

# Robson Forensic

Engineers, Architects, Scientists & Fire Investigators

**JAMIE R. WILLIAMS, Ph.D.**

**Biomedical Engineer / Biomechanics and Bioengineering**

Investigates and analyzes biomechanical and biomedical injuries; injury causation; and medical equipment, devices and implants.

**Assesses Injuries:** Applying physics, anatomy and physiology, assesses injuries involving:

- traumatic brain injuries and skull fractures;
- neck, back and spinal cord injuries;
- orthopedic and neurologic injuries;
- vascular ruptures;
- abdominal organs;
- heart, lungs, skin (including burns) and other organs;
- musculo-skeletal injuries including joints (i.e., shoulders, knees, ankles and elbows), soft tissues (i.e., rotator cuff, tendons and ligaments), and fracture patterns (torso, long bone, hand, foot or skull).

**Determines Cause:** Applying engineering principles, determines:

- the manner in which tissue failed: the type of loading, the direction of loading and magnitude or size of the load that caused the injury;
- if injury patterns are causally related or consistent with the hazardous condition or circumstances claimed;
- whether there was sufficient force in the right direction to cause an injury;
- the presence of pre-existing conditions and how they affect the injury;
- who and/or what action contributed to the injuries;
- what could have been done to prevent the injuries.

**Typical Personal Injury Cases Involve:**

- motor vehicle collisions;
- slips, trips and falls;
- medical malpractice or device failures;
- occupational and work place injuries;
- sports and recreational injuries.

## PROFESSIONAL EXPERIENCE

2006 to present **Robson Forensic, Inc.**  
*Associate*

Provide technical investigations, analysis, reports, and testimony towards the resolution of personal injury litigation involving injury analysis and causation, medical equipment, medical devices, and procedures.

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2003 to present	<b>Rush University Medical Center, Department of Orthopedic Surgery</b> <i>Visiting Professor</i> <i>Assistant Director Orthopedic Biomechanics Laboratory</i> <i>Assistant Professor</i> <i>Instructor</i>	2007-present 2006-2007 2005-2007 2003-2005
2005 to present	<b>University of Illinois at Chicago, Department of Bioengineering</b> <i>Adjunct Professor</i>	
1999 to 2003	<b>Rush University Medical Center, Department of Orthopedic Surgery</b> <i>Graduate Research Assistant</i>	
1997 to 1999	<b>University of Iowa, Department of Biomedical Engineering</b> <i>Research Assistant</i>	
1996 to 1999	<b>Greenleaf Orthopedic Associates</b> <i>Intern</i>	

### EDUCATION

Ph.D., Bioengineering, University of Illinois at Chicago, Chicago, IL  
M.S., Bioengineering, University of Illinois at Chicago, Chicago, IL  
B.S.E., Biomedical Engineering, University of Iowa, Iowa City, IA

### PROFESSIONAL MEMBERSHIPS

Orthopedic Research Society  
American Society of Biomechanics  
American Society of Mechanical Engineering  
Solid Mechanics Committee (Bioengineering Technical Division)  
Education Committee (Bioengineering Technical Division)  
Association for the Advancement of Automotive Medicine

### CERTIFICATIONS

Group Fitness Instructor, American Council on Exercise  
Scuba Diver, YMCA

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## PUBLICATIONS

- 2008 R.N. Natarajan, **J.R. Williams**, S.A. Lavender, H.S. An, G.B. Anderson. "Relationship Between Disc Injury and Manual Lifting: a Poroelastic Finite Element Model Study," *Proceedings of the Institution of Mechanical Engineers. Part H, Journal of Engineering in Medicine*, 222(2):195-207
- 2007 **J.R. Williams**, R.N. Natarajan, G.B. Andersson. "Inclusion of Regional Poroelastic Material Properties Better Predicts Biomechanical Behavior of Lumbar Discs Subjected to Dynamic Loading," *Journal of Biomechanics*. 40(9):1981-7
- 2006 R.N. Natarajan, **J.R. Williams**, G.B.J. Andersson. "Modeling Changes in Intervertebral Disc Mechanics with Degeneration," *Journal of Bone and Joint Surgery (Am)*, Suppl 2:36-40
- 2004 R.N. Natarajan, **J.R. Williams**, G.B.J. Andersson. "Recent Advancements in Analytical Modeling of Lumbar Disc Degeneration," *Spine*, 29(23): 2733-2741
- 2003 **J.R. Williams**, "Numerical Investigation of Lumbar Disc Injury Under Cyclic Loading Conditions." Doctoral Dissertation
- 2001 R.N. Natarajan, **J.R. Williams**, G.B.J. Andersson. "Finite Element Model of a Lumbar Spinal Motion Segment to Predict Circadian Variation in Stature," *Computers & Structures*, 81(8-11): p.835-842
- 2000 **J.R. Williams**, "Biomechanical Response of a Lumbar Motion Segment Under Cyclic Loading." Masters Thesis

## PAPERS PRESENTED AT SCIENTIFIC MEETINGS

- 2008 Y. Otuska, H.S. An, **J.R. Williams**, K. Yamaguchi, R.S. Ochia, G.B. Andersson, N. Inoue. "Measurement of Three-Dimensional Lumbar Facet Joint Orientation and Area: In Vivo Analysis," *Transcripts of the 39<sup>th</sup> Annual Meeting, Scoliosis Research Society*
- 2007 R.N. Natarajan, **J.R. Williams**, S.A. Lavender, G.B. Andersson. "Lifting That Involves Lateral Bending of the Trunk is More Harmful to the Lumbar Disc Than That Involves Flexing or Twisting of the Trunk," *Transactions of the 53<sup>rd</sup> Annual Meeting, Orthopaedic Research Society*

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### Biomedical Engineer / Biomechanics and Bioengineering

- 2007 R.N. Natarajan, **J.R. Williams**, G.B. Andersson. "Biomechanical Comparison Between Two Techniques Used in Modeling Annular Fiber in a Lumbar Motion Segment," *Transactions of the 53<sup>rd</sup> Annual Meeting, Orthopaedic Research Society*
- 2007 Y. Otska, H.S. An, R.S. Ochia, **J.R. Williams**, G.B. Andersson, N. Inoue. "In Vivo Measurement of Lumbar Facet Surface Area," *Transactions of the 53<sup>rd</sup> Annual Meeting, Orthopaedic Research Society*
- 2006 R.N. Natarajan, **J.R. Williams**, G.B.J. Andersson, "Numerical Model to Predict the Failure Progression in a Lumbar Disc Due to Cyclic Loading," *American Society of Mechanical Engineers, Bioengineering Division*
- 2006 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Increase in the Water Content of Degenerated Disc Tissues Does Not Restore Mechanical Response to That of a Normal Disc," *Summer Bioengineering Conference, American Society of Mechanical Engineers Bioengineering Division*
- 2005 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Comparison of the Biomechanical Response of a Lumbar Motion Segment to Loading and Unloading When Loads are Applied Suddenly and at Normal Lifting Speeds," *International Society of Biomechanics Annual Meeting*
- 2005 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Biomechanical Response of a Lumbar Motion Segment Under Physiological Loading Condition that Includes Large Shear Loads," *Summer Bioengineering Conference, American Society of Mechanical Engineers Bioengineering Division*
- 2004 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Prediction of Endplate Bulging With and Without Inclusion of Physiological Swelling Pressure and Strain Dependent Permeability and Porosity," *International Mechanical Engineering Congress and R&D Expo, American Society of Mechanical Engineers*
- 2004 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Better Understanding of Biomechanical Response of Cadaveric Lumbar Motion Segments to Creep Loading and Unloading," *International Society for the Study of the Lumbar Spine*
- 2003 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Effect of Regional Variations in Material Properties of the Disc on Circadian Variation in Stature," *Conference Proceedings, 27<sup>th</sup> Annual Meeting of the American Society of Biomechanics*

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### Biomedical Engineer / Biomechanics and Bioengineering

- 2003 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Numerical Investigation of Circadian Variation in Stature," *Proceedings of the Summer Bioengineering Conference, Bioengineering Division of the American Society of Mechanical Engineers*
- 2003 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Influence of Lumbar Disc Fluid Content on Axial Disc Stiffness During Creep Loading and Unloading: A Poroelastic Finite Element Study Including the Effect of Strain Dependent Permeability and Soft Tissue Swelling," *International Society for the Study of the Lumbar Spine*
- 2003 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Change in Water Content has Greater Effect on Lumbar Disc Stiffness in Comparison to Change in Permeability," *Transactions of the 49<sup>th</sup> Annual Meeting, Orthopaedic Research Society, February, Vol. 28*
- 2002 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Numerical Investigation of Biomechanical Response of a Lumbar Motion Segment Under Repetitive Loading Conditions," *International Society for the Study of the Lumbar Spine*
- 2002 **J.R. Williams**, R.N. Natarajan, G.B.J. Andersson, "Numerical Investigation of Circadian Variation in Stature and the Effects of Spinal Loading," *Transactions of the 48th Annual Meeting, Orthopaedic Research Society, February, Vol. 27*
- 2001 R.N. Natarajan, **J.R. Williams**, G.B.J. Andersson. "Effect of Lifting Speed on the Biomechanical Behavior of a Lumbar Spinal Motion Segment," *Conference Proceedings, Twenty-Fifth Annual Meeting of the American Society of Biomechanics*
- 2001 Raghu N. Natarajan, **Jamie R. Williams**, Gunnar B.J. Andersson. "Biomechanical Response in a Lumbar Motion Segment to Dynamic Lifting Activity," *Bioengineering Conference, ASME 2001, Vol. 50*
- 2001 R.N. Natarajan, **J.R. Williams**, G.B.J. Andersson. "Effect of Frequency of Cyclic Loading on Biomechanical Characteristics of Human Lumbar Intervertebral Joints," *International Society for the Study of the Lumbar Spine, 2001*

### FEDERAL AND NON-FEDERAL GRANTS RECEIVED

- 2006 to 2011 Intervertebral Disc Degeneration and Regeneration: Biomechanical and Biochemical Aspects; Project 2: Biomechanical Effects of Repetitive Loading on the Lumbar Motion Segment, Gunnar Andersson, M.D., Ph.D., Principal Investigator, Co-Investigator, National Institutes of Health

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## JAMIE R. WILLIAMS, Ph.D.

### Biomedical Engineer / Biomechanics and Bioengineering

- 2006 to 2011 Intervertebral Disc Degeneration and Regeneration: Biomechanical and Biochemical Aspects; Project 1: Relationship Between Disc and Facet Degeneration and Lumbar Kinematics, Nozomu Inoue, M.D., Ph.D., Principal Investigator, Co-Investigator, National Institutes of Health
- 2001 to 2006 Intervertebral Disc Degeneration and Regeneration: Biomechanical and Biochemical Aspects; Project 2: Relationship Between Disc Injury and Repetitive Lifting (AR 48152-02), Gunnar Andersson, M.D., Ph.D., Principal Investigator. Graduate Student, National Institutes of Health

### INDUSTRY CONTRACTS RECEIVED

- 2006 to 2007 Three-Dimensional Facet Kinematics in Healthy and Degenerated Discs in Lumbar Motion Segments, Co-Principal Investigator, Stryker
- 2006 to 2007 Endplate Microfracture Initiation of Disc Degeneration, Co-Investigator, Zimmer Spine Inc.
- 2006 to 2007 Biomechanical Comparison of C1-2 Posterior Fixation Techniques, Co- Investigator, Stryker
- 2006 to 2008 Realistic Motion and Load Input Data for Lumbar Disc Arthroplasty for the Study of Biomechanics and War of Artificial Discs, Co-Principal Investigator, Medtronic Sofamor Danek

### SERVICE TO A PROFESSIONAL OR GOVERNMENT ORGANIZATION

- 2008 Journal of Biomechanical Engineering, Reviewer
- 2006 Congressional Directed Medical Research Program, Peer Reviewed Military Panel (Trauma), Reviewer
- 2006 Experimental Mechanics, Reviewer
- 2006 Judge, Ph.D. Paper Competition, American Society of Mechanical Engineers, Bioengineering Summer Conference, Amelia Island, FL
- 2005 Session Co-Chair, American Society of Mechanical Engineers, Bioengineering Summer Conference, Vail, CO

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- 2004 Session Co-Chair, American Society of Mechanical Engineers, IMECE Anaheim, CA
- 2003 Session Co-Chair, American Society of Mechanical Engineers, Bioengineering Summer Conference, Key Biscayne, FL
- 2000 Local Organizing Committee, American Society of Biomechanics

## INVITED LECTURES

- 2007 “A Multi-Dimensional, Multi-Disciplinary Approach to Biomaterials Science, Getting To Phase I: Preclinical Trials,” *Society for Biomaterials 2007 Annual Meeting and Exposition, April 2007*
- 2006 “Finite Element Modeling of the Lumbar Spine: A Poroelastic Model Based on Mechanical and Biochemical Parameters” Japanese Orthopaedic Association, Visiting Fellows, March 2006
- 2006 “Application of Finite Element Analysis to Spine Biomechanics” Spine Biomechanics (BioE 515), Department of Bioengineering, University of Illinois at Chicago, March 2006
- 2005 “Introduction to Experimental Methods Used in Biomechanics Testing Laboratory” Spine Biomechanics (BioE 515), Department of Bioengineering, University of Illinois at Chicago, Chicago, Illinois, November 2005
- 2005 “Introduction to Finite Element Analysis” Spine Biomechanics (BioE 515), Department of Bioengineering, University of Illinois at Chicago, Chicago, Illinois, October 2005
- 2005 “Recent Advancements in Spine Biomechanics Research” Antioch Rotary Club, Antioch, Illinois, May 2005
- 2003 “Biomechanical Behavior of the Intervertebral Disc: A Numerical Model Using Mechanically and Biologically Driven Parameters” Midwest Connective Tissue Workshop, Rush University Medical Center, Chicago, Illinois, November 2003
- 2002 “Numerical Investigation of Biomechanical Response of a Lumbar Motion Segment Under Repetitive Loading Conditions” Department of Orthopedic Surgery, Rush-Presbyterian-St. Luke’s Medical Center, Chicago, Illinois April 2002

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- 2002 “Biomechanical Response of a Lumbar Motion Segment Under Repetitive Loading Conditions: A Finite Element Study” Biomechanics Lab, Legacy Clinical Research and Technology Center, Portland, Oregon March 2002
- 2001 “Dynamic Response of a Lumbar Motions Segment to Cyclic Loading”, Department of Orthopedic Surgery, Rush-Presbyterian-St. Luke’s Medical Center, Chicago, Illinois April 2001

## HONORS

- 2002 University of Illinois at Chicago: 2<sup>nd</sup> Place Sigma Xi Graduate Research Forum
- 2001 University of Illinois at Chicago Student Travel Award
- 2000 Who’s Who among America’s College and Universities
- 1999 Rush-Presbyterian-St. Luke’s Medical Center: Thomas Andriacchi Endowment Scholarship Recipient
- 1999 University of Iowa: College of Engineering Outstanding Graduating Senior Award
- 1995 to 1999 Clara Abbott Foundation Educational Scholarship, Abbott Laboratories

## TEACHING

- 2006 Soft Tissue Biomechanics (BioE 494), Department of Bioengineering, University of Illinois at Chicago, *Developed course for undergraduate and graduate bioengineering students*