traumatic brain injury"

The purpose of this pilot grant is to test molecular mechanisms which give rise to secondary injury syndrome in traumatic brain injury.

R01 EB009041 PI: Konofagou, E.E. (Columbia) 09/08-08/13
Co-I: Morrison III, B. 10%

National Institutes of Health Total: $2,236,475; Morrison: $150,000

"Optimization of ultrasound-facilitated blood-brain barrier opening"

The purpose of this grant is to optimize ultrasound parameters to transiently and safely open the blood brain barrier and to identify mechanisms of opening.

10-3215-BIR PI: Shreiber, D.I. (Rutgers) 6/10-5/13
Co-I: Morrison III, B. 4%

New Jersey Commission on Brain Injury Research Total: $494,993; Morrison: $164,992

"Evaluation of genipin as a multi-potent therapeutic agent following brain injury"

The purpose of this grant is to test whether the natural product genipin is neuro-protective and neuro-regenerative after traumatic brain injury.

DTNH2208C00088 **PI: Morrison III, B.** 25% 09/08-02/13

National Highway Traffic Safety Administration Total: $934,000

"Critical studies to advance brain injury biomechanics through SIMon"

The purpose of this grant is to generate critical data necessary for NHTSA's finite element model of the human head for car crash testing, including functional tolerance criteria and age-dependent, anisotropic brain material properties.

CBET-0853946 PI: Banta, S. (Columbia) 06/09-05/12
Co-PI: Morrison III, B. 2%
National Science Foundation Total: $300,000
"Directed evolution of specific cell penetrating peptides"
The purpose of this grant is to use phage display and directed evolution to discover new cell penetrating peptides with the ability to target cargoes to specific brain cell types.

09-3209-BIR PI: Firestein, B. (Rutgers) 06/08-05/12
Co-PI: Morrison III, B. 8%
Co-PI: Wagner S. (Princeton)
Co-PI: Meaney D.F. (Penn)
New Jersey Commission on Brain Injury Research Total: $1,800,000; Morrison: $300,000
"The mechanisms and efficacy of using uric acid to improve outcome after traumatic brain injury"
The purpose of this grant is to evaluate the efficacy of uric acid in preventing both cell death and neuronal dysfunction after TBI.

57510-LS-RIP **PI: Morrison III, B.** 0% 11/10-10/11
DoD: Defense University Research Instrumentation Program (DURIP) Total: $83,000
"Multi-department, multi-user microelectrode array electrophysiology setup dedicated to engineering research and education"
The purpose of this equipment grant is to obtain an electrophysiology rig to support ongoing research projects and education of graduate and undergraduate students.

R21 MH080024 PI: Banta, S. (Columbia) 05/07-04/10
Co-PI: Morrison III, B. 10%
National Institutes of Health NIMH Total: $361,580
"Delivery Systems for Precision Brain Cell Targeting"
The goal of this project is to develop homing peptides with the ability to systemically treat injured brain cells by targeted delivery of therapeutic compounds.

R21 EY18505 PI: Konofagou, E.E. (Columbia) 09/07-08/09
Co-I: Morrison III, B. 10%
National Institutes of Health NEI Total: $412,250
"Ultrasound-Induced Drug Delivery through the Blood-Brain Barrier"
The main objective is to determine the factors in the effective molecular delivery in the hippocampus of wild-type mice and mice affected by neurodegenerative disease.

PI: Kaufmann, P. (Columbia) 07/08-06/09
Co-I: Morrison III, B. 8%
Columbia University Clinical and Translational Science Award (Phase 2) Total: $125,000
"Gravity Neutral Orthotic (GNO)- Design and evaluation of a novel rehabilitation device for

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people with severe physical disability”

The purpose of this grant is to develop an orthotic device to improve mobility of severely disable children with spinal muscular atrophy.

W81XWH-08-1-0293 PI: Bergold, P. (SUNY Downstate) 09/08-04/09

Co-I: Morrison III, B. 4%

US Army Medical Research and Materiel Command Total: $180,000; Morrison: $38,000

“Multidrug treatment of traumatic brain injury”

The purpose of this grant is to use an organotypic model of TBI to test the therapeutic efficacy of drug combinations.

R21 NS052794 **PI: Morrison III, B.** 15% 05/06-04/08

National Institutes of Health NINDS Total: $374,233

“Elastomeric Microelectrode Array for in-Vitro Brain”

The purpose of this R21 proposal is to develop a stretchable microelectrode array on a silicone rubber substrate that is compatible with *in vitro* models of stretch injury enabling continuous electrophysiological recording pre-, during, and post-stretch.

R03 NS054256 **PI: Morrison III, B.** 1% 06/06-05/08

National Institutes of Health NINDS Total: $148,717

“Temporal transcriptomes of TBI and OGD for dissemination (T3OD)”

The purpose of this R03 is to measure temporal changes in mRNA levels across the entire genome after traumatic brain injury and oxygen glucose deprivation and to release these datasets via the NCBI Gene Expression Omnibus and the NIH’s Neuroscience Microarray Consortium.

PI: Morrison III, B. 10% 02/07-01/09

The Gatsby Initiative in Brain Circuitry Total: $50,000

“Novel nanofiber technology for dissection of neural circuit function “

The purpose of this proposal is to develop carbon nanofiber-based, microelectrode arrays for multimode recording of neuronal function.

W911NF-08-1-0236 **PI: Morrison III, B.** 0% 04/08-04/09

DoD: Defense University Research Instrumentation Program (DURIP) Total: $196,680

“Multi-Department, Multi-User Flow Cytometer Dedicated to Engineering Research and Education”

The purpose of this grant is to purchase a multi-user piece of equipment to enhance ongoing and future research projects funded or of interest to the DoD.

PI: Vunjak-Novakovic, G. (Columbia) 04/08-03/09

Co-I: Morrison III, B. 0%

New York State’s Stem Cell Board Total: $1,000,000

"Institutional Development of Stem Cell Research Capabilities"

The purpose of this grant is to establish an imaging core facility in the BME department.

PI: Kaufmann, P. (Columbia) 05/07-05/08
Co-I: Morrison III, B. 0%

Columbia University Clinical and Translational Science Award (Phase 1) Total: $25,000

"Gravity Neutral Orthotic (GNO) – Design and Evaluation of a device to improve the lives of severely disabled children with Spinal Muscular Atrophy (SMA)"

The purpose of this grant was to develop a collaborative team for design of an orthotic device to improve mobility of severely disable children with spinal muscular atrophy.

PI: Morrison III, B. 10% 05/05-04/08

Southern Consortium for Injury Biomechanics & National Highway Traffic Safety Administration Total: $300,000

"Quantitative tolerance criteria for SIMon: cell death and dysfunction"

The goal of this project is to determine mechanical tolerance criteria for living brain tissue for both cell death and functional impairments. The tolerance criteria will be implemented into NHTSA's finite element crash simulator to predict the biological response to virtual crashes.

PI: Banta, S. (Columbia) 08/05-12/07
Co-PI: Morrison III, B. 10%

The Brain Trust Total: $200,000

"Directed evolution of cell penetrating peptides for therapeutic delivery across the blood-brain barrier to specific cellular targets"

The goal of this research is to discover cell penetrating peptides that can shuttle therapeutic cargoes across the blood brain barrier and target specific brain cell types.

PI: Morrison III, B. 50% 01/01-12/03
Co-PI: Sundstrom, L.E.

Defense Evaluation and Research Agency & the Medical Research Council Total: £200,000

"Development of a clinically relevant *in vitro* model of traumatic brain injury"

The goal of this research was to develop an *in vitro* model of traumatic brain injury to replace *in vivo* models.

PI: Morrison III, B. 50% 01/01-12/03
Co-PI: Sundstrom, L.E.

European Commission Total: €315,000

"Establishment of a clinically relevant model of shear injury in organotypic brain slice cultures"

The purpose of this project was to build a physical injury device compatible with long-term organotypic slice cultures to study functional consequences of traumatic brain injury and to track the long term recovery of function over time after injury.

F.4 Direct Student Support

2007-2010 M.J. Simon, National Science Foundation Graduate Research Fellowship; "Discovery of Protein Engineering Design Principles for Cell-Specific, Cell-Penetrating Peptides", Advisor: **B. Morrison III**

2008-2010 B.S. Elkin, Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship "Mechanical Properties of Brain Tissue: Implications for Traumatic Brain Injury" Advisor: **B. Morrison III**

2009-2012 M.R. Lamprecht, National Science Foundation Graduate Research Fellowship; "Utilizing Dual Sensing Electrode Arrays to Delineate the Role of Astrocytes in Spike-Timing-Dependent Plasticity after Traumatic Brain Injury", Advisor: **B. Morrison III**

2012-2015 C.D. Hue, National Science Foundation Graduate Research Fellowship; "Engineering Novel Cell Penetrating Peptides for Therapeutic Delivery Across the Blood-Brain Barrier to Specific Cellular Targets", Advisor: **B. Morrison III**

2012-2015 E.W. Vogel, National Defense Science and Engineering Graduate Research Fellowship; "Quantitative Thresholds For Blast Traumatic Brain Injury", Advisor: **B. Morrison III**

F.5 Direct Fellow Support

2012-2014 J.D. Finan, Charles H. Revson Senior Fellowship in the Biomedical Sciences; "Anti-edema treatments for brain swelling ", Advisor: **B. Morrison III**

2015 E. Chierto, Mobility Grant, Universite Paris Descartes; "Organotypic cerebellar slice cultures on deformable substrates", Advisors: M. Jararian-Tehrani & **B. Morrison III**

G. Other Honors and Awards

1999 Biomedical Engineering Society Travel Award

1999 National Neurotrauma Society Travel Award

2001 Richard Skalak Best Paper Award in the *Journal of Biomechanical Engineering* for 2000, Bioengineering Division of the American Society of Mechanical Engineers:

> **Morrison III, B.**, Meaney, D.F., Margulies, S.S., and McIntosh, T.K., *Dynamic mechanical stretch of organotypic brain slice cultures induces differential genomic expression: Relationship to mechanical parameters.* J.Biomech.Eng., 2000. **122**: p. 224-30.

2004 John Paul Stapp Best Paper Award in the *Stapp Car Crash Journal* for 2003:

> **Morrison III, B.**, Cater, H.L., Wang, C.B., Thomas, F.C., Hung, C.T., Ateshian, G.A., and Sundstrom, L.E., *A tissue level tolerance criteria for living brain developed with an in vitro model of traumatic mechanical loading.* Stapp Car Crash J., 2003. **47**: p. 93-105.

2006 The Kim Award for Student-Faculty Involvement, Fu Foundation School of Engineering and Applied Science, Columbia University, New York, NY

2006 Invited speaker, annual National Neurotrauma Symposium

2009 Keynote speaker, annual meeting of the International Research Council on Biomechanics of Injury

2010 Invited speaker, annual National Neurotrauma Symposium

2013 Cover image, Journal of Neurotrauma for Hue, C.D., Cao, S., Haider, S.F., Vo, K. V., Effgen, G.B., Vogel, E.W., Panzer, M.B., Bass, C.R., Meaney, D.F., **Morrison III, B.**, *Blood-brain barrier dysfunction after primary blast injury in vitro*, J. Neurotrauma, 2013, **30**: 1652-1663.

2015 Elected Vice President of the International Research Council on Biomechanics of Injury

G.1 Honors and Awards won by Morrison Research Group

2005 **Student Travel Grant (Z. Yu)** from the NINDS Neural Interfaces Workshop 2005; "Highly compliant electrode arrays for improved modulus matching", Advisor: **B. Morrison III**

2006 **Student Travel Grant (Z. Yu)** from the 24th Annual National Neurotrauma Symposium; "A new tool to study post-traumatic neuronal dysfunction: stretchable microelectrode arrays", Advisor: **B. Morrison III**

2006 Extraordinary Teaching Assistant Award (B.S. Elkin), from the Fu Foundation School of Engineering and Applied Science, Columbia University, Advisor: **B. Morrison III**

2007 **National Science Foundation Graduate Research Fellowship (M.J. Simon)**; "Discovery of Protein Engineering Design Principles for Cell-Specific, Cell-Penetrating Peptides", Advisor: **B. Morrison III**

2007 **Stapp Student Award (B.S. Elkin)** from the 51st Stapp Car Crash Conference; "Region-specific tolerance criteria for the living brain", Second Place, Advisor: **B. Morrison III**

2008 **Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship (B.S. Elkin)** "Mechanical Properties of Brain Tissue: Implications for Traumatic Brain Injury" Advisor: **B. Morrison III**

2008 **Student Travel Grant (M.J. Simon)** from the 26th Annual National Neurotrauma Symposium; "TAT-mediated intracellular delivery is dependent upon cell-type and phenotype: implications for delivery to activated astrocytes following injury" Advisor: **B. Morrison III**

2009 **National Science Foundation Graduate Research Fellowship (M.R. Lamprecht)**; "Utilizing Dual Sensing Electrode Arrays to Delineate the Role of Astrocytes in Spike-Timing-Dependent Plasticity after Traumatic Brain Injury", Advisor: **B. Morrison III**

2010 **Student Award (B.S. Elkin)** from the 36th Northeast Bioengineering Conference "Chondroitin Sulfate Proteoglycans Contribute to Brain Tissue Swelling Behavior", Advisor: **B. Morrison III**

2010 **Student Travel Grant (B.S. Elkin)** from the 28th Annual National Neurotrauma Symposium, “The effect of chondroitinase ABC on brain tissue swelling *in vitro*”, Advisor: **B. Morrison III**

2010 **Ph.D. Student Poster Competition Finalist (B.S. Elkin)** from the Summer Bioengineering Conference of ASME, “Mechanical properties of the rat brain: effect of age and anatomical region”, Advisor: **B. Morrison III**

2011 **Student Travel Grant (M.R. Lamprecht)** from the Annual National Neurotrauma Symposium, “Combinational Drug Therapies as Treatment for Traumatic Brain Injury”, Advisor: **B. Morrison III**

2011 **Student Travel Grant (C.D. Hue)** from the Annual National Neurotrauma Symposium, “Blast overpressure induces disruption of brain endothelial monolayer integrity”, Advisor: **B. Morrison III**

2011 **Student Poster Competition Finalist (M.R. Lamprecht)** from the Annual National Neurotrauma Symposium, “Combinational Drug Therapies as Treatment for Traumatic Brain Injury”, Advisor: **B. Morrison III**

2012 **The Murray Mackay Young Researcher Award (C.D. Hue)** from the International Research Council on Biomechanics of Injury, "Blast-induced disruption of an in vitro blood-brain barrier model**"**, Advisor: **B. Morrison III**

2012 **Oral Presentation Award in Engineering, Mathematics and Physics (S.F. Haider)** from the Annual Biomedical Research Conference for Minority Students, "Increased solute permeability of an in vitro blood-brain barrier model exposed to blast overpressure", Advisor **B. Morrison III**

2012 **Student Poster Competition Finalist (G.B. Effgen)** from the Annual National Neurotrauma Symposium, “A combination of 17β-estradiol and memantine after repetitive, mild traumatic brain injury reduces injury synergy”, Advisor: **B. Morrison III**

2013 **Columbia University Presidential Award for Outstanding Teaching by Graduate Students - Finalist (C.D. Hue)**, Advisor **B. Morrison III**

2014 **Acorda Scientific Excellence Award from Acorda Therapeutics** (A. Huang), Advisor **B. Morrison III**

2014 **Student Travel Grant (C.D. Hue)** from the Annual National Neurotrauma Symposium, “Dexamethasone potentiates recovery of the blood-brain barrier after primary blast injury in vitro”, Advisor: **B. Morrison III**

H. Patents

1. Spermidine derivatives for the treatment of chronic neurodegenerative diseases (European patent #EP2003704764; US patent application #20050124554)
2. Treatment of chronic neurodegenerative and related diseases (European patent #EP1471901)
3. Chondroitinase ABC reduces brain tissue swelling (patent filed November 23, 2011)

I. Professional Service

I.1 Editorial Positions

2010 – 2013 Associated Editor, *BMC Neuroscience*
2011 2012 Review Editor, *Frontiers in Neurotrauma*
2012 – Associate Editor, *Journal of Biomechanical Engineering*
2016 – Associate Editor, *Journal of Neurotrauma*

I.2 Professional Board Positions

2006 –2013 Engineering Conferences International, Advisory Board Member
2012 – International Research Council on Biomechanics of Injury, Council Member
2012 – 2015 International Research Council on Biomechanics of Injury, Publications Committee
2014 – International Research Council on Biomechanics of Injury, Membership & Awards Committee
2015 – Vice President International Research Council on Biomechanics of Injury
2016 – Board of Directors, Football Research, Inc., NY

I.3 Consulting

1. NeoStem, Inc., NY, 2014
2. Falcon Sports Biomedical Engineering & Design, Inc., NY 2014 –

I.4 Conference Organization

1. Material Research Society, Spring 2006, San Francisco: Symposium CC: Electrobiological Interfaces on Soft Substrates with Stephanie Lacour (Princeton University) and Joao Conde (Instituto Superior Tecnico)
2. IASTED International Conference on Biomechanics (BioMech 2006), Palma De Mallorca, Spain, Advisory Board
3. Material Research Society, Spring 2007, San Francisco: Advanced Materials for Neuroprosthetics with Daryl Kipke (University of Michigan), Stephanie Lacour (Cambridge University), Dustin Tyler (Case Western Reserve)
4. Material Research Society, Spring 2008, San Francisco: Materials and Technology for Fully Elastic Electronic Applications with Stephanie Lacour (Cambridge University) John Rogers (University of Illinois, Urbana-Champagne), Takao Someya (University of Tokyo)
5. Engineering Conference International, Nanotechnology for the Study of Cellular and Molecular Interactions, session titled “Nanoscience for Neuroscience”, June 14-18th, 2009.

6. Engineering in Medicine and Biology Conference, Co-chair of track 6.9 Neural Trauma with Michelle LaPlaca (Georgia Technical Institute), September 2-6th, 2009.
7. Material Research Society, Spring 2010, San Francisco: Stretchable electronics and conformal biointerfaces with Stephanie Lacour (Cambridge University) John Rogers (University of Illinois, Urbana-Champagne), Siegfried Bauer (Johannes-Kepler Universität Linz)
8. Material Research Society, Fall 2011, Boston: Compliant electronics and photonics with Sigfried Bauer (Johannes-Kepler Universitat Linz), Kunigunde Cherenack (ETH), and Tsuyoshi Sekitani (University of Tokyo)
9. Biomedical Engineering Society, Fall 2011, Hartford: Neural Engineering Track Chair with Lance Kam (Columbia University)
10. 6th International Conference on Biomechanics, International Association of Science and Technology for Development (IASTED), Conference Chair, November 7-9th, 2011.
11. 17th US National Congress on Theoretical & Applied Mechanics, Minisymposium Chair with King Yang (Wayne State University), "Traumatic Brain Injury Biomechanics", June 15-20th, 2014.

I.5 Session Chair

1. 5th World Congress on Biomechanics, 2006, Munich, Germany: Impact biomechanics; spine kinematics and injury biomechanics with Dale Bass (University of Virginia)
2. IEEE Engineering in Medicine and Biology Conference 2006, New York City: Neural and Rehabilitation Engineering, and Neuromuscular Systems
3. Material Research Society, Spring 2006, San Francisco: Electrode coating: Electrical transfer I
4. Material Research Society, Spring 2007, San Francisco: Surface Biofunctionalization
5. NIH, NINDS workshop Combination Therapies for TBI, 2008, Rockville, MD: "Strategies for Testing Combination Therapies for TBI: *in vitro* screening" with Dr. David Meaney (*University of Pennsylvania*)
6. NIH, NINDS Workshop, Neurological Effects of Blast Injury, 2008 Rockville, MD: "Understanding the Biophysics and Biomechanics of the Brain" with Dr. Christopher White (*National Institute of Standards and Technology*).
7. Material Research Society, Spring 2008, San Francisco: Chaired 3 Sessions
8. Engineering Conference International, Nanotechnology for the Study of Cellular and Molecular Interactions, session titled "Nanoscience for Neuroscience", June 14-18th, 2009.
9. Engineering in Medicine and Biology Conference, "Neural Trauma", September 2-6th, 2009.
10. Northeast Bioengineering Conference, "Imaging of Biomaterials", March 28th, 2010.
11. Material Research Society, "Electrode-tissue Interface", April 8-9th, 2010.
12. 6th World Congress on Biomechanics, 2010, Singapore: "Head/Brain Injury: Tolerances", August 1-6th, 2010.
13. Material Research Society, Chaired 2 Sessions, November 29-30, 2011.
14. 45th Winter Conference on Brain Research, Snowbird, UT: "Blast traumatic brain injury", January 21-26, 2012

15. Biomedical Engineering Society, Fall 2012, Atlanta: "Neuro Trauma Injury & Repair I", October 26, 2012.
16. Biomedical Engineering Society, Fall 2012, Atlanta: "Neuro Trauma Injury & Repair II", October 27, 2012.
17. International Research Council on Biomechanics of Injury Conference, 2013, Gothenburg, Sweden: “Tissue Characterization II”, September 12, 2013
18. International Research Council on Biomechanics of Injury Conference, 2013, Gothenburg, Sweden: “Tissue Characterization III”, September 13, 2013
19. Biomedical Engineering Society, Fall 2013, Seattle: "Clinical Biomechanics", September 28, 2013.
20. International Research Council on Biomechanics of Injury Conference, 2014, Berlin, Germany: “Tissue Biomechanics - Tissue Characterization I”, September 10, 2014
21. International Research Council on Biomechanics of Injury Conference, 2014, Berlin, Germany: “Tissue Biomechanics - Tissue Characterization II”, September 11, 2014
22. Material Research Society, “Stretchable Electronic Materials for Transducers, Biosensors and Optical Devices I”, April 8th, 2015.
23. International Research Council on Biomechanics of Injury Conference, 2015, Lyon, France: “Brain / Head Injury/ Tissue Biomechanics”, September 10, 2015
24. International Research Council on Biomechanics of Injury Conference, 2015, Lyon, France: “Blast Injury”, September 10, 2015

I.6 Conference Panel Participant

1. Brain Injuries and Neuro-Regeneration Panel, Biomedical Science and Engineering Conference, Oak Ridge National Laboratory, May 26th, 2010.
2. IEEE EMBS Forum on Grand Challenges in Neuroengineering, Bethesda, May 7th & 8th, 2010
3. Kavli Salon on Neurodegeneration III, Rockefeller University, NY, November 5th, 2015

I.7 Grant Reviewer

2009	Center for Materials Innovation, Washington University in St. Louis
2009	The Severnside Alliance for Translational Research, United Kingdom
2009	Collaborative and Multidisciplinary Pilot Research (CaMPR) Phase I, Irving Institute for Clinical and Translational Research, Columbia University
2010	United States-Israel Binational Science Foundation, Israel
2010	Wessex Medical Research, United Kingdom
2010	Wellcome Trust, United Kingdom
2010	National Football League Charities Medical Research Grants (internal Columbia review)
2011	Emerging Technologies and Training in Neurosciences (ETTN-10), National Institutes of Health (2X)

2012 New Jersey Commission on Spinal Cord Research
2012 Research Council Katholieke Universiteit Leuven, Netherlands
2012 Emerging Technologies and Training in Neurosciences (ETTN-10), National Institutes of Health
2012 Collaborative and Multidisciplinary Research (CaMPR) Award Phase I, (internal Columbia review)
2013 Collaborative and Multidisciplinary Research (CaMPR) Award Phase II, (internal Columbia review)
2015 Research Initiative in Science and Engineering (RISE) (internal Columbia review)
2015 Blavatnik Awards for Young Scientists (internal Columbia review)

I.8 Manuscript Reviewer

1. *ACS Nano*
2. *Acta Biomaterialia*
3. *Annals of Biomedical Engineering*
4. *American Association of Pharmaceutical Scientists Journal*
5. *Biomechanics and Modeling in Mechanobiology*
6. *Biomedical Microdevices*
7. *Biophysical Journal*
8. *Cellular and Molecular Bioengineering*
9. *Computational Material Science*
10. *Computer Methods in Biomechanics and Biomedical Engineering*
11. *Cytoskeleton (formerly Cell Motility and the Cytoskeleton)*
12. *Experimental Neurology*
13. *IEEE Transactions on Biomedical Engineering*
14. *Journal of Biomechanics*
15. *Journal of Biomechanical Engineering*
16. *Journal of the Mechanical Behavior of Biomedical Materials*
17. *Journal of Neural Engineering*
18. *Journal of Neurotrauma*
19. *Journal of Physical Chemistry*
20. *Mechanical and Chemical Biosystems*
21. *Nature Nanotechnology*
22. *Neurobiology of Disease*
23. *PLoS ONE*
24. *Restorative Neurology and Neuroscience*

I.9 Abstract Reviewer

1. National Neurotrauma Society annual meeting, 2001
2. 1st Joint Symposium of the National and International Neurotrauma Societies, 2002
3. Material Research Society, Symposium CC: Electrobiological Interfaces on Soft Substrates, Spring 2006
4. Material Research Society, Symposium U: Advanced Materials for Neuroprosthetics, Spring 2007
5. ASME Summer BED Conference Ph.D. student competition, 2007
6. Material Research Society, Symposium M: Materials and Technology for Flexible, Conformable, and Stretchable Sensors and Transistors, Spring 2007
7. National Neurotrauma Society annual meeting, 2008
8. ASME Summer BED Conference Ph.D. student competition, 2008
9. ASME Summer BED Conference Ph.D. student competition, 2009
10. National Neurotrauma Society annual meeting, 2009
11. Northeast Bioengineering Conference, 2010
12. Biomedical Science & Engineering Center Conference, Oak Ridge National Laboratory, 2010
13. Engineering in Medicine and Biology Conference, 2011
14. Biomedical Engineering Society Conference, 2011
15. 6th International Conference on Biomechanics, IASTED, 2011
16. Engineering in Medicine and Biology Conference, 2012
17. International Research Council on Biomechanics of Injury Conference, 2013
18. Engineering in Medicine and Biology Conference, 2013
19. Biomedical Engineering Society Conference, 2013
20. National Neurotrauma Society annual meeting, 2014
21. International Research Council on Biomechanics of Injury Conference, 2014
22. International Research Council on Biomechanics of Injury Conference, 2015
23. National Neurotrauma Society annual meeting, 2015
24. International Research Council on Biomechanics of Injury Conference, 2016
25. National Neurotrauma Society annual meeting, 2016

I.10 Membership in Professional Societies

1. Biomedical Engineering Society (BMES, 1995 - present)
2. Engineering in Medicine and Biology Society (IEEE EMBS, 1995 - present)
3. National Neurotrauma Society (1995 - present)
4. Society for Neuroscience (1995 - 2010)
5. Material Research Society (2004 – 2012, 2015)
6. American Society of Mechanical Engineers (2013 –)

I.11 Invited Presentations

1. April 7, 1997 "*In vitro* mechanical injury of organotypic brain slice cultures" for the Head Injury Research Center of the *University of Pennsylvania*
2. June 19, 1998 "An *in vitro* model of brain trauma: A combination of engineering and molecular biology" for the Institute for Medicine and Engineering of the *University of Pennsylvania*
3. July 15, 1999 "Mechanisms of cell death after traumatic brain injury: implications for therapeutic strategies" for the Department of Clinical Neurological Sciences, *University of Southampton*, UK
4. July 16, 1999 "Mechanisms of cell death after traumatic brain injury: implications for therapeutic strategies" for the Department of Neurosurgery, *King's College Hospital*, UK
5. October 13, 1999 "Differential genomic expression after *in vitro* mechanical injury of organotypic brain slice cultures" for the joint BMES EMBS Annual Conference, Atlanta, GA
6. October 27, 1999 "Differential gene expression after mechanical injury of organotypic brain slice cultures" for the 29th Annual Meeting of the Society for Neuroscience, Miami, FL
7. October 16, 2000 "*In vitro* traumatic brain injury affects the expression of both cell death and cell survival genes" for the International Workshop on Medical and Engineering Aspects of Dynamic Head and Neck Injuries, Cranfield, UK
8. February 15, 2001 "Re-engineering *in vitro* models of traumatic brain injury" for the Neuroscience Research Department, Glaxo SmithKline, Harlow, UK
9. February 23, 2001 "Can animal models of traumatic brain injury be reproduced in tissue culture?" for the CNS Seminar Series, *Southampton University*, UK
10. December 14, 2001 "Molecular Consequences of *In vitro* Traumatic Brain Injury of Organotypic Slice Cultures" for the Department of Bioengineering, *University of Toledo*
11. March 14, 2002 "Molecular consequences of *in vitro* traumatic brain injury of organotypic slice cultures" for the Department of Bioengineering, *University of Pittsburgh*
12. April 19, 2002 "Molecular consequences of *in vitro* traumatic brain injury of organotypic slice cultures" for the Department of Bioengineering, *Wayne State University*
13. April 22, 2002 "Utilizing *in vitro* models to study traumatic brain injury" for the Biomechanics Division of the National Highway Traffic Safety Administration, Washington, D.C.
14. April 23, 2002 "Utilizing *in vitro* models to study traumatic brain injury" for the Division of Neurosciences, Walter Reed Army Institute of Research, Silver Spring, MD
15. April 25, 2002 "Molecular consequences of *in vitro* traumatic brain injury of organotypic slice cultures" for the Department of Biomedical Engineering, *City College of New York*
16. April 29, 2002 "Molecular consequences of *in vitro* traumatic brain injury of organotypic slice cultures" for the Department of Biomedical Engineering, *Columbia University*
17. May 21, 2003 "Development of universal injury criteria for living brain tissue" for the NATO sponsored Personal Protection joint AVT-HFM Meeting, Koblenz, Germany.

18. October 27, 2003 “A tissue level tolerance criteria for living brain developed with an in vitro model of traumatic mechanical loading”, Stapp Car Crash Conference, San Diego, CA.
19. July 21, 2005 “Quantitative Tolerance Criteria for SIMon: Cell Death and Dysfunction” Southern Consortium for Injury Biomechanics, *University of Alabama*, Birmingham, AL.
20. October 6, 2005 “Brain constitutive properties measured with atomic force microscopy: implications for head injury” for the Department of Biomedical Engineering, *Georgia Technical Institute*
21. November 17, 2005 “Are sub-regions of the hippocampus more vulnerable to post-traumatic cell death? Insights from atomic force microscopy and an *in vitro* model” for the Virginia Tech - Wake Forest Center for Injury Biomechanics, *Virginia Technical Institute*
22. November 30, 2005 “*In vitro* approaches can increase our understanding of head injury biomechanics using atomic force microscopy and an organotypic slice culture model of traumatic brain injury” for the Department of Biomedical Engineering, *City College of New York*
23. December 1, 2005 “Heterogeneous constitutive properties of the hippocampus measured by atomic force microscopy may explain trauma-induced, regional patterns of cell death” for the Departments of Biomedical Engineering and Mechanical and Aerospace Engineering, *University of Virginia*
24. December 12, 2005 “Hippocampal mechanical properties determined with the atomic force microscope: implications for head injury” for the Department of Biomedical Engineering, *Wayne State University*
25. February 20, 2006 “Regional brain material properties and injury tolerance criteria” for the Department of Neurosurgery, *University of Pennsylvania*
26. March 30, 2006 “Structural properties of the hippocampus and injury tolerance criteria” for the Department of Biomedical Engineering, *Duke University*
27. June 19, 2006 “Understanding the biomechanics of head injury” for the Summer Undergraduate Research Fellowship program, *Columbia University*
28. July 8, 2006 “Flexible microelectrode arrays” for the 24th Annual National Neurotrauma Society Conference, St. Louis, MO
29. November 3, 2006 “Is post-traumatic, intra-hippocampal regional vulnerability a function of biomechanical heterogeneity?” for the Spinal Cord and Brain Injury Research Center, *University of Kentucky*
30. December 13, 2006 “Quantitative tolerance criteria for SIMon: Cell death and dysfunction” for the Southern Consortium of Injury Biomechanics, *University of Alabama*
31. February 26, 2007 “Advances in cellular brain injury biomechanics” for the Brain Injury Symposium, National Highway Traffic Safety Administration
32. March 6, 2007 “Flexible electronics and stretchable microelectrode arrays” for the Center for Biomaterials & Advanced Technologies, Medical Devices Group, Ethicon, Inc. (J&J)
33. March 12, 2007 “Reducing the societal cost of traumatic brain injury”, for the Virginia Tech - Wake Forest Center for Injury Biomechanics, *Virginia Technical Institute*
34. April 27, 2007 “Toward understanding regional vulnerability in traumatic brain injury” for the Department of Biomedical Engineering, *New Jersey Institute of Technology*

35. May16, 2007 “Softening the impact of traumatic brain injury” for the Spinal Cord and Brain Injury Research Center, *University of Kentucky*
36. December 6, 2007 “Quantitative tolerance criteria for SIMon: Cell death and dysfunction” for the Southern Consortium of Injury Biomechanics, *University of Alabama*
37. January 27, 2008 “Biomechanics and modeling of mild traumatic brain injury” for the *Winter Conference on Brain Research*, Snowbird, UT
38. February 11, 2008 “Mind storm: Traumatic brain injury… a silent epidemic” for Café Science, *Columbia University*
39. May 8, 2008 “Development of methods to enable the directed evolution of cell penetrating peptides for targeted brain cell delivery” *Wyeth Research*, NJ
40. October 3, 2008 “The Neurotrauma and Repair Laboratory” for the Graduate Student Seminar Series, *Columbia University*, NY.
41. October 15, 2008 “Modeling traumatic brain injury: lessons learned and critical data” for the Man Vehicle Laboratory, *Massachusetts Institute of Technology*, MA.
42. November 14, 2008 “Enabling data for modeling traumatic brain injury” for the Biomechanics & Injury Mitigation Systems, *Johns Hopkins University Applied Physics Laboratory*, MD.
43. March 19, 2009 “Modeling traumatic brain injury *in vitro*: functional changes in the absence of cell death” for the Biomedical Science and Engineering Conference, *Oak Ridge National Laboratory*, TN.
44. April 6, 2009 “Vertically aligned carbon nanofiber arrays for neuroscience” for the CTSA Nanotechnology Seminar Series, *Columbia University Medical Center*, NY.
45. June 5, 2009 “Brain tissue heterogeneity and implications for traumatic brain injury” for Grand Rounds in the Department of Neurosurgery, *Medical College of Wisconsin*, WI.
46. June 17, 2009 “Vertically aligned carbon nanofiber arrays for electrophysiological and electrochemical recordings from brain slices” for the Nanotechnology for the Study of Cellular and Molecular Interactions Conference, *Engineering Conferences International*, Barga, Italy.
47. September 3, 2009 “Quantification of functional alterations after in vitro traumatic brain injury” for the “Neural Injury” session at the *Engineering in Medicine and Biology Conference*, MN.
48. September 4, 2009 “Neural sensing of electrical activity with stretchable microelectrode arrays” for the “Neural Sensing and Applications” session at the *Engineering in Medicine and Biology Conference*, MN.
49. September 9, 2009 “Advances in the study of brain injury biomechanics”, **Keynote lecture** for the *International Research Council on Biomechanics of Injury* conference, UK.
50. November 12, 2009 “Studying traumatic brain injury through a combination of biomechanics and cell biology”, for Grand Rounds, Department of Neurosurgery, *Columbia University Medical Center*, NY.
51. February 11, 2010 “Compliant tissue/electronics interfaces for biomedical studies”, for the Electrical Engineering Department, *Princeton University*.
52. March 18, 2010 “Brain material properties and tolerance criteria: critical ingredients for computational models of brain injury” for the Mechanical Engineering department, *City College of New York*.

53. March 28, 2010 “Mechanical properties of anatomical structures of the rat brain” for the *Northeast Bioengineering Conference*, NY.
54. May 5, 2010 “Material properties and failure criteria for brain: understanding brain injury biomechanics” for the Department of Chemistry, Chemical Biology, and Biomedical Engineering, *Stevens Institute of Technology*.
55. June 15, 2010 “Outcome measures in *in vitro* modeling of TBI / validation of *in vitro* models” for the *National Neurotrauma Symposium*, NV.
56. August 3, 2010 “Determining a mechanical tolerance criterion for neuron function within the hippocampus” for the *6th World Congress on Biomechanics*, Singapore.
57. August 12, 2010 “Heterogeneous material properties and tolerance criteria for brain injury models” for the DoD Brain Injury Computational Modeling Expert Panel, FL.
58. October 20, 2011 “Region and mechanism-specific tolerance criteria for traumatic brain injury” for the Columbia University Seminar on Injury Prevention, NY.
59. November 9, 2011 “Traumatic Brain Injury Tolerances: *In Vitro* Insights” for the Safar Center, University of Pittsburgh Medical Center, PA.
60. January 12, 2012 "Biomechanical insight to traumatic brain injury from brain slice models" for the Center for Neuroscience & Regenerative Medicine, Uniformed Services University of the Health Sciences, MD.
61. November 14, 2012 "Brain trauma: Biomechanical Insights" for First Year Seminars in Modern Biology, *Columbia University*, NY
62. March 21, 2013 “Traumatic Brain Injury: Inertia- and Blast-Injuries and an Edema Therapy” for Grand Rounds, Department of Neurosurgery, *Columbia University Medical Center*, NY
63. August 10, 2013 “Better Strategies to Prevent Brain Injuries”, for *Aspen BrainLab*, Aspen, CO
64. October 2, 2013 "Brain trauma from Blast" for First Year Seminars in Modern Biology, *Columbia University*, NY
65. December 10, 2013 “From biomechanics to cerebral edema after traumatic brain injury” for Visiting Professor Research Seminar, Department of Anesthesiology, *Columbia University Medical Center*, NY
66. March 3, 2014 “Traumatic brain injury: at the intersection of neuroscience and biomechanics” for the Current Issues in Neuroscience seminar series, *Teacher College, Columbia University*, NY
67. September 23, 2014 “Biomechanics at the mesoscopic scale: Knowledge and tools to define tolerance” for Army Research Laboratory, Aberdeen Proving Grounds, MD
68. October 14, 2014 “Traumatic brain injury alters electrophysiological function in organotypic brain slice cultures” for The Head Injury Center CNS Injury Seminar Series, *University of Pennsylvania*, PA
69. November 12, 2014 "Mild traumatic brain injury – in a dish!?" for First Year Seminars in Modern Biology, *Columbia University*, NY
70. December 4, 2014 “Neuronal network function is altered after in vitro traumatic brain injury” for the Neuroscience Seminar, *Tulane University*, LA
71. February 6, 2015 “Learning deficits in hippocampal slice cultures after traumatic brain injury” for the Biomedical Engineering Seminar Series, *New Jersey Institute of Technology*, NJ

72. June 23, 2015 “Traumatic brain injury”, for the GEM4 2015 Summer Institute, *Carnegie Mellon University*, PA
73. September 17, 2015 “Heading Off Damage: New insights in traumatic brain injury”, for Columbia University’s Mortimer B. Zuckerman Mind Brain Behavior Institute, Stavros Niarchos Foundation – Brain Insight Lecture Series, *Columbia University*, NY.
74. November 5, 2015 Kavli Salon on Neurodegeneration III, Roundtable discussion, *Rockefeller University*, NY.
75. December 4, 2015 “Reproducing mild traumatic brain injury in a slice culture model”, for the Columbia Translational Neuroscience Initiative, *Columbia University*, NY.
76. May 6, 2016 “Comparing primary and tertiary phases of blast traumatic brain injury with an in vitro model”, for Department of Anatomy & Neurobiology, *Virginia Commonwealth University*, VA.
77. June 16, 2016 “Studying repetitive TBI in a culture dish”, for the Center for Injury Epidemiology and Prevention, *Columbia University*, NY.
78. July 13, 2016 “Biomechanics for Prevention: Preventing synergy of repetitive mTBI” for the Big Ten–Ivy League Traumatic Brain Injury Research Collaboration, Philadelphia, PA.

J. Academic Service

J.1 University Committees

2007 – 2013 University Institutional Animal Care and Use Committee (Morningside)
2013 – University Financial Conflict of Interest Committee (Morningside)
2013 – University Committee on Animal Welfare
2014 Promotions and Tenure Committee, School of Arts and Sciences (*ad hoc*, external reader)
2014 – Committee on Instruction, Columbia College and General Studies, SEAS representative
2014 – Educational Policy and Planning Committee, Columbia College and General Studies, SEAS representative
2014 – 2016 Provost’s Middle States Commission on Higher Education Accreditation Subcommittee
2015 – Chandler Classroom Steering Committee
2015 – Educational Policy and Planning Committee, Columbia College and General Studies, working group for course numbering

J.2 School of Engineering and Applied Science Committees and Duties

2012 – 2014 SEAS Committee on Instruction
2012 – 2014 SEAS Advisory Committee on Undergraduate Curriculum
2013 Chair, SEAS-level Tenure Review Committee (*ad hoc*)
2014 – Vice Dean for Undergraduate Programs, SEAS
2014 – Co-Chair, SEAS Committee on Instruction
2015 – Facilitator, SEAS Strategic Forum Discussion on Undergraduate Education

2016 – Presenter, SEAS Strategic Forum Discussion on Graduate Education
2016 – Academic Integrity Task Force
2016 – SEAS Website Redesign Review Committee
2016 – ABET Coordination Team for Reaccreditation

J.3 Departmental Committees and Duties

2003 – Undergraduate Student Advisor
2003 – Graduate Student Advisor
2003 – 2005 Chair of the International Student Exchange Program Committee
2003 – 2007 Chair of the Industrial Liaison Committee
2004 – 2005 Chair of the Departmental Holiday Reception Committee
2004 – 2006 Member of the ABET Committee
2004 – 2014 Member of the Undergraduate Curriculum Committee
2004 – 2014 Member of the Undergraduate Laboratory Committee
2004 – 2006 Member of the BME New Science Building Space Proposal Committee
2004 – 2008 Member of the Biomechanics Track Faculty Search Committee
2005 Member of the Coulter Foundation Partnership Preliminary Application Committee
2006 – 2007 Chair of the Biomechanics Track Faculty Search Committee: Hired Drs. Chris Jacobs and Hayden Huang
2006 – 2012 Member of the Undergraduate Teaching Laboratory Committee
2006 Chair of the Undergraduate Teaching Laboratory Committee
2007 – 2008 Chair of the Biomechanics Track Faculty Search Committee: Hired Dr. Henry Hess
2007 – 2010 Chair of the Undergraduate Curriculum Committee
2007 – 2010 3-2 Program (Transfer Student) Advisor
2008 – 2009 Instituted an Online Undergraduate Advising and Academic Tracking System
2009 Member of the Search Committee for Instructor in Biomedical Engineering: Hired Dr. Aaron Kyle
2010 Instituted a totally revised Online Undergraduate Advising and Academic Tracking System
2011 – 2013 Member of the ABET Renewal Committee
2012 – 2014 Vice-chair, Department of Biomedical Engineering
2012 – Administrative Committee, Department of Biomedical Engineering
2013 – 2014 Member of the Biomedical Engineering Instructor Search Committee: Hired Dr. Katherine Reuther
2013 – 2014 Chair, Biomedical Engineering Neural Engineering Faculty Search Committee: Hired Dr. Josh Jacobs

J.4 Department, School, and University Outreach

2003 Organized the BME-Center for Career Education Orientation
2004 Engineering Invitational Presentation on BME Senior Design
2004 Parents' Weekend Open House
2004 Organized the BME-Center for Career Education Orientation
2005 Days on Campus Luncheon and Laboratory Tours
2005 Organized Engineering Open House for Rising Sophomores
2005 Organized Sophomore Group Advising Session
2005 Departmental Participant in Days on Campus Luncheon and Laboratory Tours
2005 Hosted Katherine Jernberg, Dean of Admissions, Keck Graduate Institute
2006 Departmental Gateway Lecture
2006 Participant in Collegiate School Laboratory Tours
2006 SURF lecture, "Understanding the biomechanics of head injury"
2006 Departmental Coordinator for Summer Engineering Invitational
2006 Academic Resources Fair Departmental Representative
2006 Prospective Student Host: Brandon Boston
2006 Prospective Student Host: Nicholas Fountoulakis
2007 Departmental Gateway Lecture
2007 Prospective Student Host: Janelle Geddes
2007 BMES Career Panel Member during Engineering Week
2007 Faculty Representative at Summer Engineering Invitational
2007 3-2 Program Student Orientation
2007 Organized two Faculty Academic Advising Training Sessions
2007 Conducted the Town Hall Meeting for Junior BME Students
2008 Café Science, Featured Scientist
2008 Departmental Gateway Lecture
2008 Departmental Representative for Days on Campus
2008 Prospective student host: Colin Hoffman
2008 Departmental Representative at the Engineering Invitational Parent Student Reception
2008 Prospective student host: Nabil Mehta
2008 Departmental Representative for SEAS Major Night
2008 3-2 Program Student Orientation
2008 Conducted the Town Hall Meeting for Junior BME Students
2008 Met with Diversified Search Ray & Berndston to inform the search for Dean of Division of Student Affairs
2009 Untenured Faculty Focus Group Leader
2009 Facilitator of a meeting between Junior Faculty and Dean Feniosky Pena-Mora
2009 Presented to the SEAS Committee on Instruction the BME system for undergraduate advising and tracking
2009 Days on Campus Biomedical Engineering Department Representative

2009 Participant in Collegiate School Laboratory Tours
2009 Prospective student host: Natasha Satya
2009 Engineering Invitational Biomedical Engineering Lecture
2009 New Student Orientation Program Biomedical Engineering Representative
2009 SEAS Parents Weekend Lecture
2009 Conducted the Town Hall Meeting for Junior BME Students
2010 Departmental Gateway Lecture
2010 Addressed the President's Council, Cold Spring Harbor Laboratory
2011 Participant in Collegiate School Laboratory Tours
2012 Science Expo, The School at Columbia
2012 First Year Seminars in Modern Biology BIOL C2908, "Brain Trauma: Biomechanical Insights"
2012 Participant in Collegiate School Laboratory Tours
2013 Alumni Weekend Departmental Lunch representative
2013 Participant in Collegiate School Laboratory Tours
2013 First Year Seminars in Modern Biology BIOL C2908, "Brain Trauma: Biomechanical Insights"
2013 – 2014 Organizing Committee, Science Expo, The School at Columbia University
2014 ResInc, introductions at fall kickoff speaker series
2014 Just Desserts, Dean's office representative
2014 Student Leadership Dinner, Dean's office representative
2014 First Year Seminars in Modern Biology BIOL C2908, "Mild traumatic brain injury – in a dish!?"
2014 Engineering Career Fair Dinner, Dean's office representative
2014 Faculty Excellence Celebration dinner with donors, Dean's office representative
2015 Columbia Engineering Scholarship Dinner, Dean's office representative
2015 Columbia Engineering Alumni Association Dinner, speaker
2015 Columbia Engineering Days on Campus, speaker
2015 Davis Scholars lunch for prospective families
2015 Perspectives on Diversity Alumni Brunch
2015 SEAS Awards of Distinction Dinner, speaker
2015 Archimedes Dinner
2015 Carleton Commons Dedication lunch
2015 SWE dinner, speaker
2015 Academic Success Program lunch
2015 SEAS Senior Dinner
2015 Columbia Engineering Class Day
2015 Prospective Egleston Scholars reception
2015 Alumni Reception and Dinner
2015 Convocation
2015 Egleston Family welcome reception

2015 Academic Assembly
2015 SEAS Manhattanville brainstorming session, participant
2015 Just Desserts, speaker
2015 SEAS Strategy meeting on undergraduate education, chaired & presented
2015 Race, Ethnicity and University Life: Next Steps from Office of University Life
2015 Chairs' Meeting, presentation on advising
2015 SEAS Faculty Meeting, presentation on advising
2015 Columbia Engineering Alumni Association Cruise
2015 Summer Engineering Research Invitational, speaker
2015 – 2016 Organizing Committee, Science Expo, The School at Columbia University
2016 SEAS strategy meeting on graduate education, presented
2016 Egelston Scholar enhanced advising
2016 Scholarship Dinner
2016 Columbia Engineering Young Alumni dinner, speaker
2016 Lynn Conway Lunch on Diversity in STEM
2016 Magill Lecture by Lynn Conway
2016 Engineering Strategic Discussion Dinner
2016 Senior Toast
2016 Egleston Recruitment dinner
2016 Days on Campus Reception, speaker
2016 Davis Scholars Lunch for prospective families
2016 Diversity brunch
2016 Deans in Halls
2016 Awards of Distinction dinner
2016 Senior Dinner
2016 Academic Success Program lunch, speaker