

BETH A. WINKELSTEIN, Ph.D.

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EDUCATION:

Ph.D., Biomedical Engineering, Duke University, Durham, NC December 1999
Advisor: Barry S. Myers, M.D., Ph.D.

Thesis: A Mechanical Basis for Whiplash Injury: The Cervical Facet Joint, Spinal Motion Segment, and Combined Loading

B.S.E., Bioengineering, University of Pennsylvania, Philadelphia, PA May 1993

POSITIONS HELD & RESEARCH EXPERIENCE:

University of Pennsylvania, Philadelphia, PA.
2012-Present Associate Dean, Undergraduate Education, School of Engineering & Applied Science
2011-Present Professor, Department of Bioengineering
2011-2012 Chair, Bioengineering Graduate Group
2011-Present Member, Neuroscience Graduate Group
2011-Present Professor, Department of Neurosurgery
2007-2011 Associate Professor, Department of Bioengineering
2007-2011 Associate Professor, Department of Neurosurgery
2009-Present Member, Center for Brain Injury and Repair
2006-Present Member, Penn Center for Musculoskeletal Disorders
2006-Present Member, Center for Human Modeling & Simulation
2006-Present Member, Mechanical Engineering & Applied Mechanics Graduate Group
2002-Present Member, Institute for Medicine and Engineering
2004-2007 Assistant Professor, Department of Neurosurgery
2002-2007 Assistant Professor, Department of Bioengineering

2000-June 2002 *Dartmouth College, Hanover, NH.*
Postdoctoral Fellow, Departments of Anesthesiology, Pharmacology & Orthopaedics

Additional Positions.
2012-Present Co-Editor, *Journal of Biomechanical Engineering*
2012-Present Member, External Advisory Board, Duke University Biomedical Engineering Dept.
2010-Present Elected Member, Cervical Spine Research Society
2008-2010 Consulting Professor, National University of Singapore, College in BioValley

2008-Present Consultant, Zyga Technology, MN
 2007-Present Elected Member, Stapp Car Crash Advisory Committee

HONORS & DISTINCTIONS:

2014 Fellow, Biomedical Engineering Society (BMES)
 2013 1st Place, Basic Science Research Award Paper, Cervical Spine Research Society.
 2013 Stapp Association Award, 2nd Place in Best Student Paper, Stapp Car Crash Conf.
 2013 Ford Motor Company Award for Faculty Advising, University of Pennsylvania.
 2013 Fellow, American Institute for Medical and Biological Engineering (AIMBE)
 2012 Fellow, American Society of Mechanical Engineers
 2012-2014 Penn Fellow, University of Pennsylvania
 2011 Stapp Association Award, 2nd Place in Best Student Paper, Stapp Car Crash Conf.
 2011 Cervical Spine Research Society, 21st Century Grant Award.
 2011 Invited participant, National Academies Keck Futures Initiative Conference.
 2010 1st Place, Basic Science Research Award Paper, Cervical Spine Research Society.
 2010 Invited participant, IEEE EMBS Forum on Grand Challenges in Neuroengineering.
 2009 Invited participant, NAE Japan-America Frontiers of Engineering Symposium.
 2008 Cervical Spine Research Society, Research Grant Award.
 2008 Stapp Association Award, Best Student Paper, 2008 Stapp Car Crash Conference.
 2007 3rd place, Stapp Association Student Paper Award, 2007 Stapp Car Crash Conf.
 2006 Y.C. Fung Young Investigator Award, ASME.
 2006-2011 NSF CAREER Award.
 2006 Ford Motor Company Award for Faculty Advising, University of Pennsylvania.
 2005 John Paul Stapp Award, Best Paper of 2004 Stapp Car Crash Conference.
 2004 Stapp Association Award, Best Student Paper, 2004 Stapp Car Crash Conference.
 2003-2005 Whitaker Foundation Young Investigator Research Award.
 2002-2006 NIH Research Career Award (K01).
 2001-2002 NIH NRSA Postdoctoral Fellowship.
 2002 Dannemiller Memorial Educational Foundation selected paper for AnalgesiaFile.
 2001 Medtronic Sofamor-Danek Award, Best Basic Science Paper,
 International Society for the Study of the Lumbar Spine Annual Meeting.
 2000 Stapp Association Award, Best Student Paper, 2000 Stapp Car Crash Conference.
 1999 Stapp Association Award, Best Student Paper, 1999 Stapp Car Crash Conference.
 1997 Arnold W. Siegel Award, Most Outstanding Paper, Stapp Car Crash Conference.
 1993-1996 National Science Foundation Fellowship.
 1993 Cum Laude, University of Pennsylvania.
 1992 E. Stuart Eichart, Jr. Alumni Award, University of Pennsylvania.
 1989-1993 Benjamin Franklin Scholar, University of Pennsylvania.

PROFESSIONAL SOCIETY MEMBERSHIPS:

2011-Present International Association for the Study of Pain
 2010-2011 New York Academy of Sciences
 2010-Present Cervical Spine Research Society
 2007-Present Association for the Advancement of Automotive Medicine
 2007-2011 Association for Women in Science
 2005-Present Biomedical Engineering Society

2001-Present	Orthopaedic Research Society
2000-Present	Society for Neuroscience
1997-Present	American Society of Mechanical Engineers
1997-2001	Society of Automotive Engineers
1995-2011	American Society of Biomechanics

EDITORIAL ACTIVITIES:

Editor, Journal of Biomechanical Engineering (2012-present)
Executive Editor, Journal of Bioengineering & Biomedical Science (2010-2013)
Associate Editor, Journal of Biomechanical Engineering (2009-2012)
Associate Editorial Board, Spine (2008-present)
Advisory Panel, **Neck Injury Biomechanics Compendium**, J Pike (Ed.), SAE International, 2009.

BOOKS:

Winkelstein BA, *Orthopaedic Biomechanics*, Boca Raton, FL: CRC Press Taylor & Francis, 2012.

JOURNAL REVIEWER ACTIVITIES (2000-present):

Anatomical Record	Journal of Neuroscience Methods
Annals of Biomedical Engineering	Journal of Neurotrauma
Arthritis Research & Therapy	Journal of Orthopaedic Research
Biomaterials	Journal of Pain
Biomechanics & Modeling in Mechanobiology	Journal of the Royal Society Interface
BioResearch Open Access	Journal of Sport & Health Science
Brain, Behavior, & Immunity	Medical & Biological Engineering & Computing
Clinical Orthopaedics & Related Research	Medical Engineering & Physics
Expert Review of Neurotherapeutics	Molecular & Cellular Neuroscience
European Journal of Pain	Molecular Pain
European Journal of Pharmacology	Molecular Pharmaceutics
European Spine Journal	Muscle & Nerve
Fundamental & Clinical Pharmacology	Neuroscience
International Journal of Clinical Rheumatology	Neuroscience Letters
Journal of American Association for Laboratory Animal Science	Neurotherapeutics
Journal of Biomechanical Engineering	Osteoarthritis & Cartilage
Journal of Biomechanics	Pain
Journal of Manipulative & Physiological Therapeutics	Physiology & Behavior
Journal of the Mechanical Behavior of Biomedical Materials	PLOSOne
Journal of Medical Devices	PNAS
Journal of Neuroinflammation	Science
Journal of Neurophysiology	Science Translational Medicine
Journal of Neuroscience	Spine
	Stapp Car Crash Journal
	The Spine Journal
	Traffic Injury Prevention

PROFESSIONAL SOCIETY ACTIVITIES & CONFERENCE ORGANIZATION:

Chair, PhD Paper Competition, *ASME Bioengineering Conference*, 2006, 2007.
 Education Committee, *ASME Bioengineering Division*, 2006 – 2009.
 Solid Mechanics Technical Committee, *ASME Bioengineering Division*, 2006 – Present.
 Student Paper Competition Review Committee, *Stapp Car Crash Conference*, 2007 – 2012.
 Chair, Student Paper Competition, *ASME Summer Bioengineering Conference*, 2008.
 YC Fung Young Investigator Award Committee, *ASME-Bioengineering Division*, 2008-2014.
 Co-Chair, Orthopedics & Rehabilitation Engineering Track, *BMES Annual Meeting*, 2009.
ASME NIH Task Force & Inter-Sector Committee on Federal R & D, 2010-2013.
 Co-Organizer, *New York Academy of Sciences BPDG Symposium*, 2010.
 Organizer, Facet Mechanics Symposium, *6th World Congress of Biomechanics*, Singapore, 2010.
 Organizing Committee, *ASME Society-Wide Micro/Nano Technology Forum*, 2010, 2011.
 Publications Chair, *ASME Summer Bioengineering Conference*, 2011.
 International Program Committee, *IASTED Biomech 2011 Conference*, 2011.
 Education Committee, *Biomedical Engineering Society*, 2011 – 2013.
 Scientific Program Committee, *Association for the Advancement of Automotive Medicine*, 2011 – 2014.
 Seed Starter Grant Sub Committee, *Cervical Spine Research Society*, 2013 – 2016.
 Co-Chair, Biomechanics Track, *BMES Annual Meeting*, 2014.

CONFERENCE SESSIONS CHAIRED:

Skeletal: Injury Biomechanics, *ASME Summer Meeting*, Key Biscayne FL, 2003.
 Joint Biomechanics/Human Movement, *BMES Meeting*, Philadelphia PA, 2004.
 Soft Tissue Mechanics, *BMES Meeting*, Baltimore MD, 2005.
 Disc Mechanics, *ASME Summer Bioengineering Conference*, Amelia Island FL, 2006.
 Chair, PhD Paper Competition, *ASME Summer Bioengineering Conference*, 2006, 2007.
 Whiplash & Neck Injury Biomechanics, *5th World Congress of Biomechanics*, Munich, 2006.
 Spine II, *ASME Summer Bioengineering Conference*, Keystone CO, 2007.
 Spine Regenerative Medicine, *Fall Meeting of Philadelphia Spine Research Society*, 2007.
 Head & Neck Impact Response & Injury, *51st Stapp Car Crash Conference*, San Diego, CA, 2007.
 Biomechanics of Forensic Engineering, *ASME Summer Bioengineering Conf*, Marco Island FL, 2008.
 Pediatric & Pregnant Occupant Biomechanics, *52nd Stapp Car Crash Conference*, San Antonio, TX, 2008.
 Orthopedic Soft Tissue Biomechanics, *BMES Annual Meeting*, Pittsburgh, PA, 2009.
 Whiplash & Neck Injury Biomechanics, *6th World Congress of Biomechanics*, Singapore, 2010.
 Facet Mechanics, *6th World Congress of Biomechanics*, Singapore, 2010.
 Head & Neck Injury Biomechanics & Anthropometry, *54th Stapp Car Crash Conf*, Scottsdale, AZ, 2010.
 Spine Biomechanics, *Orthopaedic Research Society Annual Mtg*, Long Beach, CA, 2011.
 Biomechanics of Injury, *ASME Summer Bioengineering Conf*, Nemaconlin, PA, 2011.
 Workshop Panelist, Strategies for Postdocs & Early Investigators, *ASME Summer Bioengineering Conf*, Nemaconlin, PA, 2011.
 Panel Discussion Leader, *5th International Whiplash Trauma Congress*, Lund, Sweden 2011.
 Neural Engineering, *BMES Annual Meeting*, Hartford, CT, 2011.
 Biomechanics of Injury, *ASME Summer Bioengineering Conf*, Fajardo, Puerto Rico, 2012.
 Workshop Panelist, Tips for Tenure, *ASME Summer Bioengineering Conf*, Fajardo, Puerto Rico, 2012.
 Injury II, *ASME Summer Bioengineering Conf*, Sunriver, OR, 2013.

Symposium: Basic and Clinical Evidence that Painful Lesions are Induced after Whiplash Injury, 8th Congress of the European Federation of the IASP Chapters, Florence, Italy, 2013.
 Injury Biomechanics, 57th Stapp Car Crash Conf, Orlando, FL, 2013.
 Spine Biomechanics Modeling, 7th World Congress of Biomechanics, Boston, MA, 2014.
 Spinal Facet Biomechanics, 7th World Congress of Biomechanics, Boston, MA, 2014.
 In Vitro Models of Organ Biomechanics, 7th World Congress of Biomechanics, Boston, MA, 2014.
 Head Injury Biomechanics, *BMES Annual Meeting*, San Antonio, TX, 2014.
 Pain, *BMES Annual Meeting*, San Antonio, TX, 2014.
 Challenges & Opportunities in University Space for High Impact Teaching, *AAU STEM Initiative Conference*, Washington DC, 2014.

PROFESSIONAL SOCIETY REVIEWER ACTIVITIES:

Technical Paper Reviewer, Occupant Protection, *SAE, World Congress & Exhibition*, 2005, 2008 – 2010.
 Abstract Reviewer, Orthopaedic Biomechanics, *ASME Bioengineering Conference*, 2006.
 Abstract Reviewer, Spine, *ASME Summer Bioengineering Conference*, 2007.
 Abstract Reviewer, Injury, *ASME Summer Bioengineering Conference*, 2009.
 Abstract Reviewer, Student Paper Competition, *ASME Summer Bioengineering Conference*, 2009.
 Abstract Reviewer, Orthopedic Soft-Tissue Biomechanics, *BMES Annual Meeting*, 2009.
 Abstract Reviewer, *TMJ Bioengineering Conference*, 2009.
 Abstract Reviewer, Other Solid Mechanics, *ASME Summer Bioengineering Conference*, 2010.
 Abstract Reviewer, Spine, *Orthopaedic Research Society Annual Conference*, 2011.
 Abstract Reviewer, Neural Engineering, *BMES Annual Meeting*, 2011.
 Abstract Reviewer, *IASTED Biomech 2011 Conference*, 2011.
 Paper Reviewer, *AAAM Conference*, 2012, 2013.
 Abstract Reviewer, Injury, *ASME Summer Bioengineering Conference*, 2012, 2013.
 Paper Reviewer, *ASME 11th Biennial Conference on Engineering Systems Design & Analysis*, 2012.
 Abstract Reviewer, Nerve & Spinal Cord Injury, *Orthopaedic Research Society Annual Conf*, 2013, 2014.

GRANT REVIEW ACTIVITIES:

Wellcome Trust Foundation – Training Fellowship & Program Grant Awards, 2002, 2005
 National Science Foundation Panel Review – CAREER Awards, 2002, 2011
 Natural Sciences & Engineering Research Council of Canada – CHRP Awards, 2003
 National Institutes of Health, NIBIB (ZRG1-EB01, ZEB1-OSRB01) – K & T32 Awards, 2003, 2004
 National Institutes of Health, (SCS) – ad hoc reviewer, 2005
 Health Research Board of Ireland – Research Program Grants, 2005
 Department of Veterans Affairs – Rehabilitation Research & Development, 2005
 National Science Foundation – Graduate Research Fellowship Program, 2006, 2009
 National Institutes of Health, (BDCN K-18S) – ad hoc reviewer, 2006
 National Institutes of Health, NCCAM (ZAT1 DB25, ZAT1 DB27) – ad hoc reviewer, 2006, 2007
 Catalan Agency for Health Technology Assessment & Research – Research Grants, 2007
 Prince Salman Centre for Disability Research – Research Grants, 2007
 AIBS – US Army Medical Research & Materiel Command (MOMRP)
 Brain & Spine Injury Hazards Program Review Panel, 2008
 RAD 3 – USAMRMC Grant Review, 2008
 National Institutes of Health, NCCAM (SBIR LD26) – ad hoc reviewer, 2008
 Dutch Arthritis Association, Reumafonds – Research Grants, 2009

National Institutes of Health, (GDD) – ad hoc reviewer, 2009
 National Institutes of Health, (MOSS F15) – ad hoc reviewer, 2010
 National Institutes of Health, NCCAM (PCCTR, U19 awards) – ad hoc reviewer, 2010
 Department of Veterans Affairs, Rehabilitation Research & Development, ad hoc reviewer, 2010, 2014
 National Institutes of Health, (MRS) – ad hoc reviewer, 2011
 Czech Science Foundation – reviewer, 2011
 Natural Sciences & Engineering Research Council of Canada – Discovery Grants, 2012
 National Institutes of Health, (ANIE) – ad hoc reviewer, 2012
 Cervical Spine Research Society, Seed Starter Grants, 2013 – 2016
 Swedish Research Council, Ministry of Education and Science, Sweden – scientific expert panel, 2013
 American Heart Association, Brain Stroke–Basic Science – reviewer, 2013
 Swiss National Science Foundation, Division of Biology and Medicine – reviewer, 2013
 Natural Sciences & Engineering Research Council of Canada–Discovery Grants – reviewer, 2013
 Research Grants Council of Hong Kong – reviewer, 2014

TEACHING EXPERIENCE:

University of Pennsylvania, Philadelphia, PA

ENGR 566 – Design of Appropriate Technologies for Point of Care Diagnostics (enrollment 7)	Spring 2014 & Fall 2014
ENGR 299 – Engineering Research (enrollment 17)	Fall 2013
BE495/496 – Senior Design (enrollment 68, 92, 78, 80, 90)	2010-2015
BE 699 – Graduate Seminar Course (each of Fall/Spring Terms)	2011-2013
BE 200 – Introduction to Biomechanics & Biomaterials (enrollment 96, 117)	Fall 2008, Fall 2009
BE 210 – Bioengineering Laboratory II (2 sections; total enrollment 92)	Spring 2009
EAS 296 – Global Biomedical Service (faculty participant for Spring & Summer)	2007, 2009
BE/BFS 225 – Technology & Engineering in Medicine (enrollment 18, 23)	Fall 2006, Spring 2008
BE 210 – Bioengineering Laboratory II (2 sections; enrollment 92,88,82,80)	Spring 2004–2007
BE 505 – Quantitative Human Physiology (enrollment 34,15)	Fall 2003, Fall 2004
BE 210 – Bioengineering Laboratory II (single section; enrollment 25)	Spring 2003

Dartmouth College, Hanover, NH

Module Instructor, ENGS 56 – Introduction to Biomedical Engineering	Spring 2001, 2002
Research Mentor, WISP Program	2001-2002

INSTITUTIONAL ADMINISTRATIVE RESPONSIBILITIES:

2014	Member, Consultative Committee, Appointment of Dean of School of Engineering and Applied Science, Penn
2013	Member, Consultative Committee, Appointment of Dean of Graduate School of Education, Penn
2012-Present	Associate Dean, Undergraduate Education, School of Engineering & Applied Science
2012-2014	Member, Steering Committee for Middle States Self Study, Penn
2012-2013	Chair, Working Group on Undergraduate Research for Middle States Self Study, Penn
2012-2013	Founding Director, Annual Bioengineering Graduate Research Symposium
2012	Member, Animal Research Committee
2012	Member, Faculty Senate Nominating Committee, Penn
2012	Member, Consultative Committee on Chair of Materials Science & Engineering, Penn
2011-2012	Chair, Bioengineering Graduate Group

2011-2012	Committee Member, Natural Science and Engineering Review Panel, University Research Foundation, Penn
2011	Member, Consultative Review Committee on Reappointment of Dean of School of Veterinary Medicine, Penn
2009-2012	Faculty Member, Comparative Medical & Molecular Genetics Training Grant, Penn
2009-Present	Executive Committee, Neurosurgery Brain Injury Training Grant (T32), Penn
2009-2012	Member, Faculty Council on Access & Academic Support, Univ. of Penn
2008-2011	Director, Bioengineering Graduate Student Admissions & Recruiting
2008-Present	Faculty Advisor, Biomedical Engineering Society, Penn Chapter
2008-2010	Member, Engineering Faculty Council, Univ. of Penn
2008-2010	Member, Senate Committee on Faculty & Academic Mission, Univ. of Penn
2008	Founding Director, Bioengineering Talks with Alumni Undergraduate Series
2008	Member, Neurosurgery Faculty Search – Spine, Univ. of Penn
2007-2009	Board Member, Student Disciplinary System, Univ. of Penn
2007-2009	Coordinator, Bioengineering Undergraduate Laboratory Curriculum
2007-2010	Member, Bioengineering Undergraduate Curriculum Committee
2007-2010	Member, Rachleff Engineering Scholars Faculty Committee, Univ. of Penn
2007-Present	Member, Animal Program Advisory Committee, Univ. of Penn
2006-2007	Animal Resources Review Committee, Univ. of Penn
2006-2007	Co-Director, Bioengineering Departmental Seminar Series
2006-2007	Member, Bioengineering Chair Search Committee
2005-2011	Executive Board, Benjamin Franklin Scholars Program, Univ. of Penn
2004-2008	Faculty Member, Penn Women Biomedical Society Faculty Chat Program
2004-2007	Member, IME Pilot Grant Review Committee, Univ. of Penn
2003-2010	Faculty Advisor, Society of Women Engineers, Penn Chapter
2003-2007	Director, Bioengineering MD/PhD Recruiting & Admissions
2003-2006	Member, Bioengineering Undergraduate Laboratory Committee
2003	Faculty Educator, Penn-Merck Summer Program, Univ. of Penn
2002-2004	Member, Bioengineering Graduate Recruiting & Admissions Committee

CURRENT RESEARCH FUNDING:

Source: NIH, NIAMS (R01 AR064157)

Title: Notochordal Cell Derived Therapies for Painful Disc Degeneration 8/13-7/18

Role: PI of Penn Sub-Contract (PI: J. Iatridis, Mt. Sinai) Penn Direct Costs \$59,210

Source: NIH, NIBIB (U01 EB016638)

Title: Multiscale Modeling of Facet Capsule Mechanobiology 7/13-6/18

Role: PI (PI: V. Barocas, UMN) Penn Direct Costs \$736,000/over 5 years

Source: Army Research Office (Defense University Research Instrumentation Program)

Title: Biaxial Test System for Biomechanical Testing in Trauma Research 7/13-6/14

Role: PI \$83,081

Source: Association of American Universities/Helmsley Charitable Trust 9/1/13-8/31/16

Title: AAU STEM Initiative

Role: PI (PI: D. DeTurck) \$500,000

<i>Source:</i> St. Jude Medical, Inc.	12/12-6/15
<i>Title:</i> Defining Effects of Spinal Cord Stimulation on Thalamic Modulation of Painful Radiculopathy	
<i>Role:</i> PI	\$59,600
<i>Source:</i> Oral and Maxillofacial Surgery Foundation	1/13-12/14
<i>Title:</i> PET/CT for the Diagnosis/Prognosis of TMJ Osteoarthritis	
<i>Role:</i> Co-PI (PI: EJ Granquist)	\$75,000
<i>Source:</i> Vice Provost for Global Initiatives (University of Pennsylvania)	12/12-12/14
<i>Title:</i> Design of Appropriate Biomedical Technologies for Point of Care Diagnostics in Sub-Saharan Africa	
<i>Role:</i> PI	\$25,000
<i>Source:</i> Cervical Spine Research Society	1/12-12/14
<i>Title:</i> A Novel Bioengineered Biomaterial to Treat Painful Neural Trauma via Modified Thrombin Activity for Improving Neuronal Function & Treating Pain	
<i>Role:</i> PI	<i>Total Costs:</i> \$75,000
<i>Source:</i> US Army Research (W911NF-07-D-0001)	9/11-10/14
<i>Title:</i> Cervical Spine Human Surrogate Mechanical Investigations	
<i>Role:</i> PI: Winkelstein (Co-I: Welch)	<i>Total Direct Costs:</i> \$149,703
<i>Source:</i> Catherine D. Sharpe Foundation Award	9/13-8/18
<i>Title:</i> Defining Injury Mechanisms, Identifying Effective Interventions & Implementing Safe Treatment for the Spine: Integrating Biomechanics & Neurosurgery	
<i>Role:</i> Co-PI (Co-PI: Welch)	<i>Total Costs:</i> \$500,000
<i>Source:</i> NIH, NIAMS (R01 AR056288)	4/09-3/15
<i>Title:</i> Nociceptive Mechanisms in Whiplash Injury	<i>Total Direct Costs:</i> \$969,123
<i>Role:</i> PI	Percentile: 1.4%
<i>Source:</i> NIH, NIAMS (BIRT AR551895)	7/10-3/15
<i>Title:</i> Building Interdisciplinary Research Teams	
<i>Role:</i> PI: Winkelstein (Co-I: Golder)	<i>Total Direct Costs:</i> \$100,000
<i>Source:</i> DOD, CDMRP- TDA (#OR090496)	9/10-10/15
<i>Title:</i> Development of a Novel Translational Model of Vibration Injury to the Spine to Study Acute Injury in Vivo	
<i>Role:</i> PI: Winkelstein (Co-I: Welch)	<i>Total Direct Costs:</i> \$1,998,755 (4 yrs)
PAST RESEARCH FUNDING:	
<i>Source:</i> St. Jude Medical, Inc.	12/12-12/13
<i>Title:</i> SCS Programming: Acute Extracellular Recordings	
<i>Role:</i> PI	\$37,087
<i>Source:</i> Provost's Interdisciplinary Seminar Fund (University of Pennsylvania)	12/12-12/13
<i>Title:</i> Challenges & Opportunities in Pain: Interdisciplinary Approaches to Effective Therapies	
<i>Role:</i> PI (Conference Grant)	\$35,000

<i>Source:</i> Catherine D. Sharpe Foundation Award	6/08-9/13
<i>Title:</i> Defining Injury Mechanisms, Identifying Effective Interventions & Implementing Safe Treatment for the Spine: Integrating Biomechanics & Neurosurgery	
<i>Role:</i> Co-PI of Sub-Contract (Program PI: Grady)	<i>Total Costs:</i> \$450,000
<i>Source:</i> NSF, BES (CAREER 0547451)	7/06-6/13
<i>Title:</i> Biomechanics of Neck Pain: Does Form Dictate Function?	<i>Total Direct Costs:</i> \$402,000
<i>Role:</i> PI	
<i>Source:</i> NSF-GOALI Award	2/08-6/13
<i>Role:</i> PI (Co-PI: Whiteside, Wyeth)	<i>Total Costs:</i> \$15,000
<i>Source:</i> Foerderer Award	8/11-7/12
<i>Title:</i> Mechanisms of Chronic Pain During Development	
<i>Role:</i> Collaborator (PI: Barr; CHOP)	<i>Total Costs:</i> \$49,616
<i>Source:</i> DOD, CDMRP-HDA (#OR090700)	9/10-12/12
<i>Title:</i> Salmon Thrombin as a Treatment to Attenuate Acute Pain & Promote Tissue Healing by Modulating Local Inflammation	
<i>Role:</i> PI: Winkelstein (Co-I: Janmey)	<i>Total Direct Costs:</i> \$100,000
<i>Source:</i> Provost's Interdisciplinary Seminar Fund (University of Pennsylvania)	8/11-12/12
<i>Title:</i> The Penn Interdisciplinary Pain Seminar Series	
<i>Role:</i> PI	\$9,000
<i>Source:</i> University Research Foundation Award (University of Pennsylvania)	3/10-9/11
<i>Title:</i> Electrophysiological Methods for Understanding Chronic Pain in Vivo	
<i>Role:</i> PI	\$40,000
<i>Source:</i> Synthes Spine Co., USA (sponsored research agreement)	8/08-2/11
<i>Title:</i> Characterization of Cervical Facet Joint Pressures During Normal Spine Motions & following Surgical Intervention: A Cadaveric Study	
<i>Role:</i> Co-PI (Co-PI: Schuster)	<i>Total Costs:</i> \$77,400
<i>Source:</i> Army Research Office (Defense University Research Instrumentation Program)	
<i>Title:</i> Integrated Imaging & Neurophysiology Workstation for Trauma Research	8/09-5/10
<i>Role:</i> PI	\$83,000
<i>Source:</i> NSF-CHOP Center for Child Injury Prevention Research (PI)	5/08-11/09
<i>Title:</i> Painful Spine Injury in Children and Young Adults: Integrated Biomechanics and Pain Modeling	
	<i>Total Costs:</i> \$50,000
<i>Source:</i> CDC, NCIPC (R49 CE000689)	8/31/05-8/30/09
<i>Title:</i> Biomechanical Mechanisms of Facet-Mediated Whiplash Injury & Pain	
<i>Role:</i> PI	<i>Total Direct Costs:</i> \$599,991
<i>Source:</i> NIH, NIDCR (R21 DE017817)	7/1/06-6/30/09
<i>Title:</i> A Novel Model of TMJ Osteoarthritis to Define Glial Reactivity in Chronic Pain	
<i>Role:</i> PI (Co-PIs: Nicoll, Akintoye)	<i>Total Direct Costs:</i> \$275,000

- Source:* Cervical Spine Research Society 1/08-6/09
Title: Novel Imaging Approach Using 3D Stress MRI to Detect Altered Biomechanics in Patients with Evoked Neck Pain *Total Costs:* \$60,310
Role: PI
- Source:* Synthes Spine Co., USA (sponsored research agreement) 4/07-6/08
Title: Characterization of Cervical Facet Joint Biomechanics with Progressive Spinal Degeneration & Surgical Interventions: A Pilot Cadaveric Study
Role: Co-PI (Co-PI: Schuster) *Total Costs:* \$62,000
- Source:* Catherine D. Sharpe Foundation Award 2/03-5/08
Title: Understanding Painful Neck Injuries: Integration of Spine Biomechanics with Neurosurgical Approaches for Diagnosis & Treatment
Role: PI of Bioengineering Sub-Contract (Program PI: Grady) *Total Direct Costs:* \$400,000
- Source:* Southern Consortium for Injury Biomechanics (NHTSA) 5/05-4/08
Title: Injury Mechanisms of Facet-Mediated Whiplash Neck Pain *Total Costs:* \$299,877
Role: PI
- Source:* Japan Automobile Research Institute 3/15/06-12/31/06
Title: Defining Cervical Facet Kinematics for Combined Shear, Compression & Axial Pretorque of Vertebral Motion Segments
Role: PI *Total Costs:* \$70,000
- Source:* Whitaker Foundation Biomedical Engineering Grant (#RG-02-0311) 1/1/03-12/31/06
Title: Understanding the Mechanical Role of the Cervical Facet Joint in Neck Pain: Biomechanics & Nociceptive Responses in an *In Vivo* Model *Total Costs:* \$239,998
Role: PI
- Source:* NIH, K01 Research Career Award (AR47564-01) 9/1/02-8/31/06
Title: Local Tissue Biomechanics in Low Back & Radicular Pain *Total Costs:* \$366,703
Role: PI
- Source:* University of Pennsylvania, Institute for Medicine & Engineering 4/1/04-3/31/05
Title: Developing an Interdisciplinary Understanding of Facet-Mediated Neck Pain: Defining the Relationship Between Biomechanics & NK-1 Receptor Expression in the CNS
Role: Co-PI (Co-PI: Commons) *Total Costs:* \$20,000
- Source:* Synthes, USA 7/01/02-6/31/03
Title: Biomechanics of the Cervicothoracic Junction Using Kinematic Computerized Tomography
Role: Co-PI (PI: Grady) *Total Direct Costs:* \$45,000
- Source:* NIH, Individual National Research Service Award (F32-NS11161-1) 3/01/01-6/30/02
Title: Role of Biomechanics/Neural Plasticity in Radicular Pain *Total Costs:* \$113,448

RESEARCH SUPERVISION:

Doctoral Students

Raymond Hubbard (Product Development Engineer, Integra LifeSciences) Defended 3/08

National Science Foundation Fellowship, Ashton Fellowship 1 st place, PhD Podium, Student Paper Competition, ASME Bioengineering Conf, 2006 Solomon R. Pollack Award for Excellence in Bioengineering, 2008 1 st place, Stapp Association Student Paper Competition, 2008	
Kathryn Lee (Consultant, Frankel Group)	Defended 11/08
National Science Foundation Fellowship 1 st place, Stapp Association Student Paper Competition, 2004	
Sarah Rothman (Senior Research Biologist, Neurodegeneration; Merck)	Defended 4/09
National Neurotrauma Society Travel Fellowship, 2005 Recipient, National Research Council Post-Doctoral Fellowship, 2009	
Kyle Quinn (Assistant Professor, University of Arkansas)	Defended 7/10
Fellowship, Association for the Advancement of Automotive Medicine, 2008 3 rd place, Stapp Association Student Paper Competition, 2007 1 st place, Stapp Association Student Paper Competition, 2008 Solomon R. Pollack Award for Excellence in Bioengineering, 2011	
Ling Dong (Associate Manager, Genentech)	Defended 10/11
BE Department GAANN Fellowship, 2006-2007 Honorable Mention, Student Paper Competition, ASME Bioengineering Conf, 2007	
Kristen Nicholson (Spine Research Medical Writer, Rothman Institute)	Defended 7/13
Ashton Fellowship Honorable Mention, National Science Foundation Fellowship, 2009 Biomedical Engineering Society Student Travel Award, 2009 2 nd place, Stapp Association Student Paper Competition, 2011 Finalist, Student Paper Competition, ASME Bioengineering Conf, 2013 1 st place, Basic Science Paper, Cervical Spine Research Society, 2013	
Jeffrey Kras,	2008-Present
BE Department GAANN Fellowship, 2008-2009 Biomedical Engineering Society Student Travel Award, 2009	
Nathan Crosby	2009-Present
Ashton Fellowship Honorable Mention, National Science Foundation Fellowship, 2011	
Jenell Smith	2010-Present
Ashton Fellowship Finalist, Student Paper Competition, ASME Bioengineering Conf, 2011 Pre-Doctoral Trainee, Orthopaedic Training Grant, 2013-2015	
Sijia Zhang	2012-Present
2 nd place, Stapp Association Student Paper Competition, 2013	
Ben Bulka	2013-Present

Research Fellows

Scott Simon, MD (Neurosurgeon, Hamden, CT)	2002-2003
Zhong Huang, MD (pursuing PhD in Information Science, Drexel, PA)	2006-2007
Nadine Dunk, PhD (faculty, Humber College, Toronto, Canada)	2008-2009
Joel Bauman, MD (spine surgery fellow, New England Baptist Hospital)	2008-2011
Neurosurgery Research & Education Foundation Research Fellowship, 2009	
Yu-Wen Chang, PhD (visiting scholar, Academia Sinica, Taiwan)	2009-2010

Nicolas Jaumard, PhD Trainee, Neurosurgery Training Grant, 2010-2012	2009-present
La'Toya Latney, DVM Trainee, Comparative Medical and Molecular Genetics Training Grant	2010-present
Eric Granquist, DMD, MD	2011-2013
Peter Syré, MD Trainee, Neurosurgery Training Grant, 2012-present Resident Research Award, 24 th Annual Pan Philadelphia Neurosurgery Conference, 2012	2011-2013
Kosuke Tanaka, DMD	2011-2014
Nadia Gharbi, DMD	2012-2013
Parul Sikand Pall, PhD	2013-2014
Blythe Philips, VMD	2014-present

Masters Students

Hassam Baig (BE) 3 rd place, Student Paper Competition, ASME Bioengineering Conf, 2013	2012-2013
Nadia Gharbi (Masters of Science in Oral Biology, Penn Dental)	2012-2013
Morgan Fox (BE)	2011-2013
Akhilesh Gokhale (MEAM)	2010-2012
Derek Lee (BE) (Drexel Medical School)	2010-2012
Kiersten Craig (BE) (Analyst, Systems Integration Platform, Accenture) 3 rd place, Student Paper Competition, ASME Bioengineering Conf, 2009	2008-2009
Boyang Tang	2008

Graduate Rotation Students

John Thinnies, "Design of a rodent spine loading device."	2002-2003
Cathryn Peltz, "Protocols for quantifying ligament fiber undulation."	Fall 2004
Chris Dubois, "Detection of spinal neuropeptides in radicular pain." (recipient, Fontaine Fellowship)	2004-2005
Diana Santos, "Characterization of combined loading in facet distraction." (recipient, Fontaine Fellowship)	2004-2005
Amy Orlansky, "Defining spinal glial activation in a TMJ pain model."	Fall 2006
Elena Tous, "Astrocyte transfection for detection of inducible cytokines."	Fall 2007
Katherine Reuther, "Widespread spinal astrocytic responses in pain."	Fall 2009
Dianne Weeks, "Brain activation in chronic pain."	Fall 2009
Tristan Driscoll, "BKCa channels in pain."	Spring 2010
Kalonda Johnson (recipient, Fontaine Fellowship, National Science Foundation Fellowship)	2009-2010
Lorre Atlan (recipient, Fontaine Fellowship)	Fall 2011
Benjamin Freedman (recipient, National Science Foundation Fellowship)	Fall 2011
Christine Yoon	Fall 2012
Megan Sperry	Summer 2014
Meagan Ita	Fall 2014

Senior Design/Thesis

Chris Paryse, "Pressure characterization of microvascular clips."	Spring 2003
Roanne Mejilla, "Device design for facet contour measurement."	2003-2004

Kathryn Keenan, Justin Mills, Liz Robinson “Design of multi-axis spine loading device.”	2004-2005
David Gokhin, “Design of isolated rat ligament loading device.”	2004-2005
Elizabeth Kim, “Lidocaine treatments for neck pain relief.”	Spring 2005
Pooja Sethi, “Quantification of disc pathology following applied spine flexion.”	Fall 2005
Ross Leimberg, “Species scaling for biomechanics: Of mice and men.”	Fall 2005
Andrew Franklin, Michelle Gupta, Will Marsh, “Design of dynamic facet loading device.”	2005-2006
Vincent Cina, Kiersten Craig, Elizabeth Hines, Tefesehet Mesfin, “Design of system to provide delivery of sustained mouth-opening in multiple rats simultaneously.”	2007-2008
Osama Ahmed, Mohammed Khan, Joan Jose Martinez, Robert Mozia, “Design of model system for optimal treatment of neuropathology from painful injury.”	2008-2009
Chidi Ahaghotu, “Spinal glial activation in response to cytokine treatments.”	2009-2010
Andrea Barberio, Elizabeth Green, Michael Czubakowski “Design of an MR compatible head positioning device.” (winners, BE Senior Design Competition)	2010-2011

Independent Study

Andrea Tan, “NK-1 responses in facet-mediated pain.”	2004-2005
Sahana Mysore, “Brain responses in persistent pain.”	Spring 2005
Gary Evans-Gaspar, “Tooth strength of AmelX null mice”	2006-2007
Vandana Sood, “Spinal serotonin in facet-mediated pain” (Blair Fellow)	2008-2009
Elizabeth Robinson, “Spinal regulation of CGRP mRNA in painful facet injury”	2008-2009
Chukwunyere Ahaghotu, “Temporal astrocyte morphology related to activation”	Spring 2009
Melissa Cedarholm, “Computational biomechanics of a prosthetic interface”	Spring 2012

Undergraduate Researchers

Grant Arnold, “Design & development of an in vivo compression device.”	Summer 2003
David Gokhin, “Strain analysis techniques of the cervical facet capsule.” (recipient, Spring 2004, Research Opportunities in Penn Engineering Award)	2003-2004
Andrew Franklin, “Design & use of rodent test-frames.”	2003-2005
Robert Kreider, “Quantification of spinal neuropeptides in pain.”	Summer 2004
Andrea Tan, “NK-1 responses in facet-mediated pain.”	Summer 2004
Sarah Ghafurian, “Quantification of immunohistochemistry.”	Summer 2005
Cheryl Yang, “Geometric measurements of rodent ligaments.”	Fall 2005
Michelle Gupta, “Strain analysis of facet mechanics.”	2005-2006
Liz Hines, “Kinematic measurements for spine motion segments.” participant, NSF/AMP Program; 2 nd place oral presentation contest 2005, 1 st place 2006; 2 nd place poster contest 2007)	Summer 2005-present
Gary Evans-Gaspar, “Design of fixture & protocol for testing mice teeth”	Summer 2006
Akriti Saxena, “Multiplex assays of spinal cytokines in pain” participant, University Scholars Program	Summer 2006
Moses Tam, “Facet capsule strain & neurite outgrowth analysis.”	Spring 2006-2008
Chukwunyere Ahaghotu	Spring 2007-2008
Joan Jose Martinez participant, NSF/AMP Program; 2 nd -place poster contest 2008	Summer 2007-2008
Vandana Sood recipient, Blair Fellowship, Fall 2008	Summer 2007-present

Ben Guarino	Summer 2008-2010
Sarah Hanna	Summer 2009
Marc van de Rijn, “Astrocytic responses to fibrin gels.” participant, Nano-Bio Interface Summer Program	Summer 2009
Julia Quindlen	Spring 2010-2012
Daniel Lipschutz	Spring 2010-2012
Joshua Black	Summer 2010-2011
awardee, Penn Undergraduate Research Mentorship Program, Summer 2010	
Luis Medina	Summer 2011
participant, Nano-Bio Interface Summer Program	
Taylor Gilliland	Fall 2011-2014
awardee, Littlejohn Undergraduate Research Program, Summer 2013	
Jasmine Lee	Fall 2012-present
Timothy Zhou, Rachleff Scholar	Fall 2012-present
Nina Zhu, Rachleff Scholar	Spring 2013-present
Alec Stablow	Summer 2014-present
awardee, Penn Undergraduate Research Mentorship Program, Summer 2014	
Angel Xiao	Summer 2014-present

DOCTORAL THESIS COMMITTEES (not primary advisor):

Mari Allison (Arbogast), Bioengineering
 Nelly Andarawis (Soslowsky), Bioengineering (Committee Chair), defended 2008.
 Heather Ansorge (Soslowsky), Bioengineering (Committee Chair), defended 2010.
 Lorre Atlan (Margulies), Bioengineering (Committee Chair)
 Hallie Brink (Nicoll), Bioengineering (Committee Chair), defended 2008.
 John Boxberger (Elliott), Bioengineering (Committee Chair), defended 2009.
 Yung Chia Chen (Meaney), Bioengineering (Committee Chair), defended 2013.
 Brittany Coats (Margulies), Bioengineering, defended 2007.
 Michael DeRidder (Meaney), Bioengineering (Committee Chair), defended 2005.
 Laurel Hind (Hammer), Bioengineering
 Nicole Ibrahim (Margulies), Bioengineering (Committee Chair), defended 2009.
 Sarah Rooney (Soslowsky), Bioengineering (Committee Chair)
 Varsha Jain (Wehrli), Bioengineering (Committee Chair), defended 2012.
 Wade Johannessen (Elliott), Bioengineering (Committee Chair), defended 2006.
 Kevah Laksari (Darvish), Mechanical Engineering, Temple University, defended 2009.
 Jiamin Liu (Udupa), Bioengineering (Committee Chair), defended 2006.
 John Martin (Elliott, Mauck), Mechanical Engineering & Applied Mechanics (Committee Chair)
 Kris Miller (Soslowsky), Bioengineering, defended 2012.
 William Miller (Meaney), Bioengineering (Committee Chair), defended 2007.
 William Olsen (Luo), Neuroscience
 Tapan Patel (Meaney), Bioengineering (Committee Chair), defended 2013.
 John Peloquin (Elliott), Bioengineering
 Stephanie Perry (Soslowsky), Bioengineering (Committee Chair), defended 2008.
 Amber Price (Diamond), Bioengineering (Committee Chair), defended 2006.
 Brent Showalter (Elliott), Bioengineering (Committee Chair)
 Pallab Singh (Meaney), Bioengineering, defended 2011.

Daniel Thorek (Tsourkas), Bioengineering (Committee Chair), defended 2009.
 Katie von Reyn (Meaney), Bioengineering (Committee Chair), defended 2010.
 Michael Wang (Reddy), Bioengineering, defended 2010.
 Jessamine Winer (Janmey), Bioengineering (Committee Chair), defended 2009.
 Jonathon Yoder (Elliott), Mechanical Engineering & Applied Mechanics, defended 2014.

INVITED PLENARY TALKS:

1. "Mechanisms of Central Sensitization, Neuroimmunology & Injury Biomechanics in Persistent Pain." *State-of-the-Art Research Symposium: Perspectives on Musculoskeletal Disorder Causation and Control*, National Institute for Occupational Safety & Health, Columbus, OH, May, 2003.
2. "Subfailure Injuries of the Neck: Implications for Whiplash and Pain." *International Whiplash Trauma Congress*, Breckenridge, CO, February, 2005.
3. "Mechanisms of Painful Injuries in the Neck: Defining Spinal Responses to Mechanical Injuries for Future Treatment Strategies." *Keynote: Molecular Bioscience Symposium of Petersheim Academic Exposition*, Seton Hall University, NJ, April, 2005.
4. "Painful Spinal Injuries: Biomechanics, CNS Neuroimmune Responses & Their Implications for Persistent Pain." *Human Factors & Ergonomics Society*, Delaware Valley Chapter, Philadelphia, PA, November, 2005.
5. "Mechanical & Physiological Pathologic Mechanisms of Painful Cervical Facet Capsule Injury." *International Whiplash Trauma Congress*, Portland, OR, June, 2006.
6. "Spine Pain Mechanisms – Where Does Back Pain Come From?" *Philadelphia Spine Research Society Annual Spring Meeting*, Philadelphia, PA, June, 2006.
7. "Biomechanics of Pain in Whiplash." *International Whiplash Trauma Congress*, Miami, FL, October, 2007.
8. "Theories of Neck Injury Mechanisms in Motor Vehicle Crashes." *World Congress on Neck Pain*, Los Angeles, CA, January, 2008.
9. "Biomechanics of Spine Trauma." *Annual Symposium of the American Society of Spine Radiology*, Indian Wells, CA, February, 2008.
10. "Nerve Root Compression in Acute & Chronic Radicular Pain: Mechanical Contributions to Local & Spinal Responses." *27th Annual Scientific Meeting of the American Pain Society*, Tampa, FL, May, 2008.
11. "Hints from Seasoned Study Section Members." *NIH – NCCAM Grantsmanship Workshop*, Bethesda, MD, June, 2008.
12. "Mechanisms of Traumatic Neck Pain." *Pain: Molecular to Community (M2C) Conference – Canada Training in Pain*, Quebec, Canada, June, 2009.
13. "Persistent Pain from Mechanical Joint Injury: Mechanistic Insights from Models of Whiplash & TMJ." *TMJ Bioengineering Conference*, Denver, CO, November, 2009.
14. "What is Spinal Injury? Considerations for Injury and Pain." *5th Annual Philadelphia Spine Research Symposium*, Philadelphia, PA, December, 2009.
15. "Neck Injury – What is it? How is it Diagnosed and Treated?" *18th Annual Meeting of the Rachidian Society*, Kona, HI, January, 2010.
16. "Biomechanics of Painful Injuries." *Injury Science Day*, University of Pennsylvania, Philadelphia, PA, March, 2010.

17. "Strategies For Developing Effective (& Relevant) Pre-Clinical Models of Pain: Relating Symptoms to Syndromes." *New York Academy of Sciences Symposium on Unmet Needs in Pain Therapeutics*, New York, NY, April, 2010.
18. "Spinal Facet Joint Anatomy & Biomechanics." *Facet Mechanics Symposium, 6th World Congress of Biomechanics*, Singapore, August, 2010.
19. "The Future of Neural Engineering." *40th Anniversary of the Department of Biomedical Engineering at Duke University*, Durham, NC, September, 2010.
20. "Glia, Inflammation & Pain." *Lyme & Other Tick-Borne Diseases Conference: The Science & Clinical Implications*, Philadelphia, PA, October, 2010.
21. "Animal Models in the Transition to Chronic Pain." *International Forum on Whiplash*, Queensland, Australia, February, 2011.
22. "How Can Animal Models Inform on Transition to Chronicity?" *International Whiplash Symposium 2011: How to Lessen the Transition to Chronicity*, Centre of Clinical Research Excellence, University of Queensland, Australia, February, 2011.
23. "Pre-Clinical Models of Back Pain" *4th Annual Targeting Pain with Novel Therapeutics Conference*, Philadelphia, PA, June, 2011.
24. "The Facet Joint as a Pain Generator in Neck Trauma." *5th International Whiplash Trauma Congress*, Lund, Sweden, August, 2011.
25. "Using Biomechanics to Define Physiologic Dysfunction – Revising Our Definition of Injury Tolerance." *Northeast Bioengineering Conference*, Philadelphia, PA, March, 2012.
26. "Acute to Chronic: What "Drives" Pain?" *International Whiplash Conference: 15 Year on: The Problem That has not Gone Away*, Bristol, UK, April, 2012.
27. "The Spinal Facet Joint and Musculoskeletal Pain." *2nd International Symposium on Musculoskeletal System & Pain*, Sapporo, Japan, July, 2012.
28. "Evidence of Pain from Cervical Spine Tissues & Associated Neuroplastic & Immune Changes in Physiological Model." *14th World Congress on Pain*, Milan, Italy, August, 2012.
29. "Underlying Factors of Musculoskeletal Disorders: What Are We Missing?" *Human Factors and Ergonomics Society 56th Annual Meeting*, Boston, MA, October, 2012.
30. "Neck Pain Mechanisms: Insights for Prevention & Treatment." *Evidence-Based Solutions for Improving Cervical Spine Health and Function*, Chicago, IL, March, 2013.
31. "Cervical Facet Joint Injury: Review of Animal Studies." *Canadian Pain Society Annual Conference*, Winnipeg, MB, Canada, May, 2013.
32. "Animal Models of Pain - "Back Translation" for Neck and Back Pain" *12th Annual World Pharma Congress*, Philadelphia, PA, June, 2013.
33. "Evidence of Pain from Cervical Spine Tissues: Associated Neuroplastic & Immune Changes in Physiological Models" *8th Congress of the European Federation of the IASP Chapters*, Florence, Italy, October, 2013.
34. "Mechanisms of Trauma-Induced Joint Pain and Insights for Diagnosis and Treatment." *Symposium on Challenges & Opportunities in Pain*, Philadelphia, PA, December, 2013.
35. "Biomechanics of Neurologic Injury" *Research Spotlight - Orthopaedic Research Society Annual Meeting*, New Orleans, LA, March, 2014.
36. "Pain Signaling from Injured Cervical Facet Joints" *Whiplash Injury: A Model for Development of Chronic Pain – IASP Research Symposium*, Aarhus, Denmark, March, 2014.
37. "Cervical Facet Joint Biomechanics in Normal & Injury Conditions." *7th World Congress of Biomechanics*, Boston, MA, July, 2014.

38. “Painful Tissue Loading can Induce Widespread Inflammation via Integrated Mechanotransduction Cascades.” *7th World Congress of Biomechanics*, Boston, MA, July, 2014.
39. “Neuronal Activity in the CNS Modulates Persistent Pain: Mechanisms & Therapeutic Potential.” *BMES Annual Meeting*, San Antonio, TX, October, 2014.

INVITED DEPARTMENTAL SEMINARS & SYMPOSIA:

1. “Subcatastrophic Spinal Injuries: Biomechanics, Pain and Injury Mechanisms.” *Bioengineering Seminar Series*, University of Pennsylvania, Philadelphia, PA, April, 2001.
2. “Biomechanics and Physiology of Radiculopathy and Other Painful Spinal Injuries.” *Neurology Grand Rounds*, Dartmouth-Hitchcock Medical Center, Lebanon, NH, July, 2001.
3. “Painful Spinal Injuries: Biomechanics, Pain and Injury Mechanisms.” *Department of Orthopaedics Research Seminar Series*, Brown University, Providence, RI, August, 2001.
4. “The Role of Neuroimmunity in Persistent Pain: CNS Responses and Biomechanical Implications.” *CNS Injury Seminar*, University of Pennsylvania, Philadelphia, PA, September, 2001.
5. “CNS Neuroimmune Responses and Biomechanical Implications in Persistent Pain.” *Annual Orthopaedics/Spine Center Visiting Professor Lectureship Symposium*, Dartmouth-Hitchcock Medical Center, Lebanon, NH, October, 2001.
6. “Whiplash-Related Neck Pain: What Role Does the Cervical Facet Play?” *Neurosurgery Grand Rounds*, University of Pennsylvania, Philadelphia, PA, September, 2002.
7. “Lumbar Nerve Root Mechanics in Compression: Implications for Persistent Low Back Pain.” *Mechanical Engineering Departmental Seminar Series*, University of Vermont, Burlington, VT, October, 2002.
8. “The Role of Local Biomechanics in Persistent Pain.” *Institute for Medicine and Engineering Interdisciplinary Seminar Series*, University of Pennsylvania, Philadelphia, PA, February, 2003.
9. “Spinal Injury & Pain: Biomechanics, Neuroimmunity and Injury Mechanisms.” *TraumaLink Seminar*, University of Pennsylvania, Philadelphia, PA, April, 2003.
10. “Spinal Pain Mechanisms: Understanding the Relationship Between Injury Mechanics & Immunology.” *Neuroscience Program Seminar*, Temple University, Philadelphia, PA, October, 2003.
11. “Cervical Facet-Mediated Injury: Lessons from an In Vivo Model Integrating Biomechanics, Behavior & Nociception.” *Department of Bioengineering*, Wayne State University, Detroit, MI, October, 2005.
12. “Mechanisms of Painful Nerve Root Injury: Integrating Tissue Mechanics with Cellular Reactivity to Understand Pain Symptoms.” *Orthopaedic Surgery Grand Rounds*, Duke University Medical Center, Durham, NC, December, 2005.
13. “Defining Tolerances for Neck Pain: Mechanical & Physiological Considerations.” *Department of Bioengineering*, Columbia University, New York, NY, January, 2006.
14. “Does Nerve Root Compression “Sting”? Understanding Neck Pain in the Context of Biomechanics and Nociceptive Cascades.” *Center for Injury Biomechanics*, Virginia Tech/Wake Forest, Blacksburg, VA, April, 2006.
15. “Neck Pain: Biomechanics & Cellular Responses for Injury in the Cervical Spine.” *Orthopaedics Department Grand Rounds*, Dartmouth-Hitchcock Medical Center, Lebanon, NH, May, 2006.

16. "Nerve Root Compression & Pain: Does Tissue Biomechanics Influence Injury Responses?" *Applied Biomechanics Laboratory*, University of Washington, Seattle, WA, May, 2006.
17. "Biomechanics of Subfailure Tissue Loading: Engineering Approaches to Understand & Treat Painful Injuries" *Center for Biomolecular & Tissue Engineering*, Duke University, Durham, NC, September, 2006.
18. "Biomechanics of Subfailure Tissue Loading: Considerations for Design & Retrofit." *Ergonomics Program Seminar Series in Biomedical & Mechanical Engineering & Kinesiology*, University of Michigan, Ann Arbor, MI, October, 2006.
19. "Novel In Vivo Models to Understand Mechanisms & Identify Treatments for Neck Pain." *Neuroscience Discovery Research Department*, Wyeth Pharmaceuticals, Princeton, NJ, November, 2006.
20. "Injury Mechanisms of Facet-Mediated Whiplash Neck Pain." *Southern Consortium for Injury Biomechanics Scientific Symposium*, Homewood, AL, December, 2006.
21. "An Integrated Approach to Understand Facet Pain: Biomechanics, Behavior & Nociception." *Department of Neurobiology & Anatomy*, Drexel University College of Medicine, Philadelphia, PA, February, 2007.
22. "Tissue Responses for Mechanical Neck Injury: Considerations for Pharmacological Treatments of Pain." *Department of Pharmacology*, Boston University School of Medicine, Boston, MA, April, 2007.
23. "Understanding Pain Responses in Neck Injuries to Develop Targeted Therapeutics." *Department of Chemical Engineering*, University of Louisville, Louisville, KY, November, 2007.
24. "Facet-Mediated Whiplash Neck Pain." *Southern Consortium for Injury Biomechanics Scientific Symposium*, Birmingham, AL, December, 2007.
25. "Neck Pain: Using Preclinical In Vivo Models to Define Mechanistic Cascades & Help Identify Effective Interventions." *Pain Research Department*, Abbott Pain Care, Chicago, IL, September, 2008.
26. "Re-Defining Mechanical Failure for Painful Neck Injury." *Department of Mechanical & Aerospace Engineering*, University of Virginia, Charlottesville, VA, February, 2009.
27. "An Engineering Approach to Diagnose & Treat Neck Pain." *Biomedical Engineering & Biomedical Sciences Program Joint Seminar*, University of South Carolina, Columbia, SC, March, 2009.
28. "An Integrated Approach to Define Biomechanical Tolerances for Injury, Pain & Cellular Dysfunction." *Department of Biomedical Engineering*, University of Minnesota, Minneapolis, MN, March, 2010.
29. *Department of Mechanical & Aerospace Engineering*, University of Virginia, Charlottesville, VA, May, 2010.
30. *ULAR Veterinary Series on Animal Models*, University of Pennsylvania, Philadelphia, PA, August, 2010.
31. "A Bioengineering Approach to Define Biomechanical Tolerances for Painful Injury & Cellular Dysfunction." *Department of Bioengineering*, The Pennsylvania State University, University Park, PA, October, 2010.
32. "Integration of Biomechanical Tissue Tolerances with Physiologic Responses for Facet-Mediated Pain." *Department of Orthopaedic Surgery*, Rush University, Chicago, IL, November, 2010.

33. "Mechanisms of Facet-Mediated Neck Pain: A Bioengineering Approach to Inform Clinical Management." *Department of Physical Therapy & Human Movement Sciences*, Northwestern University, Chicago, IL, November, 2011.
34. "Biomechanics, Injury & Tolerance." *Department of Computer Engineering*, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, May, 2012.
35. "Neck Pain Mechanisms: Insights for Prevention & Treatment." *Rehabilitation Institute of Chicago*, Chicago, IL, March, 2013.
36. "Bioengineering Approaches to Understand, Prevent and Treat Facet Joint Pain." *Center for Excellence in the Neurosciences*, University of New England, Biddeford, ME, July, 2013.
37. "Bioengineering Approaches to Define Biomechanical Tolerances for Tissue Injury, Pain & Neuronal Dysfunction." *Department of Mechanical Engineering & Materials Science*, Washington University, St. Louis, MO, September, 2013.
38. "An Engineering Approach to Understand & Treat Radicular Pain." *Department of Biomedical Engineering*, University of Florida, Gainesville, FL, January, 2014.
39. "Bioengineering Approaches to Understand Spine Injury & Pain: "Back" to the Basics & Integrating for the Future." *Department of Biomedical Engineering*, The Ohio State University, Columbus, OH, February, 2014.
40. "Biomechanics of Spinal Joint Injury: Considering All "Facets" Ranging from Tissue Tolerance to Pain & Dysfunction." *The School of Biomedical Engineering*, Colorado State University, Ft. Collins, CO, March, 2014.
41. "Bioengineering & Engineering Futures: Academics & Opportunities." *Gashora Girls Academy*, Gashora, Rwanda, June, 2014.

CONFERENCE PRESENTATIONS:

1. **Winkelstein BA**, Nightingale RW, Myers BS, "Impact Neck Injury Dynamics: Relationships Between Impact Surface, Cervical Spine Kinetics, and Injury Risk." *6th Injury Prevention Through Biomechanics Symposium*, Detroit, MI, May, 1996.
2. **Winkelstein BA**, Myers BS, "Preliminary Results of a Mechanical Investigation of the Role of the Cervical Facet Capsule in Whiplash Injury." *8th Injury Prevention Through Biomechanics Symposium*, Detroit, MI, May, 1998.
3. **Winkelstein BA**, Nightingale RW, Myers BS, "A Preliminary Study of the Biomechanics of the Cervical Facet Capsule." *Whiplash '98 Symposium*, Tempe, AZ, November, 1998.
4. **Winkelstein BA**, Richardson WJ, Myers BS, "A Mechanical Investigation of the Role of the Cervical Facet Capsule in Whiplash Injury." *ASME Summer Bioengineering Conference*, Big Sky, MT, June, 1999.
5. **Winkelstein BA**, Nightingale RW, Richardson WJ, Myers BS, "Cervical Facet Joint Mechanics: Its Application to Whiplash Injury." *43rd Stapp Car Crash Conference*, San Diego, CA, October, 1999.
6. **Winkelstein BA**, Myers BS, "Experimental and Computational Characterization of Three-Dimensional Cervical Spine Flexibility." *44th Stapp Car Crash Conference*, Atlanta, GA, November, 2000.
7. **Winkelstein BA**, Weinstein JN, Pahl JL, DeLeo JA, "Local Tissue Biomechanics in Lumbar Radiculopathy: A New Model Approach." *Orthopaedic Research Society 47th Annual Meeting*, San Francisco, CA, February, 2001.

8. **Winkelstein BA**, Rutkowski MD, Weinstein JN, DeLeo JA, “An *In Vivo* Approach to Characterizing Local Biomechanics in a Radiculopathy Model.” *Annual Meeting of the International Society for the Study of the Lumbar Spine*, Edinburgh, Scotland, June, 2001.
9. **Winkelstein BA**, Rutkowski MD, DeLeo JA, “Chemokines in Neuropathic Pain: Potential Benefits for Modulating Pain by Targeting Their Actions.” *31st Annual New England Pharmacologists Meeting*, Hanover, NH, January, 2002.
10. **Winkelstein BA**, Rutkowski MD, Weinstein JN, DeLeo JA, “Temporal Responses in a Lumbar Radiculopathy Model: Tissue Biomechanics, Allodynia & Central Neuroimmune Changes.” *International Society for the Study of the Lumbar Spine Annual Meeting*, Cleveland, OH, May, 2002.
11. **Winkelstein BA**, Weinstein JN, DeLeo JA, “Role of Local Biomechanics in Temporal Behavioral Responses of Painful Radiculopathy.” *4th World Congress of Biomechanics*, #5057, Calgary, Canada, August, 2002.
12. **Winkelstein BA**, DeLeo JA, “The Role of Tissue Biomechanics in Painful Injuries: Mechanics, Cellular Responses and Pain Behaviors.” *ASME Summer Bioengineering Conference*, Key Biscayne, FL, June, 2003.
13. Lee KE, Thinnes JH, Gokhin D, **Winkelstein BA**, “In Vivo Biomechanics in a Facet-Mediated Neck Pain Model: Biomechanical Implications for Painful Whiplash Injuries.” *International Whiplash Trauma Conference*, Denver, CO, October, 2003.
14. **Winkelstein BA**, Hubbard RD, DeLeo JA, “Biomechanics and Painful Injuries: Tissue & CNS Responses for Nerve Root Mechanical Injuries.” *ASME International Mechanical Engineering Conference*, Washington DC, November, 2003.
15. Lee KE, Davis MB, Mejilla RM, **Winkelstein BA**, “*In Vivo* Cervical Facet Capsule Distraction: Mechanical Implications for Whiplash and Neck Pain.” *48th Stapp Car Crash Conference*, Nashville, TN, November, 2004.
16. Rothman SM, Kreider RA, **Winkelstein BA**, “Understanding Mechanisms of Painful Cervical Nerve Root Injury: Defining a Relationship between Persistent and Resolving Neck Pain Symptoms and Spinal Neuropeptide Responses.” *Cervical Spine Research Society 32nd Annual Meeting*, Paper #38, Boston, MA, December, 2004.
17. Lee KE, Gupta M, **Winkelstein BA**, “In Vivo Facet Capsule Failure in a Rat Model: Implications for Whiplash & Facet-Mediated Neck Pain.” *5th World Congress of Biomechanics*, #4489, Munich, Germany, July, 2006.
18. **Winkelstein BA**, Udupa JK, Hilibrand AS, Schuster JM, Siegler S, Hirsch BE, Borthakur A, Melhem ER, “Novel Imaging Approach Using 3D Stress MRI to Detect Altered Biomechanics in Patients with Evoked Neck Pain.” *Cervical Spine Research Society 36th Annual Meeting*, Austin, TX, December, 2008.
19. **Winkelstein BA**, Udupa JK, Hilibrand AS, Schuster JM, Siegler S, Hirsch BE, Borthakur A, Melhem ER. “Novel Imaging Approach Using 3D Stress MRI to Detect Altered Biomechanics in Neck Pain Patients.” *BMES Annual Fall Meeting*, #OP10-3-8D, Pittsburgh, PA, October 2009.
20. **Winkelstein BA**, Udupa JK, Hilibrand AS, Schuster JM, Siegler S, Hirsch BE, Borthakur A, Melhem ER. “A Novel 3D Stress MR Imaging Approach to Detect Altered Biomechanics in Neck Pain Patients.” *Cervical Spine Research Society Annual Meeting*, #17, Salt Lake City, UT, December 2009.
21. **Winkelstein BA**. Inflammatory Mechanisms Contributing to Cervical Radiculopathy. *18th Annual Meeting of the Rachidian Society*, Kona, HI, February, 2010.

- *22. **Winkelstein BA**, Weisshaar CL, Thorek DL, Hubbard RD, Tsourkas A. Macrophage as a Potential Biomarker for Imaging Radicular Pain. *Cervical Spine Research Society Annual Meeting*, Paper #15, Charlotte, NC, December 2010.
- 23. Smith JR, Weisshaar CL, Janmey PJ, **Winkelstein BA**. Salmon Thrombin Treatment Reduces Protease Activated Receptor 1 Expression Following Painful Nerve Root Injury. *Military Health System Research Symposium*, #12-141, Ft. Lauderdale, FL, August 2012.
- 24. Guarino BB, Baig HA, Jaumard NV, Branconi JL, Dorman DB, Shivers BL, **Winkelstein BA**. A New Model of Repeated Whole Body Vibration Exposure in the Rat: Biomechanical & Pain Responses. *Military Health System Research Symposium*, #12-023, Ft. Lauderdale, FL, August 2012.
- ^25. Nicholson KJ, Zhang S, **Winkelstein BA**. Riluzole Provides Neuroprotection against the Development of Axonal Damage and Spinal Hypersensitivity, While Abolishing Radicular Pain. *Cervical Spine Research Society Annual Meeting*, Paper #16, Los Angeles, CA, December 2013.

PUBLICATIONS IN REFEREED JOURNALS:

1. Meaney DF, Ross DT, **Winkelstein BA**, Brasko J, Goldstein D, Bilston LB, Thibault LE, Gennarelli TA. Modification of the cortical impact model to produce axonal injury in the rat cerebral cortex. *Journal of Neurotrauma*, 11(5):599-612, 1994.
- *2. Myers BS, **Winkelstein BA**. Epidemiology, classification, mechanism, and tolerance of human cervical spine injuries. *Critical Reviews in Biomedical Engineering*, 23(5&6):307-409, 1995.
3. **Winkelstein BA**, Myers BS. The biomechanics of cervical spine injury and implications for injury prevention. *Medicine & Science in Sports & Exercise*, 29(7):S246-55, 1997.
4. **Winkelstein BA**, Nightingale RW, Richardson WJ, Myers BS. The cervical facet capsule and its role in whiplash injury: A biomechanical investigation. *Spine*, 25(10):1238-1246, 2000.
5. **Winkelstein BA**, Myers BS. Experimental and computational characterization of three-dimensional cervical spine flexibility. *Stapp Car Crash Journal*, 44:139-158, 2000.
- **6. Siegmund GP, Myers BS, Davis MB, Bohnet HF, **Winkelstein BA**. Human cervical motion segment flexibility and facet capsular ligament strain under combined posterior shear, extension & axial compression. *Stapp Car Crash Journal*, 44:159-170, 2000.
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* Invited.

¥ Graduate student received Student Travel Grant award from GSAC (Penn) to present paper, 2007.

§ Graduate student received Honorable Mention in PhD Student Paper Competition at ASME-BED Meeting, 2007.

‡ Graduate student received Student Travel Grant award from GAPSAs (Penn) to present paper, 2008.

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‡ Graduate student received Student Travel Grant award from GAPSAs (Penn) to present paper, 2008.

* Bachelor student received 3rd Place in Poster Competition, Student Paper Competition, ASME-BED Mtg, 2009.

‡ Graduate student received Student Travel Grant award from GAPSAs (Penn) to present paper, 2009.

* Graduate student received Travel Grant award from Biomedical Engineering Society to present paper, 2009.

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‡ Graduate student received Student Travel Grant award from GAPSA (Penn) to present paper, 2009.

* Graduate student received Travel Grant award from Biomedical Engineering Society to present paper, 2009.

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* Paper received 1st Place, Best Basic Science Research Award at CSRS Meeting, 2010.

‡ Graduate student received Student Travel Grant award from GAPSA (Penn) to present paper, 2011.

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† Graduate student received Student Travel Grant award from GAPSA (Penn) to present paper, 2011.

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101. **Winkelstein BA**, Weisshaar C. Spinal NK1-Receptor Expressing Cells Contribute to the Development of Pain from the Facet Joint. *14th World Congress on Pain*, #PW254, Milan, Italy, August 2012.
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109. Smith JR, Nicholson KJ, Syré P, Janmey PA, **Winkelstein BA**. A Novel Bioengineered Biomaterial to Treat Painful Neural Trauma via Modified Thrombin Activity for Improving Neuronal Function and Treating Pain. *Cervical Spine Research Society Annual Meeting*, Chicago, IL, December 2012.
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- ^*112. Baig HA, Dorman DB, Shivers BL, Breaux-Waltz A, Chancey VC, **Winkelstein BA**. Characterization of the Frequency & Muscle Response in the Lumbar & Thoracic Spines

* Graduate student received Student Travel Grant award from GAPSA (Penn) to present paper, 2012.

‡ Resident Awarded Best Resident Paper at Conference, 2012.

- during Sinusoidal Vertical Whole Body Vibration. *ASME Summer Bioengineering Conference*, #SBC2013-14055, Sunriver, OR, June 2013.
- *113. Nicholson KJ, Gilliland TM, **Winkelstein BA**. Duration of Nerve Root Compressive Trauma Modulates the Subsequent Thermal Hyperalgesia & the Spinal Expression of the Glutamate Transporter, GLT1. *ASME Summer Bioengineering Conference*, #SBC2013-14110, Sunriver, OR, June 2013.
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115. Kras, JV, **Winkelstein BA**. Intra-Articular Nerve Growth Factor is Both Necessary and Sufficient for the Development of Joint Pain and Contributes to Central Sensitization. *BMES Annual Meeting*, #OP-Thurs-1-12, Seattle, WA, September 2013.
116. Syré PP, Lee JYK, **Winkelstein BA**. Increased Electrophysiological Activity in Neurons in the Thalamus and Spinal Cord is Evident in Persistent Pain States after Cervical Radiculopathy. *Congress of Neurological Surgeons 2013 Annual Meeting*, #374, San Francisco, CA, October 2013.
- ♦117. Kras JV, Weisshaar CL, Quindlen JC, **Winkelstein BA**. A Role for Spinal Brain-Derived Neurotrophic Factor in Persistent Pain in a Rat Model of Mechanical Facet Joint Injury. *Society for Neuroscience*, #267.04/UU19, San Diego, November 2013.
- ♦118. Crosby ND, Dong L, **Winkelstein BA**. Dorsal Horn Synaptogenesis after Painful Joint Injury is Attenuated by Gabapentin. *Society for Neuroscience*, #827.05/UU20, San Diego, November 2013.
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120. Barr GA, Wang S, Cheng J, Bass K, Weisshaar CL, **Winkelstein BA**. Behavioral and immune studies of neuropathic pain from infancy to adolescence. *Society for Neuroscience*, #166.06/OO4, San Diego, November 2013.
121. Kartha S, Zeeman ME, Baig HA, Guarino BB, **Winkelstein BA**. Upregulation of NGF & BDNF in Cervical Intervertebral Discs Exposed to Painful Whole Body Vibration. *2nd International Philadelphia Spine Research Symposium*, Philadelphia, PA, November 2013.
- *122. Nicholson KJ, Zhang S, **Winkelstein BA**. Riluzole Provides Neuroprotection against the Development of Axonal Damage and Spinal Hypersensitivity, While Abolishing Radicular Pain. *Cervical Spine Research Society Annual Meeting*, Paper #16, Los Angeles, CA, December 2013.
123. Crosby N, Goodman Keiser M, Weisshaar C, Zeeman M, **Winkelstein BA**. Optimization of Burst SCS Parameters in a Rat Model of Neuropathic Pain. *North American Neuromodulation Society Annual Meeting*, Las Vegas, NV, December 2013.

♦ Masters student received 3rd Place in Student Paper Competition, ASME-SBC Mtg, 2013.

* Graduate student received Student Travel Grant award from GAPSAs (Penn) to present paper, 2013.

♦ Graduate student finalist in PhD Student Paper Competition at ASME-BED Meeting, 2013.

♦ Graduate student received Student Travel Grant award from GAPSAs (Penn) to present paper, 2013.

♦ Graduate student received Student Travel Grant award from GAPSAs (Penn) to present paper, 2013.

♦ Paper received 1st Place, Best Basic Science Research Award at CSRS Meeting, 2013.

124. Lai A, Purmessur D, Skovrlj B, **Winkelstein BA**, Cho SK, Hecht AC, Iatridis JC. Effect of Lumbar Intradiscal Injection of Tumor Necrosis Factor-alpha and Nerve Growth Factor/Vascular Endothelial Growth Factor on Disc Degeneration, Pain Behavior and Neurovascular Ingrowth in an In-Vivo Rat Model. *Orthopaedic Research Society Annual Meeting*, Paper No. 0247, New Orleans, LA, March 2014.
125. Giuvelis D, Corner J, **Winkelstein B**, Sawyer E, Bilsky EJ. Assessment of the Antinociceptive Effects of Salmon Thrombin in Preclinical Models of Post-operative Pain. *American Academy of Pain Medicine 30th Annual Meeting*, Poster #217, Phoenix, AZ, March 2014.
126. Skovrlj B, Lai A, Moon A, Purmessur D, **Winkelstein BA**, Cho SK, Hecht AC, Iatridis JC. Effect of Lumbar Intradiscal Injection of Tumor Necrosis Factor-alpha and Nerve Growth Factor/Vascular Endothelial Growth Factor on Disc Degeneration, Pain Behavior and Neurovascular Ingrowth in an In-Vivo Rat Model. *Lumbar Spine Research Society Annual Meeting*, Paper #15, Chicago, IL, May 2014.
127. Granquist E, Kartha S, Zhou T, **Winkelstein B**. A Novel Non-Invasive Model of Temporomandibular Joint Pain in the Rat with Tunable Outcomes of Acute & Chronic Pain. *TMJ Bioengineering Conference – IV*, Pittsburgh, PA, June 2014.
128. Smith JR, Janmey PA, **Winkelstein B**. Painful Nerve Root Compression Alters the Compressive Properties of the Spinal Cord. *7th World Congress of Biomechanics*, #R347, Boston, MA, July 2014.
129. Pall PS, Zeeman ME, Kartha S, Baig HA, **Winkelstein B**. Painful Whole Body Vibration Increases Serum Cytokines: Potential Biomarkers of Painful Injury. *7th World Congress of Biomechanics*, #R192, Boston, MA, July 2014.
130. Claeson A, Yeh Y, Akkin T, **Winkelstein B**, Barocas V. Polarization-Sensitive Optical Coherence Tomography Measurement of Fiber Realignment in the Facet Capsular Ligament During Flexion of Isolated L4-L5 Motion Segments. *7th World Congress of Biomechanics*, #R393, Boston, MA, July 2014.
- *131. Zhang S, Barocas V, **Winkelstein B**. Local Neuronal Loading Modulates pERK Expression in a Neuron-Collagen Gel Construct Simulating Facet Capsule Injury. *7th World Congress of Biomechanics*, #W229, Boston, MA, July 2014.
132. Zitnay JL, Lake SP, Quinn KP, Lee DJ, **Winkelstein BA**, Barocas V. Multiscale Modeling of the Cervical Facet Capsular Ligament During Tensile Joint Loading. *7th World Congress of Biomechanics*, #111-12, Boston, MA, July 2014.
133. DeTurck D, **Winkelstein BA**, Lenthall B. Structured, Active, In-class Learning at the University of Pennsylvania. *AAU STEM Initiative Conference*, #P26, Washington DC, July 2014.
134. Barocas VH, Akkin T, Shephard M, **Winkelstein BA**. Multiscale Modeling of Facet Capsule Mechanobiology: Integrating Modeling and Experimental Techniques. *Multiscale Modeling Consortium Meeting*, Bethesda, MD, September, 2014, submitted.
135. **Winkelstein BA**, Crosby N, Goodman-KV. Burst Spinal Cord Stimulation has Optimal Reduction on Neuronal Firing & Percent Neurons Firing when Optimizing Charge per Burst in a Rat Model of Radicular Pain. *15th World Congress on Pain*, #PF209, Buenos Aires, Argentina, October 2014.
- ♦136. Skovrlj B, Lai A, Moon A, Purmessur D, **Winkelstein B**, Cho SK, Hecht AC, Iatridis J. Effect of Lumbar Intradiscal Injection of Tumor Necrosis Factor-Alpha and Nerve Growth

* Paper received 2nd Place in BS Student Paper Competition, World Congress of Biomechanics Mtg, 2014.

Factor/Vascular Endothelial Growth Factor on Disc Degeneration. *North American Spine Society*, #169, San Francisco, CA, November 2014.

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138. **Winkelstein BA**, Kras JV. Intra-articular Nerve Growth Factor Initiates Pain and Associated Spinal Neuronal Hyperexcitability from Cervical Joint Pain, submitted.
139. Zhou T, Kartha S, Granquist E, **Winkelstein BA**. A Mechanically Induced Model of Pain and Structural Changes in the Temporomandibular Joint in the Rat, submitted.
140. Crosby ND, Weisshaar CL, Goodman-Keiser M, Smith JR, Zeeman ME, **Winkelstein BA**. Burst & Tonic SCS in a Rat Model of Painful Radiculopathy: The Role of GABA, submitted.

PATENTS:

Sawyer ES, Janmey PA, **Winkelstein BA**. Method of using salmon thrombin to alleviate pain. US Patent #8,771,684, 7/8/14.

Winkelstein BA, Janmey PA, Sawyer ES. Method of using salmon thrombin to alleviate central nervous system-mediated pain. Application #20100111926 filed 5/6/10.

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♦ Paper selected as Best Basic Science Paper, North American Spine Society Annual Mtg, 2014.