

## **James Christopher Iatridis**

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### **I. GENERAL INFORMATION**

#### **A. Education**

##### **Columbia University, Graduate School of Arts and Sciences, New York, NY**

Ph.D. Mechanical Engineering/Biomechanics, 1996  
Thesis title: Biomechanics of the anulus fibrosus and nucleus pulposus of the human lumbar intervertebral disc and the effects of degeneration  
Thesis advisor: Van C. Mow

M.Phil. Mechanical Engineering/Biomechanics, 1992

##### **Columbia University, School of Engineering and Applied Science, New York, NY**

M.S. Mechanical Engineering/Biomechanics, 1991  
B.S. Mechanical Engineering, Honors with Distinction, 1990

##### **Franklin and Marshall College, Lancaster, PA**

B.A. Physics, Cum Laude, 1990

#### **B. Employment**

- 6/05-present **Associate Professor of Mechanical Engineering**, School of Engineering, College of Engineering and Mathematical Sciences, University of Vermont, Burlington, VT  
**Associate Director**, Vermont Experimental Program to Stimulate Competitive Research (EPSCoR)
- 8/99-present **Director**, Spine Bioengineering Laboratory  
**Secondary Appointment**, Dept. of Orthopaedics & Rehabilitation, UVM  
**Faculty Member**, Biomedical Engineering Program and Materials Science Program
- 7/06-8/07 **Adjunct Investigator (Special Volunteer)**, Cartilage Biology and Orthopaedics Branch, National Institute of Arthritis, Musculoskeletal & Skin Diseases, National Institutes of Health, Bethesda, MD
- 8/99 -5/05 **Assistant Professor**, Department of Mechanical Engineering, University of Vermont, Burlington, VT
- 6/01-12/01 **Visiting Professor**, AO-ASIF Research Institute, Davos, Switzerland
- 3/99-7/99 **Research Associate**, Department of Orthopaedics and Rehabilitation, University of Vermont
- 3/96 –3/99 **Postdoctoral Fellow**, Department of Orthopaedics and Rehabilitation, University of Vermont
- 6/90-12/95 **Graduate Research Assistant**, Orthopaedic Research Laboratory, Department of Mechanical Engineering, Columbia University, New York, NY
- 9/92-12/93 **Teacher**, Lycee Francais, New York, NY
- 9/90-5/91 **Teaching Assistant**, Department of Mechanical Engineering, Columbia University
- 9/89-5/90 **Undergraduate Research Assistant**, Department of Mechanical Engineering, Columbia University
- 6/89-8/89 **Undergraduate Research Assistant**, GTE Laboratories, Waltham, MA
- 6/88-8/88 **Undergraduate Research Assistant**, Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD

### **C. Honors/Awards**

- Winner (Co-author of presentation) New Investigator Award, Australasian Biomechanics Conference (ABC), Auckland, New Zealand, 2007
- Finalist (Senior author of presentation) New Investigator Recognition Award, Orthopaedic Research Society, San Diego, CA, 2007
- AO Research Fund Prize for highly commended research project, Influence of frequency and magnitude of dynamic compression on disc metabolism in vivo, 2006
- Hansjoerg Wyss Foundation Poster Presentation Award, *ECM VI/SRN I: Spinal Motion Segment: From Basic Science to Clinical Application*, Davos, CH, 2005
- Finalist (Senior author of presentation) New Investigator Recognition Award, Orthopaedic Research Society, Washington, DC, 2005
- Winner (Senior author of presentation) New Investigator Recognition Award, Orthopaedic Research Society, San Francisco, CA, 2004
- Macnab LaRocca Traveling Fellowship Award, International Society for the Study of the Lumbar Spine, Biosynthesis and nutrition of the intervertebral disc under cyclic loading conditions using in vivo animal models and tissue culture techniques, \$15,000, 2001
- Career Development Award (K01), National Institutes of Health, National Institute of Arthritis, Musculoskeletal & Skin Diseases, 1999-2004
- Winner (Co-author of presentation) New Investigator Recognition Award, Orthopaedic Research Society, Anaheim, CA, 1999
- Research Award, Department of Orthopaedics and Rehabilitation, University of Vermont, Burlington, VT, 1999
- Research Award, Department of Orthopaedics and Rehabilitation, University of Vermont, Burlington, VT, 1998
- Finalist – New Investigator Recognition Award, Orthopaedic Research Society, New Orleans, LA, 1998
- Finalist - Best Presentation Award, Biomechanics Research Day, Ecole Polytechnique, Montreal, Canada, 1997
- Finalist - Student Paper Competition, 13th Southern Biomedical Engineering Conference, University of the District of Columbia, Washington, DC, 1994
- Pi Tau Sigma, National Mechanical Engineering Society
- Tau Beta Pi, National Engineering Society
- Prentis Scholarship for the study of engineering, 1990
- Combined-Plan Scholar Award for the study of mechanical engineering and physics, 1990
- Kirschner Scholar Award for the study of physics, 1988
- Dean's List/Honor Roll every semester, 1985 – 1990

## II. PUBLICATIONS

### A. Refereed Journal Publications

1. Skaggs DL, Weidenbaum M, Iatridis JC, Ratcliffe A, Mow VC: Regional variation in tensile properties and biochemical composition of the human lumbar anulus fibrosus, *Spine* 19:1310-1319, 1994.
2. Acaroglu ER, Iatridis JC, Setton LA, Foster RJ, Mow VC: Degeneration and aging affect the tensile behavior of human lumbar anulus fibrosus, *Spine* 20:2690-2701, 1995.
3. Ebara S, Iatridis JC, Setton LA, Foster RJ, Weidenbaum M, Mow VC: Tensile properties of non-degenerate human lumbar anulus fibrosus, *Spine* 21:452-461, 1996.
4. Zhu WB, Iatridis JC, Ratcliffe A, Mow VC: Determinations of proteoglycan-collagen interactions in physiological concentrations, *J Biomechanics* 29:779-783, 1996.
5. Iatridis JC, Weidenbaum M, Setton LA, Mow VC: Is the nucleus pulposus a solid or fluid? Mechanical behaviors of the nucleus pulposus of the human intervertebral disc, *Spine* 21:1174-1184, 1996.
6. Iatridis JC, Setton LA, Weidenbaum M, Mow VC: Viscoelastic behaviors of the human lumbar nucleus pulposus in shear, *J Biomechanics* 30: 1005-1013, 1997.
7. Iatridis JC, Setton LA, Mow VC, Weidenbaum M: Alterations in the mechanical behavior of the human lumbar nucleus pulposus with degeneration and aging, *J Orthop Res* 15:318-322, 1997.
8. Stokes IA, Aronsson DD, Spence H, Iatridis JC: Mechanical modulation of intervertebral disc thickness in growing rat tails, *J Spinal Disorders* 11:261-265, 1998.
9. Iatridis JC, Setton LA, Rawlins BA, Foster RJ, Weidenbaum M, Mow VC: Degeneration and aging affect the anisotropic and nonlinear behaviors of human anulus fibrosus in compression, *J Biomechanics* 31:535-544, 1998.
10. Iatridis JC, Mente PL, Stokes IAF, Aronsson DD, Alini M: Compression induced changes to intervertebral discs properties in a rat tail model, *Spine*, 24:996-1002, 1999.
11. Mente PL, Stokes IAF, Aronsson DD, Iatridis JC: Manipulation of vertebral wedge deformity by mechanical modulation of growth, *J Orthop Res*, 17:518-524, 1999.
12. Iatridis JC, Kumar S, Foster RJ, Mow VC: Shear mechanical properties of human lumbar anulus fibrosus, *J Orthop Res*, 17:732-737, 1999.
13. Gu WY, Mao XG, Rawlins BA, Iatridis JC, Foster RJ, Sun DN, Weidenbaum M, Mow VC: Streaming potential of human lumbar anulus fibrosus is anisotropic and affected by disc degeneration, *J Biomechanics*, 32: 1177-1182, 1999.
14. Stokes IAF, Mente PL, Iatridis JC, Farnum CE, Aronsson DD: Growth plate chondrocyte enlargement modulated by sustained mechanical loading. *Journal of Bone and Joint Surgery*, 84A(10):1842-1848, 2002.
15. Stokes IA, Mente PL, Iatridis JC, Farnum CE, Aronsson DD: Growth plate chondrocyte enlargement modulated by mechanical loading, *Stud Health Technol Inform.* 88:378-81, 2002.
16. Iatridis JC, Laible JP, Krag MH: Influence of fixed charge density magnitude and distribution on the intervertebral disc: Applications of a poroelastic and chemical electric model, *ASME J Biomechanical Engineering*, 125:12-24, 2003.
17. MacLean JJ, Lee CR, Grad S, Ito K, Alini M, Iatridis JC: Effects of immobilization and dynamic compression on intervertebral disc cell gene expression in vivo, *Spine*, 28(10):973-981, 2003.
18. Iatridis JC, Wu J, Yandow JA, Langevin HM: Subcutaneous tissue mechanical behavior is linear and

viscoelastic under uniaxial tension, *Conn Tissue Res*, 44(5): 208 – 217, 2003.

19. Iatridis JC, ap Gwynn I: Mechanisms for mechanical damage in the intervertebral disc annulus fibrosus, *J Biomechanics*, 37(8):1165-1175, 2004.
20. MacLean JJ, Lee CR, Alini M, Iatridis JC: Anabolic and catabolic mRNA levels of the intervertebral disc vary with the magnitude and frequency of in vivo dynamic compression, *J Orthop Res*, 22(6): 1193-1200, 2004.
21. Stokes IAF, Iatridis JC: Mechanical conditions that accelerate intervertebral disc degeneration: overload versus immobilization, *Spine*, 29(23):2724-32, 2004.
22. An HS, Anderson PA, Haughton VM, Iatridis JC, Kang JD, Lotz JC, Natarajan RN, Oegema TR Jr, Roughley P, Setton LA, Urban JP, Videman T, Andersson GB, Weinstein JN: Introduction: disc degeneration: summary, *Spine*, 29(23):2677-8, 2004.
23. Iatridis JC, MacLean JJ, Ryan DA: Mechanical damage to the intervertebral disc annulus fibrosus subjected to tensile loading, *J Biomechanics*, 38(3): 557-565, 2005.
24. Langevin HM, Bouffard NA, Badger GJ, Iatridis JC, Howe AK: Dynamic fibroblast cytoskeletal response to subcutaneous tissue stretch ex vivo and in vivo. *Am J Physiol Cell Physiol*, 288(3):C747-756, 2005.
25. Lee CR, Grad S, MacLean JJ, Iatridis JC, Alini M: Effect of mechanical loading on mRNA levels of common endogenous controls in articular chondrocytes and intervertebral disk. *Anal Biochem*, 341(2):372-375, 2005. PMID: 15907885.
26. Périé D, Korda D, Iatridis JC: Confined compression experiments on bovine annulus fibrosus and nucleus pulposus: Sensitivity of the experiment in the determination of compressive modulus and hydraulic permeability, *J Biomechanics*, 2005 Nov;38(11):2164-71. Epub 2004 Dec 13. PMID: 16154403.
27. MacLean JJ, Lee CR, Alini M, Iatridis JC: The effects of short-term load duration on anabolic and catabolic gene expression in the intervertebral disc, *J Orthop Res*, 2005 Sep;23(5):1120-7. Epub 2005 Apr 9. PMID: 16140193.
28. Lee CR, Iatridis JC, Poveda L, Alini M: In vitro organ culture of the bovine intervertebral disc: effects of vertebral endplate and potential for mechanobiology studies. *Spine*, 2006 Mar 1;31(5):515-22. PMID: 16508544.
29. Périé D, Iatridis JC, Demers CN, Goswami T, Beaudoin G, Mwale F, Antoniou J: Assessment of compressive modulus, hydraulic permeability and matrix content of trypsin-treated nucleus pulposus using quantitative MRI, *J Biomechanics*, 2006;39(8):1392-400. Epub 2005 Jun 20. PMID: 15970200.
30. Iatridis JC, MacLean JJ, Roughley PJ, Alini M: Effects of mechanical loading on intervertebral disc metabolism in vivo, *J Bone Joint Surg Am*, 2006 Apr;88 Suppl 2:41-6. PMID: 16595442.
31. MacLean JJ, Owen JP, Iatridis JC: Role of endplates in contributing to compression behaviors of motion segments and intervertebral discs, *J Biomechanics*, 2007; 40(1):55-63. Epub 2006 Jan 19. PMID: 16427060.
32. Périé D, MacLean JJ, Owen JP, Iatridis JC: Correlating material properties with tissue composition in enzymatically digested bovine annulus fibrosus and nucleus pulposus tissue, *Ann Biomed Eng*, 2006 May;34(5):769-77. Epub 2006 Apr 6. PMID: 16598654.
33. Michalek AJ, Iatridis JC: A numerical study to determine pericellular matrix modulus and evaluate its effects on the micromechanical environment of chondrocytes, *J Biomechanics*, 2007;40(6):1405-9. Epub 2006 Jul 25. PMID: 16867304.
34. Stinnett-Donnelly JM, MacLean JJ, Iatridis JC: A Removable precision device for in vivo mechanical compression of rat tail intervertebral discs, *ASME Journal of Medical Devices*, 2007 March; 1(1): 56-61.
35. Costi JJ, Stokes IA, Gardner-Morse M, Laible JP, Scoffone HM, Iatridis JC: Direct measurement of intervertebral disc maximum shear strain in six degrees of freedom: Motions that place disc tissue at risk of

injury. *J Biomechanics*, 2007;40(11):2457-66. Epub 2007 Jan 2. PMID: 17198708

36. Iatridis JC, MacLean JJ, O'Brien M, Stokes IAF: Measurements of proteoglycan and water content distribution in human lumbar intervertebral discs, *Spine*, 2007 Jun 15;32(14):1493-7. PMID: 17572617.
37. Korecki C, MacLean JJ, Iatridis JC: Characterization of an in vitro intervertebral disc organ culture system, *Eur Spine J*, 2007 Jul;16(7):1029-37. Epub 2007 Feb 14. PMID: 17629763.
38. Masuoka K, Michalek AJ, MacLean JJ, Stokes IA, Iatridis JC: Different effects of static versus cyclic compressive loading on rat intervertebral disc height and water loss in vitro, *Spine*, 2007 Aug 15;32(18):1974-9. PMID: 17700443
39. Mwale F, Demers CN, Michalek AJ, Beaudoin G, Goswami T, Beckman L, Iatridis JC, Antoniou J: Evaluation of quantitative magnetic resonance imaging, biochemical and mechanical properties of trypsin-treated intervertebral discs under physiological compression loading, *J Magn Reson Imaging*, 2008 Mar;27(3):563-73. PMID: 18219615
40. Maclean JJ, Roughley PJ, Monsey RD, Alini M, Iatridis JC: In vivo intervertebral disc remodeling: Kinetics of mRNA expression in response to a single loading event, *J Orthop Res*, 2008 Jan 4; [Epub ahead of print] PMID: 18176944
41. Korecki CL, Costi JJ, Iatridis JC: Needle puncture injury affects intervertebral disc mechanics and biology in an organ culture model, *Spine*, 2008 Feb 1;33(3):235-41. PMID: 18303454
42. Rogers R, Norian J, Malik M, Christman G, Abu-Asab M, Chen F, Korecki C, Iatridis J, Catherino WH, Tuan RS, Dhillon N, Leppert P, Segars JH: Mechanical homeostasis is altered in uterine leiomyoma, *Am J Obstet Gynecol*, 2008 Apr;198(4):474.e1-11. PMID: 18395046
43. Korecki CL, MacLean JJ, Iatridis JC: Dynamic compression effects on intervertebral disc mechanics and biology, *Spine*, 2008 Jun 1;33(13):1403-9. PMID: 18520935
44. Wuertz K, Godburn K, Neidlinger-Wilke C, Urban JPG, Iatridis JC: Behavior of mesenchymal stem cells in the chemical microenvironment of the intervertebral disc, *Spine*, In Press, 2008, MS#071203.
45. Costi JJ, Stokes IA, Gardner-Morse MG, Iatridis JC: Frequency-dependent behavior of the intervertebral disc in response to each of six degree of freedom dynamic loading: solid phase and fluid phase contributions. *Spine*. 2008 Jul 15;33(16):1731-8. PMID: 18628705
46. Korecki CL, Kuo CK, Tuan RS, Iatridis JC: Intervertebral disc cell response to dynamic compression is age and frequency dependent, *J Orthop Res*, In Press, 2008, Submitted 3/19/2008
47. Iatridis JC, Furukawa M, Stokes IAF, Gardner-Morse MG, Laible JP: Spatially resolved streaming potentials of human intervertebral disc motion segments under dynamic axial compression, *ASME J Biomechanical Engineering*, In Press, 2008, BIO-07-1335, Resubmitted 6/24/2008.
48. Mwale F, Iatridis JC, Antoniou J: Quantitative MRI as a diagnostic tool of intervertebral disc matrix composition and integrity, *Eur Spine J*, In Review, 2008, Submitted 5/2008.
49. Wuertz K, Godburn K, MacLean JJ, Barbir A, Stinnett-Donnelly J, Roughley PJ, Alini M, Iatridis JC: In vivo remodelling of intervertebral discs in response to short and long term dynamic compression, *J Orthop Res*, In Review, 2008, MS# JOR-08-0379, Submitted 7/17/ 2008.
50. Wuertz K, Godburn K, Iatridis JC: PH Dose Response of Mesenchymal Stem Cells: Investigation of a Critical Factor for Intervertebral Disc Repair, *Spine*, In Review, 2008, MS#07IP03.

## **B. Book Chapters**

1. Weidenbaum M, Iatridis JC, Setton LA, Foster RJ, Mow VC: Mechanical behaviors of the intervertebral disc and the effects of degeneration, In *Low Back Pain: A Scientific and Clinical Overview*, Eds JN Weinstein, SL

Gordon, American Academy of Orthopaedic Surgeons, Rosemont: IL, pp. 557-582, 1997.

2. Stokes IAF, Iatridis JC: Biomechanics of the spine, In *Basic Orthopaedic Biomechanics and Mechano-biology, 3<sup>rd</sup> Edition*, Eds. VC Mow, R Huiskes, New York, Lippincott, Williams, & Wilkins, ISBN: 0-7817-3933-0, 2004.

### **C. Conference Proceedings and Abstracts**

***All conference proceedings and abstracts are peer-reviewed at national or international meetings except for 1 peer-reviewed regional conference, 1 local non-refereed abstract, and 1 national non-refereed abstract which are noted parenthetically in italics in the list below***

1. Sutter P, Iatridis JC, Thakor, N: Response to reflected-force feedback to fingers in teleoperations, *Transactions of the NASA Conference on Space Telerobotics*, WP2:2, 1989.
2. Zhu WB, Iatridis JC, Hlibczuk V, Ratcliffe A, Mow VC: Proteoglycan-collagen interactions in vitro, *Transactions of the Orthopaedic Research Society*, 17:129, 1992.
3. Zhu WB, Iatridis JC, Hardingham TE, Muir H: Effect of hyaluronan size on shear flow properties of proteoglycan aggregate solutions, *Transactions of the Orthopaedic Research Society*, 17:30, 1992.
4. Skaggs DL, Iatridis JC, Gibbons JM, Richardson LC, Foster RJ, Weidenbaum M: Regional variations in the tensile properties and biochemical composition of single lamellae of human anulus fibrosus, *Transactions of the Orthopaedic Research Society*, 18:420, 1993.
5. Weidenbaum MW, Iatridis JC, Wu WH, Mow VC: Regional variation in tensile properties of human anulus fibrosus, *Transactions of the International Society for the Study of the Lumbar Spine*, p. 53, 1993.
6. Iatridis JC, Zhu WB, Re P, Ratcliffe A, Mow VC: A statistical network model to evaluate molecular interactions from viscometric shear flow behaviors of proteoglycan-collagen mixtures, *Bioengineering Conference*, BED - Vol. 24, pp. 84-87, 1993.
7. Setton LA, Iatridis JC, Ehrlich RV, Foster RJ, Weidenbaum M, Mow VC: A triphasic theory of swelling strains in human anulus fibrosus, *Bioengineering Conference*, BED - Vol. 24, pp. 650-653, 1993.
8. Weidenbaum M, Iatridis JC, Wu WH, Setton LA, Mow VC: The tensile and compressive material properties of human anulus fibrosus, *Scoliosis Research Society Final Program*, pp. 202-203, 1993.
9. Iatridis JC, Ebara S, Wu WH, Foster RJ, Weidenbaum M, Setton LA, Mow VC: Anisotropy and inhomogeneity in the human anulus fibrosus, *Transactions of the Orthopaedic Research Society*, 19:734, fs1994.
10. Iatridis JC, Setton LA, Blood DC, Weidenbaum M, Mow VC: The viscoelastic shear behavior of the nucleus pulposus, *Proc 13th Southern Biomedical Engineering Conference*, pp. 39-42, 1994 (*Regional conference*).
11. Acaroglu ER, Iatridis JC, Ebara S, Foster RJ, Weidenbaum M, Mow VC, Setton LA: Effects of degeneration on the tensile properties of human anulus fibrosus, *The Lumbar Spine: A Basic Science Approach, First International Symposium*, sponsored by the International Society for the Study of the Lumbar Spine, p. 16, 1994.
12. Iatridis JC, Setton LA, Weidenbaum M, Mow VC: Determination of a relaxation spectrum to evaluate the viscoelastic behavior of the nucleus pulposus in shear, *Advances in Bioengineering*, BED - Vol. 28, pp. 317-318, 1994.
13. Iatridis JC, Setton LA, Blood DC, Weidenbaum M, Mow VC: Mechanical behavior of the human nucleus pulposus in shear, *Transactions of the Orthopaedic Research Society*, 20:675, 1995.
14. Iatridis JC, Setton LA, Mow VC, Foster RJ, Rawlins BA, Weidenbaum M: Investigation of the anisotropic biphasic behavior of the anulus fibrosus in compression, *Transactions of the Orthopaedic Research Society*, 20:70, 1995.
15. Iatridis JC, Setton LA, Foster RJ, Rawlins BA, Weidenbaum M, Mow VC: Human anulus fibrosus behaves nonlinearly and isotropically in finite deformation confined compression, *Bioengineering Conference*, BED - Vol. 29, pp. 251-252, 1995.
16. Iatridis JC, Setton LA, Mow VC, Weidenbaum M: Is the nucleus a solid or fluid? Mechanical behaviors of the human nucleus pulposus, *Scoliosis Research Society Final Program*, pp. 122-123, 1995.
17. Iatridis JC, Setton LA, Weidenbaum M, Mow VC: Effects of degeneration and aging on the material behavior of the nucleus pulposus, *Transactions of the Biomedical Engineering Society, Annals of Biomedical Engineering*, 23:S104, 1995.
18. Iatridis JC, Setton LA, Weidenbaum M, Mow VC: The mechanical behavior of the human nucleus pulposus in shear is altered by degeneration and aging, *Transactions of the Orthopaedic Research Society*, 21:139, 1996.
19. Gu W, Rabin J, Iatridis JC, Rawlins BA, Mow VC: Streaming potential of human lumbar anulus fibrosus, *Transactions of the Orthopaedic Research Society*, 21:192, 1996.

20. Iatridis JC, Kumar S, Krishnan L, Rawlins BA, Weidenbaum M, Mow VC: Shear mechanical behavior of human lumbar annulus fibrosus and the effects of degeneration, *Advances in Bioengineering*, BED - Vol. 29, pp. 149-150, 1996.
21. Iatridis JC, Rawlins BA, Handler SR, Krishnan L, Foster RJ, Weidenbaum M, Mow VC: Compressive material properties of human lumbar annulus fibrosus are altered with degeneration and aging, *Transactions of the Orthopaedic Research Society*, 22:124, 1997.
22. Mente PL, Aronsson DD, Stokes IA, Spence H, Iatridis JC: Reversal of an induced vertebral wedge deformity, *Scoliosis Research Society Final Program*, p. 43, 1997.
23. Mente PL, Aronsson DD, Stokes IA, Spence H, Iatridis JC: Correction of scoliosis in a rat tail model, *Transactions of the American Association of Pediatrics, Orthopaedic Section, Pediatrics*, 100 Suppl:485, 1997.
24. Iatridis JC, Rawlins BA, Handler SR, Krishnan L, Foster RJ, Weidenbaum M, Mow VC: Shift From Fluid to Matrix loading with Disc Degeneration, *Transactions of the SIROT 1997 Haifa Inter-Meeting*, 1997.
25. Iatridis JC, Rawlins BA, Handler SR, Krishnan L, Foster RJ, Weidenbaum M, Mow VC: Shift From Fluid to Matrix loading with Disc Degeneration, *Orthop Trans*, 21:1298,1998.
26. Iatridis JC, Mente PL, Stokes IAF, Aronsson DD, Alini M: Compression induced intervertebral disc degeneration in a rat tail model, *Transactions of the Orthopaedic Research Society*, 23:311, 1998. **(Finalist, New Investigator Recognition Award)**.
27. Mente PL, Aronsson DD, Stokes IAF, Spence H, Iatridis JC: Correction of vertebral wedging in a rat tail model of scoliosis, *Transactions of the Orthopaedic Research Society*, 23:643, 1998.
28. Iatridis JC, Mente PL, Stokes IAF, Aronsson DD, Alini M: Mechanically induced changes to intervertebral discs in a rat tail model, *Transactions of the International Society for the Study of the Lumbar Spine*, p. 50, 1998.
29. Mente PL, Aronsson DD, Stokes IAF, Iatridis JC: Manipulation of vertebral deformities by mechanical modulation of growth, *Scoliosis Research Society Final Program*, p. 85, 1998.
30. Mente PL, Aronsson DD, Stokes IAF, Iatridis JC: Manipulation of vertebral wedge deformity by mechanical modulation of growth, *Transactions of the Orthopaedic Research Society*, 24:312, 1999 **(Winner, New Investigator Recognition Award)**.
31. Aronsson DD, Mente PL, Stokes IAF, Spence H, Iatridis JC: Correction of vertebral deformity by mechanical modulation of growth, *Transactions of the American Orthopaedic Association*, 1999.
32. Stokes IA, Mente PL, Iatridis JC, Farnum CE, Aronsson DD: Growth plate chondrocyte enlargement modulated by mechanical loading *Transactions of the Orthopaedic Research Society*, 25:990, 2000.
33. Stokes IA, Mente PL, Iatridis JC, Farnum CE, Aronsson DD: Vertebral growth plate hypertrophic chondrocyte enlargement modulated by mechanical loading *Transactions of the IRSSD*, 2000.
34. Iatridis JC, Krag MH, Laible JP: Influence of fixed charge density on intervertebral disc load carriage mechanisms *Transactions of the Orthopaedic Research Society*, 26:877, 2001.
35. Stokes IA, Mente PL, Iatridis JC, Farnum CE, Aronsson DD: Vertebral growth plate chondrocyte enlargement modulated by mechanical loading *Transactions of the American Academy of Pediatrics*, 2001.
36. Iatridis JC, Laible JP, Krag MH: Intervertebral Disc Proteoglycan Content Affects Water Content and Streaming Potential *Transactions of the International Society for the Study of the Lumbar Spine*, p.65, 2001.
37. Iatridis JC, Laible JP, Krag MH: Poroelastic and chemical electric model of the healthy and degenerated intervertebral disc *Transactions of the Biomechanics IV conference, Davos, Switzerland*, *J Biomechanics* 34(S1):S11-12, 2001.
38. MacLean JJ, Lee CR, Grad S, Ito K, Alini M, Iatridis JC: Effects of cyclic compression on intervertebral disc metabolism. *Transactions of the International Society for the Study of the Lumbar Spine*, p. 72, 2002.
39. Lee CR, MacLean JJ, Grad S, Ito K, Alini M, Iatridis JC: Effects of mechanical compression on anabolic and catabolic gene expression in a rat tail model. *Transactions of the World Congress in Biomechanics*, p. 842, 2002.
40. MacLean JJ, Lee CR, Grad S, Ito K, Alini M, Iatridis JC: Effects of mechanical compression on anabolic and catabolic gene expression in a rat tail model. University of Vermont EPSCoR Annual Meeting (*University of Vermont internal publication, non-refereed*), 2002.
41. Iatridis JC, Burstein D, Munasinghe J: MRI assessment of intervertebral disc composition and structure. *Transactions of the Orthopaedic Research Society*, 28:1148, 2003.
42. MacLean JJ, Lee CR, Grad S, Ito K, Alini M, Iatridis JC: Loading history and configuration affect intervertebral disc cell gene response to cyclic compression. *Transactions of the Orthopaedic Research Society*, 28:1146, 2003.
43. Langevin HM, Wu J, Yandow JA, Iatridis JC: Viscoelastic behavior of interstitial connective tissue in tension. *FASEB J*, 17(4): A353 Part 1 Suppl, 2003.
44. MacLean JJ, Lee CR, Alini M, Iatridis JC: The Effect of Frequency on the Metabolic Response of the Disc to

- Dynamic Compression Applied In-Vivo, *Transactions of the International Society for the Study of the Lumbar Spine*, p. 220, 2003.
45. Iatridis JC, MacLean JJ, Ryan D: Mechanical damage to the intervertebral disc annulus fibrosus. *Transactions of the International Society for the Study of the Lumbar Spine*, p. 22, 2003.
  46. Iatridis JC, Risinger R, Monsey R, Goswami T, Alini M: Effects of static compression on biochemical composition of caudal discs in vivo. *Transactions of the International Society for the Study of the Lumbar Spine*, p. 101, 2003.
  47. Iatridis JC, Burstein D, Munasinghe J: MRI assessment of intervertebral disc composition and structure. *Transactions of the International Society for the Study of the Lumbar Spine*, p. 206, 2003.
  48. Ryan DA, MacLean JJ, Iatridis JC: Mechanical damage to the intervertebral disc annulus fibrosus subjected to cyclic tensile loading. *Advances in Bioengineering, ASME IMECE2003-43302*, 2003.
  49. Périé DS, Owen JP, Iatridis JC: Effect of enzymatic digestion on compressive properties of intervertebral disc, *Transactions of the Orthopaedic Research Society*, 29:347, 2004. **(Winner, New Investigator Recognition Award)**.
  50. Lee CR, Poveda L, Iatridis JC, Alini M: Potential and limitations of an in vitro intervertebral disc organ culture system: Application for mechanobiology, *Transactions of the Orthopaedic Research Society*, 29:838, 2004.
  51. MacLean JJ, Lee CR, Alini M, Iatridis JC: Intervertebral disc anabolic and catabolic mRNA levels are expressed differently in response to high and low magnitudes and frequencies of compression in vivo, *Transactions of the Orthopaedic Research Society*, 29:132, 2004.
  52. Périé DS, Korda D, Iatridis JC: Influence of swelling conditions on biomechanical properties of intervertebral nucleus pulposus in confined compression, *Transactions of the European Society of Biomechanics*, 2004.
  53. Périé DS, Iatridis JC, Beaudoin G, Goswami T, Iordanova M, Mwale F, Antoniou J: Assessment of biomechanical properties of intervertebral nucleus pulposus using quantitative MRI, *Transactions of the European Society of Biomechanics*, 2004.
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  96. Korecki CL, Costi JJ, Iatridis JC: Needle puncture affects intervertebral disc mechanics and biology in an organ culture model, *Transactions of the International Society for the Study of the Lumbar Spine*, Poster 92, 2007.
  97. Korecki CL, Costi JJ, Iatridis JC: Needle puncture affects intervertebral disc mechanics and biology in an organ culture model, Proceedings of the 21st Annual Meeting of the International Society of Biomechanics (ISB), Taipei, Taiwan, 2007.
  98. Costi JJ, Stokes IA, Gardner-Morse M, Lubinski J, Iatridis JC: Frequency dependent poroelastic and viscoelastic contributions of the intervertebral disc in response to six degree of freedom cyclic loading, *Proceedings of the 21st Annual Meeting of the International Society of Biomechanics (ISB)*, Taipei, Taiwan, 2007.
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  100. Costi JJ, Stokes IA, Gardner-Morse M, Lubinski J, Iatridis JC. Disc mechanical response to cyclic loading – poroelastic and viscoelastic contributions, *Proceedings of the 18th Annual Scientific Meeting of the Spine Society of Australia*, Hobart, Australia, 2007. **(Recipient of the Best Poster Award)**.
  101. Korecki CL, Costi JJ, Iatridis JC: Needle puncture affects intervertebral disc mechanics and biology in an organ culture model, *Transactions of the Spine Society of Australia*, 2007.
  102. Korecki CL, Kuo CK, Tuan RS, Iatridis JC: Effect of Age and Frequency on Intervertebral Disc Cell Response to Dynamic Compression, Proceedings of the 2007 Summer Bioengineering Conference, Keystone, CO, SBC2007-176595, 2007.
  103. Korecki CL, MacLean JJ, Iatridis JC: Development of a System for Application of Dynamic Mechanical Compression on Intervertebral Discs in Organ Culture and Investigation of Load Magnitude Effects, Proceedings of the 2007 Summer Bioengineering Conference, Keystone, CO, SBC2007-176569, 2007.
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  105. Antoniou J, Demers CN, Michalek AJ, Goswami T, Beaudoin G, Beckman L, Iatridis JC, Mwale F: Effect of cyclic loading on the MR properties, compressive properties and biochemical content of collagenase treated nucleus pulposus, *Transactions of the Combined Orthopaedic Research Society Meeting*, Abstract: 0193, 2007.
  106. Korecki CL, Tuan RS, Iatridis JC: Notochord cell conditioned medium stimulates mesenchymal stem cell differentiation toward a young nucleus pulposus phenotype, *Transactions of the World Forum for Spine*

*Research – The Intervertebral Disc: First Japanese Meeting January 23–26, 2008.*

107. Wuertz K, Godburn K, Iatridis JC: PH dose response of mesenchymal stem cells: Investigation of a critical factor for intervertebral disc repair, *Transactions of the Orthopaedic Research Society*, Paper #1, 2008.
108. Wuertz K, Godburn K, Barbir A, Roughley P, Alini M, Iatridis JC: In Vivo remodeling of intervertebral discs in response to long term dynamic compression, *Transactions of the Orthopaedic Research Society*, Paper #47, 2008.
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110. Korecki CL, Tuan RS, Iatridis JC: Notochord cell conditioned medium stimulates mesenchymal stem cell differentiation toward a young nucleus pulposus phenotype, *Transactions of the Orthopaedic Research Society*, Poster #1404, 2008.
111. Korecki CL, Kuo CK, Tuan RS, Iatridis JC: Intervertebral disc cell response to dynamic compression is age and frequency dependent, *Transactions of the Orthopaedic Research Society*, Poster #1424, 2008.
112. Barbir A, Michalek AJ, Iatridis JC: Collagen structure and composition affect torsional stiffness of intervertebral discs, *Transactions of the Orthopaedic Research Society*, Poster #1440, 2008.
113. Barbir A, Michalek AJ; Abbott RD; Iatridis JC: Effects of enzymatic digestion on compressive properties of rat intervertebral discs, *Transactions of the Orthopaedic Research Society*, Poster #1441, 2008.
114. Michalek AJ, Barbir A, Iatridis JC: Energy dissipation modes in rat intervertebral discs under dynamic compressive loading, *Transactions of the Orthopaedic Research Society*, Poster #1442, 2008.
115. Mwale F, Demers CN, Michalek AJ, Iatridis JC, Goswami T, Beaudoin G, Beckman L, Alini M, Antoniou J: Effect of cyclic loading and trypsin treatment on the MR properties of the annulus fibrosus in relation to its compressive properties and biochemical content, *Transactions of the Orthopaedic Research Society*, Poster #1446, 2008.
116. Wuertz K, Godburn K, Barbir A, Roughley P, Alini M, Iatridis JC: In Vivo remodeling of intervertebral discs in response to long term dynamic compression, *Transactions of the International Society for the Study of the Lumbar Spine*, Podium Paper AB111, 2008.
117. Korecki CL, Tuan RS, Iatridis JC: Notochord cell conditioned medium stimulates mesenchymal stem cell differentiation toward a young nucleus pulposus phenotype, *Transactions of the International Society for the Study of the Lumbar Spine*, Special Poster 53, 2008.
118. Wuertz K, Godburn K, Iatridis JC: PH dose response of mesenchymal stem cells: Investigation of a critical factor for intervertebral disc repair, *Transactions of the International Society for the Study of the Lumbar Spine*, Special Poster 55, 2008.
119. Wuertz K, Godburn K, Iatridis JC: Simulating changes in pH during intervertebral disc degeneration: Investigation of a critical factor in stem cell based therapies, *Transactions of the European Society for Artificial Organs*, Special Poster, September 2008.
120. Korecki CL, Godburn KE, Walter BA, Iatridis JC: Asymmetric loading promotes early signs of intervertebral disc degeneration in large animal organ culture, *Transactions of the Orthopaedic Research Society*, In Review, 2009.
121. Barbir A, Godburn KE, Michalek AJ, Lai A, Monsey RD, Iatridis JC: In vivo response of intervertebral discs to static and dynamic torsion, *Transactions of the Orthopaedic Research Society*, In Review, 2009.
122. Michalek AJ, Funabashi KL, Iatridis JC: The interactive effects of needle puncture injury and compressive overload on the biomechanics of rat intervertebral discs, *Transactions of the Orthopaedic Research Society*, In Review, 2009.
123. Michalek AJ, Buckley MR, Cohen I, Bonassar LJ, Iatridis JC: Elastic fibers govern local strains in anulus fibrosus under dynamic transverse shear, *Transactions of the Orthopaedic Research Society*, In Review, 2009.
124. Gardner-Morse MG, Costi JJ, Iatridis JC, Stokes IA, Stanley RM: Intervertebral disc swelling forces increase with decreasing osmolarity, *Transactions of the Orthopaedic Research Society*, In Review, 2009.

#### **D. Invited Lectures (In Addition to Conference Presentations)**

##### ***National & International Presentations***

1. The mechanical properties of the intervertebral disc and the effects of degeneration. University of Pittsburgh Medical Center, Musculoskeletal Institute Departmental Research Seminar, Pittsburgh, PA, June, 1995
2. The mechanical properties of the human lumbar intervertebral disc. University of California at San Diego, Orthopaedic Research Seminar Series, La Jolla, CA, January, 1996
3. The mechanical properties of the human intervertebral disc. University of Texas Health Science Center at San Antonio and the Southwest Research Institute, William Hall Seminar Series, San Antonio, TX, February, 1996
4. Anisotropic and nonlinear material behavior of the anulus fibrosus of the intervertebral disc. Duke University,

- Departments of Biomedical Engineering and Surgery Research Seminar, Durham, NC, February, 1996
5. The mechanical behavior of the intervertebral disc and the effects of degeneration. Failure Analysis Associates, Research seminar, Menlo Park, CA, February, 1997
  6. Mechanical factors in intervertebral disc degeneration. Organogenesis, Inc., Canton, MA, November, 1997
  7. Mechanical factors in intervertebral disc degeneration. Stanford University, Biomechanical Engineering Division Winter Seminar Series, Stanford, CA, February, 1998
  8. Mechanical factors in intervertebral disc degeneration. Duke University, Departments of Biomedical Engineering and Surgery Research Seminar, Durham, NC, May, 1998
  9. Intervertebral Disc Mechano-biology. International Society for the Study of the Lumbar Spine Pre-Meeting, Brussels, Belgium, June, 1998
  10. Mechanical behaviors of the intervertebral disc. Institute for Medicine and Engineering Lecture, University of Pennsylvania, Philadelphia, PA, June, 1998
  11. The role of mechanical factors in degenerative disc disease. Grand Rounds Lecture, Department of Orthopaedic Surgery, University of Pennsylvania, Philadelphia, PA, June, 1998
  12. The role of mechanical factors in degenerative disc disease. Department of Biomedical Engineering Seminar, University of Iowa, Iowa City, IA, April, 1999
  13. Intervertebral disc mechanobiology, Physiology Laboratories, Oxford University, November 2001
  14. Biosynthesis and nutrition of the intervertebral disc under cyclic loading conditions: ISSLS 2001 MacNab-Larocca Research Fellowship Report. 29<sup>th</sup> Annual Meeting of the International Society for the Study of the Lumbar Spine, Cleveland, OH, May 17, 2002
  15. Mechanical and Biological Response of the Intervertebral Disc to Mechanical Loading. Mechanical Engineering Seminar, Worcester Polytechnic Institute, Worcester, MA, October 31, 2003
  16. Damage accumulation in the intervertebral disc, Department of Mechanical and Aeronautical Engineering, Clarkson University, January 19, 2004
  17. Macromechanical factors in intervertebral disc degeneration, Focus Meeting on Intervertebral Disc Degeneration, Rush-Presbyterian Hospital, Chicago, IL, April 2, 2004
  18. Spatially resolved streaming potentials of intervertebral disc motion segments under dynamic axial compression, Center for Biomedical Engineering Seminar Series, Massachusetts Institute of Technology, Cambridge, MA, January 10, 2005.
  19. Effects of mechanical loading on disc metabolism, ECM VI/SRN I: Spinal Motion Segment: From Basic Science to Clinical Application, Davos, CH, 2005.
  20. Mechanical effects on disc metabolism, American Academy of Orthopaedic Surgeons, 2005 Research Symposium – Intervertebral Discs Degeneration Workshop, Chicago, IL, September 16, 2005.
  21. The role of mechanical damage and remodeling in intervertebral disc degeneration, Bioengineering Seminar Series, Fischell Department of Bioengineering, University of Maryland, College Park, MD, September 13, 2006.
  22. Intervertebral disc mechanobiology and the kinetics of gene expression, AO Biotechnology Symposium: Biomaterials, Cell-, Tissue and Gene based Therapies: From Basic Research to Clinical Applications, Lausanne Switzerland, October 19 - 21, 2006
  23. Role of mechanical damage and remodeling in intervertebral disc degeneration, Bioengineering Seminar Series, Department of Bioengineering, University of Pennsylvania, Philadelphia, PA, November 9, 2006.
  24. Preventing and treating disc degeneration: how can bioengineering help?, Bioengineering and Biotechnology Conference, University of Massachusetts – Dartmouth, February 9-10, 2007.
  25. The Roles of mechanical damage and remodeling in intervertebral disc degeneration and regeneration, National Institute of Standards and Technology, Gaithersburg, MD, March 13, 2007.
  26. Role of mechanical loading in damage and repair of the intervertebral disc, Department of Mechanical Engineering Seminar Series, University of Delaware, Newark, DE, March 16, 2007.
  27. Role of damage and remodeling in intervertebral disc degeneration and regeneration. Georgia Institute of Technology, April 26, 2007.
  28. Biomechanical factors in intervertebral disc degeneration and repair, Federal Working Group on Bone Diseases (FWGBD), National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), NIH, Bethesda, MD, July 31, 2007.
  29. Keynote Speaker: Intervertebral disc degeneration and repair: Opportunities and challenges, Spine Research Symposium, organized by the Philadelphia Spine Research Society, October 9th, 2007 (<http://www.materials.drexel.edu/spine/>).
  30. Organizing committee and invited faculty: Mechanical factors in the etiology of intervertebral disc degeneration, World Forum for Spine Research – The Intervertebral Disc, First Japanese Meeting, January 23–26, 2008 ([www.spineresearchforum.org](http://www.spineresearchforum.org)).

### ***Regional Presentations***

31. Effects of axial loading on rat tail intervertebral discs. Biomechanics Research Day: University of Vermont - Queen's University - Ecole Polytechnique, Ecole Polytechnique de Montreal, Montreal, Canada, May, 1997
32. Mechanisms for load induced intervertebral disc degeneration. Orthopaedic Research Laboratory, McGill University, Montreal, Canada, May 18, 2001

### ***Local Presentations; presentations within my affiliated departments (Mechanical Engineering, Orthopaedics & Rehabilitation) are not included***

33. The material properties of the human intervertebral disc. University of Vermont, Department of Orthopaedics and Rehabilitation Research Seminar, Burlington, VT, May, 1995 (talk prior to my appointment)
34. The role of mechanical factors in degenerative disc disease. Department of Mechanical Engineering Seminar, University of Vermont, Burlington, VT, May, 1999 (talk prior to my appointment)
35. Mechanically induced disc degeneration. Department of Physical Therapy Seminar, University of Vermont, Burlington, VT, October, 1999
36. Viscoelastic models of soft tissue mechanics, Vermont Lung Center, University of Vermont, February 26, 2002
37. Effects of mechanical compression on anabolic and catabolic gene expression in a rat tail model. University of Vermont EPSCoR Annual Meeting (UVM Internal publication), April 2002 (Poster)
38. Mechanobiology of intervertebral disc degeneration. UVM Biomedical Engineering Seminar Series, October 22, 2003
39. Research Activities in the Spine Bioengineering Lab. EPSCoR Polymer and Composites Meeting, February 25, 2005
40. Polymer & Composites Initiative at UVM. Vermont EPSCoR Annual Meeting, August 16, 2005
41. Mechanical factors in the etiology of intervertebral disc degeneration: Role of collagen in determining elastic and viscoelastic properties. Applied Math Seminar Series, April 23, 2008

### III. GRANTS

#### A. Extramural Funding

##### **Active Support**

\$1,393,893	National Institutes of Health (1R01 AR051146) <b>Principal Investigator</b> , 25% effort Mechanical injury and repair in the intervertebral disc	2005-2009
300,000ChF (~\$255,000)	AO Research Commission <b>Principal Investigator</b> (5% Effort) Notochordal cell enhanced intervertebral disc repair	2008-2011
\$1,500,000 (direct)	National Institutes of Health (R01 AR053132-01A1) Co-Investigator, 5% effort (PI: IAF Stokes) Progressive scoliosis deformity in intervertebral disc	2006-2010
\$1,875,000	National Institutes of Health Co-Investigator, 5% effort (PI: H Langevin) Soft tissue biomechanical behavior during acupuncture in low back pain	2006-2011
\$6.7M	National Science Foundation EPSCoR RII Co-PI (12% effort) (PI: JL Van Houten) Computational systems modeling for environmental problem solving	2007-2010

##### **Previous Support**

\$21,420	National Institutes of Health (1 F32 AR08484) <b>Principal Investigator</b> , Individual Research Service Award Mechanical loading alterations to intervertebral disc properties	1997-1998
\$424,400	National Institutes of Health (S10 RR14792) Co-Investigator (PI: D. Burstein), NCCR Shared Instrumentation Grant MRI Upgrade: Beth Israel Deaconess Medical Center Center for Basic Magnetic Resonance Research Contribution: Only involved as a user in the facility.	1999
\$35,000	AO Research Commission (2001-I12) <b>Principal Investigator</b> , Research Grant Effects of cyclic compression on intervertebral disc metabolism	2001
\$36,774	AO Research Commission (2002-I12) <b>Principal Investigator</b> , Research Grant, Year 2 Competitive Renewal Effects of cyclic compression on intervertebral disc metabolism	2002
\$418,868	National Institutes of Health Grant (1 K01 AR02078) <b>Principal Investigator</b> , Mentored Research Scientist Award Load induced disc degeneration in a rat tail model of the spine	1999-2004
\$27,475	AO Research Foundation <b>Principal Investigator</b> , Center of Excellence Grant Influence of frequency and magnitude of dynamic compression on disc metabolism in vivo	2004
\$88,028	National Institutes of Health (1F32 AR049664-01) Faculty Mentor, 5% effort (Post-doc: C Lee), Individual National Research Service Award Intervertebral disc mechanoregulation: An explant model	2003-2005
\$220,000Cdn	Canadian Institutes of Health Research Co-Investigator, 5% effort (PI: M Alini), Operating Grant	2003-2005

	Influence of cyclic compression on intervertebral disc extracellular matrix synthesis and degradation in vivo	
\$46,856	AO Research Commission (2004-I58) <b>Principal Investigator</b> , <5% effort, Research Grant, Effects of cyclic compression on intervertebral disc metabolism	2004-2005
\$412,397	National Institutes of Health Co-Investigator, <5% effort (PI: R Johnson), Institutional National Research Service Award Training in orthopaedic science	2002-2006
\$240,000	The Whitaker Foundation <b>Principal Investigator</b> , 25% effort, Biomedical Engineering Research Grant Mechanical and biological response of intervertebral discs to damage.	2003-2006
\$300,000Cdn	Canadian Institutes of Health Research Co-Investigator, 5% effort (PI: J Antoniou), Operating Grant Quantitative magnetic resonance imaging as a diagnostic tool of intervertebral disc matrix composition and integrity	2004-2007
\$1,687,442	National Institutes of Health (1R01 AR049370) Co-Investigator, 25% effort (PI: IAF Stokes) An Integrated model of intervertebral disc function	2003-2007

#### **B. Intramural Funding**

\$17,000	Bristol-Myers/Zimmer Squibb <b>Principal Investigator</b> , Institutional Excellence in Orthopaedic Research Grant (Intramural Competition) Mechanical loading alterations to intervertebral disc structure and function	1996-1997
\$36,839	National Science Foundation Co-Principal Investigator, Vermont EPSCoR Research Equipment Fund (intramural competition) Quantitative Microscopy Facility in the College of Engineering and Mathematics	1999
\$3500	UVM Office of Sponsored Programs Faculty Mentor (Student: J MacLean), SUGR/FAME Electromechanical properties of intervertebral disc tissue under confined compression loading	2001
\$1990	University of Vermont, Center for Teaching and Learning <b>Principal Investigator</b> , Instructional Incentive Grant Software to enhance information gathering and problem solving in materials science for mechanical and civil engineering courses	2001
\$6393	National Science Foundation <b>Principal Investigator</b> (Post-doc: Cynthia Lee), Post-doctoral funding supplement, Vermont EPSCoR post-doctoral training grant (intramural competition)	2001
\$4720	Hughes Endeavor for the Life Sciences Faculty Mentor (Student: David Ryan), HELiX Research Internship Mechanical damage to the intervertebral disc	2002
\$4000	UVM Office of the Provost Faculty Mentor (Student: David Korda), URECA Grant Effects of damaging compression on mechanical, chemical, and structural properties in intervertebral disc tissue	2003-2004
\$5000	Hughes Endeavor for the Life Sciences Faculty Mentor (Student: Lisa Hovey), HELiX Research Internship Effects of collagen and proteoglycan degradation on the compressive and shear mechanical properties of the intervertebral disc	2004
\$4000	UVM Office of the Provost Faculty Mentor (Student: David Korda), URECA Grant Mechanisms for mechanical damage in the vertebra-disc-vertebra complex	2004-2005

## IV. TEACHING

### A. Undergraduate and graduate classes

<u>Semester</u>	<u>Course</u>	<u>Title</u>	<u>Level</u>	<u>Students</u>	<u>Credits</u>
Fall 1999	ME 183	Mechanical Engineering Lab IV	Senior	18	2
Spring 2000	ME 257	Composite Materials	Graduate/Senior	8	3
Fall 2000	ME101	Engineering Materials	Junior	26	3
Fall 2000	ME183	Mechanical Engineering Lab IV	Senior	14	2
Spring 2001	ME 257	Composite Materials	Graduate/Senior	7	3
Spring 2001	ME 164	Manufacturing Design Project	Senior	14	1
Spring 2001	ME 295	ST: Spine Bioengineering Project	Senior	1	3
Spring 2001	ME 295	ST: Bioengineering Imaging Project	Senior	1	3
Spring 2001	ME 295	ST: Mechatronics Design Project	Senior	1	3
Spring 2002	ME257	Composite Materials	Graduate/Senior	12	3
Spring 2002	ME164	Manufacturing Design Project	Senior	20	1
Spring 2002	ME208	Biomechanics II	Graduate/Senior	6	3
Spring 2002	ME 295	ST: Advanced Spine Bioengineering	Graduate	1	3
Spring 2002	ME 295	ST: Composite Anal & Manufacturing	Senior	1	1
Fall 2002	ME101	Engineering Materials	Junior	29	3
Fall 2002	ME185/186	ME Senior Design Project	Senior	29/6	1/2
Fall 2002	ME281	ME Seminar	All levels		1
Fall 2002	ME295	ST: Mechatronics:Controller Des&Imp	Senior/Grad	1	3
Fall 2002	ME295	ST: Spine bioengineering: Matrl Testing	Senior/Grad	1	4
Spring 2003	ME186/185	ME Senior Design Project	Senior	29/6	1/2
Spring 2003	ME257	Composite Materials	Graduate/Senior	4	3
Spring 2003	ME282	ME Seminar	All levels		1
Spring 2003	ME295	ST: Mechatronics II	Senior/Grad	1	3
Spring 2003	ME295	ST: Spine mechanobiology	Senior/Grad	1	3
Fall 2003	ME101	Engineering Materials	Junior	41	3
Fall 2003	ME185/186	ME Senior Design Project	Senior	24/5	1/2
Fall 2003	ME281	ME Seminar	All levels		1
Spring 2004	ME186/185	ME Senior Design Project	Senior	21/2	2/1
Spring 2004	ME301	Biomedical Engineering	Grad	7	3
Spring 2004	ME282	ME Seminar	All levels		1
Fall 2004	ME101	Engineering Materials	Junior	28	3
Fall 2004	ME207	Biomechanics 1	Senior/Grad	12	3
Fall 2004	ME281	ME Seminar	All levels		1
Spring 2005	ME208	Biomechanics II	Senior	6	3
Spring 2005	ME301	Bioengineering	Grad	3	3
Fall 2005	ME183	Senior Lab	Senior	36	3
Fall 2005	ME207	Biomechanics I	Senior/Grad	18	3
Spring 2006	ME208	Biomechanics II	Senior/Grad	7	3
Spring 2006	ME257	Composite Materials	Senior/Grad	10	3
Fall 2007	ME207	Biomechanics I	Senior/Grad	17	3
Spring 2008	ME208	Biomechanics II	Grad	6	3

**B. Post-doctoral and graduate students supervised**

<u>Year</u>	<u>Student Name</u>	<u>Status</u>	<u>Program</u>
2001-2005	Dr. Cynthia Lee	Post-doctoral Associate	UVM/AO Research Institute
	Current position: Senior Scientist - Cartilage Technologies, DePuy Biologics, Raynham, MA		
2003-2004	Dr. Delphine Périé-Curnier	Post-doctoral Associate	Dept. of ME
	Current position: Research Scientist, Laboratoire de Biomecanique, Toulouse cedex, France		
2004	Jeffrey J. MacLean	MS Student	Bioengineering Program
	MS Thesis: An analysis of the metabolic activity of the intervertebral disc under in vivo dynamic compression		
	Current position: MD Student, University of Vermont		
2003-2005	Diana Hidalgo	MS Student	Dept. of ME/Biomechanics
	MS Project Topic: Investigation of continuous strain fields in the intervertebral disc		
	Co-Advisor: Donna Rizzo, Dept. of Civil & Environmental Engineering		
2003-2005	Casey Korecki	MS Student	Dept. of ME/Biomechanics
	Thesis Title: Development of an organ culture system for evaluating damaging compression loading on intervertebral disc explants.		
	Current position: PhD student, University of Vermont		
5/2005-12/2005	Kazunori Masuoka	Visiting Scientist	Dept. of Orthopaedics & Rehab/ME
	Current position: Dept. of Orthopedic Surgery, National Defense Medical College, Saitama, Japan		
2004-2006	Justin Stinnett-Donnelly	MS Student	Bioengineering Program
	Thesis Title: Method and analysis of the rat tail intervertebral disc response to chronically applied dynamic loading		
	Current position: MD Student, University of Vermont		
2005-2006	John Jack Costi	Post-doctoral Associate	School of Engin/Ortho & Rehab
	Current position: faculty, Repatriation General Hospital & Flinders University, Adelaide, South Australia, Australia		
2006-2007	Karin Wuertz	Post-doctoral Associate	School of Eng/Orthopaedics
	Current position: Research faculty, University of Zurich		
2006-2007	Jake Lubinsky	MS Student	Dept. of ME/Biomechanics
	Thesis Title: Biomechanical and swelling behaviors of the intervertebral disc in varying osmotic Environments		
2005-2008	Casey Korecki	PhD Student	ME/Biomechanics
	Thesis Title: Effects of compression loading, injury, and age on intervertebral disc mechanics, biology and metabolism using large animal organ and cell culture systems		
	Current position: Post-doctoral Associate, NIAMS, NIH with Rocky Tuan		
2005-present	Arthur Michalek	PhD Student	ME/Biomechanics
2006-present	Ana Barbir	PhD Student	ME/Biomechanics
2007	Alon Lai	PhD Student (attachment)	with Hong Kong Polytechnic Univ
2008-present	Benjamin A Walter	MS/PhD Student	Biomedical Engineering
2008-present	Devina Purmessur	Post-doctoral Associate	School of Engineering

**C. Graduate thesis committees (not primary advisor)**

<u>Year</u>	<u>Student Name</u>	<u>Status</u>	<u>Program</u>
2003	Victor Kosmopolous	PhD qualifying exam committee	UVM/Dept. of ME
2004	Richard Preuss	PhD committee member	McGill Univ/Physical Therapy
2004	John Jack Costi	PhD external examiner	Flinders Univ/School of Engineering
2005	David Paller	MS committee member	UVM/Bioengineering program
2005	Amy Johnson	MS committee member	UVM/Bioengineering program
2006	Aaron Powers	MS committee member	UVM/Bioengineering program
2007	Dulcie Languerand Lagies	MS Committee member	UVM/ME program
2008	Alon Lai	PhD external examiner	Hong Kong Poly, Health Tech & Infrmtcs

**D. Undergraduate research project advisor on ME185/186 Senior Project, ME295 Independent Study, and other classes**

<u>Year</u>	<u>Student Name</u>	<u>Project Title</u>
AY99-00	Leah Rafuse	Design of an oxygen tubing retractor

AY00-01	Hale Johnson	Mechatronics design project – Sip & Puff Fishing Pole Project (Awarded 2 <sup>nd</sup> Prize in Design Contest at ASME Regional Student Conference 2001)
AY00-01	Jeffrey MacLean	Mechanical and electromechanical properties of intervertebral disc (Awarded Best Technical Paper & 3 <sup>rd</sup> Prize Overall at ASME Regional Student Conference 2001)
AY00-01	Jonathan Bicknell	WKA Kart racer
AY00-01	Shannon Ellsworth	WKA Kart racer
AY00-01	Andrew East	Large scale retractable oxygen tube system
AY01-02	Andrew Wood	Torsional apparatus for spine mechanobiology
AY01-02	Luke Morrie	Composite bicycle design and manufacturing
AY01-02	Sean Chase	Design of a snowboard brake
AY01-02	Christa Goodman	Cartilage indentation testing
AY02-03	Ariane Cline	Design modifications to Magic Hat bottling line
AY02-03	Andrew Barnett	Design modifications to Magic Hat bottling line
AY02-03	Ernie Powers	Design modifications to Magic Hat bottling line
AY02-03	Suzanne Kavy	Torsional apparatus for spine testing: Instrumentation and design
AY02-03	Kendra Nardi	Snowboarding measurements
AY02-03	Ryan Walker	Re-design of a composite oar handle
AY02-03	Chris Pepe	High energy articulated limb robot
AY02-03	Laura Albert	Biology Research Project (Biol 197)
AY03-04	Jesse Cannon	Steering column assembly
AY03-04	Art Henry	Off-road vehicle
AY03-04	Chad Drake	Off-road vehicle
AY03-04	Farah Steinard	Electrostatic clamp for microprocessor manufacturing
AY04-05	Heather Boepple	Effects of enzymatic digestion on intervertebral disc structural properties
AY04-05	Anna Beth Snarski	Justin Morrill Honors Program
AY05-06		Enzymatic digestion of intervertebral discs in a rat model
AY05-06	David Korda	ME Senior Honors Thesis
		Mechanical behaviors of rat caudal and lumbar discs
AY06-07	Emir Heco	In-vivo torsion testing of rat caudal intervertebral discs
AY07-08	“	“

#### **D. Undergraduate research project supervision (non-credit)**

Summer 01	Andrew Wood	Spine mechanobiology at AO Research Institute
Summer 02	Brennan Scheaffer	Design of a controller for mechanical testing of biological tissue
Summer 02	Julia Owen	Effects of proteoglycan digestion on compressive properties of disc anulus
Summer 02	David Ryan	Fatigue of intervertebral disc anulus tissue
Summer 03	Scott Parsons	Design of an intervertebral disc tissue culture system
Spring 04	Julia Owen	Structural properties of rat tail motion segments
Summer 04	Lisa Hovey	Structural properties of rat tail motion segments
2003-2005	David Korda	Effects of proteoglycan digestion on compressive properties of annulus
Spring 05	Mary O'Brien	Measurements of proteoglycan distribution in human intervertebral discs
2006-2007	Daniel Ackil	IVD height measurements during simulated degeneration in vivo
Summer 07	Rosalynn Abbott	Effects of enzymatic digestion on intervertebral disc structural properties
Summer 08	Mark Freedman	Imaging intervertebral disc transport & structure with microCT
Summer08	Kristin Funabashi	Effects of needle puncture injury on rat intervertebral disc biomechanics

## V. NATIONAL/INTERNATIONAL SERVICE

### Professional Activities

#### Vermont Experimental Program to Stimulate Competitive Research (EPSCoR)

Associate Project Director, 2005-present

Group Leader, Polymer and Composites Group, 2005-2006

Head, EPSCoR Polymers and Composites Group, Summer 2004 – present

Facilitator, Statewide meeting to define state plan in Biotechnology, Co-sponsored by EPSCoR and VT Technology Council, March 30, 2005

#### American Society of Biomechanics, Member (1998-2002)

#### American Society of Mechanical Engineers, Member (1990-present)

Faculty Advisor to the UVM Student Section, 2000-2003

Green Mountain Professional Section, Vice President, 2001-present

Judge, student paper contest, bioengineering division, IMECE 2001

Judge, student paper contest, bioengineering division, Summer Bioengineering Conference 2002

Judge, BS & PhD paper contest, bioengineering division, IMECE 2003

Judge, MS & PhD paper contest, bioengineering division, IMECE 2004

Session Organizer, BS paper contest, bioengineering division, IMECE 2004

Judge, student paper contest, bioengineering division, Summer Bioengineering Conference, 2005

Session Chair, MS paper contest, bioengineering division, Summer Bioengineering Conference, 2005

Session Chair, PhD paper contest, bioengineering division, Summer Bioengineering Conference, 2006

Judge, PhD paper contest, Summer Bioengineering Conference, 2007

#### European Society of Biomechanics

Member (2004-present)

Session Moderator, Connective tissue mechanics, 2004 meeting

#### International Society for the Study of the Lumbar Spine

Member (2002-present)

Co-organizer of pre-meeting workshop on "The contribution of biomechanics to prevention and treatment of low back pain," Burlington, VT, June 1996

Session Moderator and Judge, Special Emphasis Poster Session, 2006 meeting

Reviewer, 2007 meeting

Judge, Special Emphasis Poster Session, 2008 meeting

#### Journal of Biomechanics, Editorial Advisory Board, 2005 – present.

#### European Spine Journal, Assistant Editorial Board, 2005 – present.

#### Orthopaedic Research Society, Member (1997-present)

Session Moderator, Soft-tissue Mechanics, 2000 meeting

Associate Reviewer, 2001 meeting

Session Moderator, Spine Biomechanics, 2001 meeting

Judge, New Investigator Recognition Award, 2002 meeting

Information Technology Committee, 2003-2004

Judge, New Investigator Recognition Award, 2004 meeting

Adjunct Reviewer, 2004 meeting

Session Moderator, Intervertebral Discs II, 2004 meeting

Session Moderator, Spine, 2005 meeting

#### University Consultation

Clemson University, Dept. Bioengineering, INBRE External Advisory Board, May 2008

University of Bern, External advisor for faculty hire in spine research, Spring 2008

## **Reviewer**

### ***Journals***

Acta Biomaterialia  
American Journal of Physical Medicine & Rehabilitation  
Annals of Biomedical Engineering  
Arthritis & Rheumatism  
Australasian Physical & Engineering Sciences in Medicine  
Biorheology  
Clinical Biomechanics  
European Spine Journal  
Journal of Anatomy  
Journal of Biomaterials Applications  
Journal of Biomechanical Engineering  
Journal of Biomechanics  
Journal of Biomedical Materials Research  
Journal of Orthopaedic Research  
Journal of the Royal Society Interface  
Medical Engineering & Physics  
Spine  
Therapy

### ***Funding Organizations***

2002-2003 Ad-hoc reviewer, AO Research Commission  
2003 Ad-hoc reviewer, Austrian Science Fund (FWF)  
2001-2002 Ad-hoc reviewer, Canadian Institutes of Health Research  
2005 Ad-hoc reviewer, National Institute for Occupational Safety and Health (NIOSH) Special Emphasis Panel  
2006-2006 Ad-hoc reviewer, NIAMS Special Study Section for R03s, NIH (multiple review cycles)  
2006-2007 Ad-hoc reviewer, Skeletal Biology and Structural Regeneration Study Section, NIH (Nov06, Feb07, Jun07)  
2007 Ad-hoc reviewer, NCCAM, Special Emphasis Panel (Nov07)  
2008 Ad-hoc reviewer, NIAMS Special Emphasis Panel (Jun08)  
2008 Ad-hoc reviewer, Research Into Ageing

## **VI. UNIVERSITY OF VERMONT SERVICE**

### **Departmental/College Service**

Department of Mechanical Engineering/School of Engineering

ME Curriculum Committee 1999-present  
ME Graduate Student Admissions Committee, 2000-present  
Point Person, Bioengineering Systems Graduate Focus Area, 2007-present  
Chair, Computational Bioengineering Faculty Search Committee, 2008  
Mechanical Engineering Senior Faculty Search Committee, 2006  
Chair, Mechanical Engineering Senior Faculty Search Committee, 2005  
Mechanical Engineering Junior Faculty Search Committee, 2005  
ME Chairman Search Committee, 2003  
Material Science Faculty Search Committee, 2003  
Mechatronics Faculty Search Committee 2002  
Thermal Sciences Faculty Search Committee 2001  
Undergraduate student recruitment efforts including tours, phone calls, etc.

College of Engineering and Mathematical Sciences

Dean's Faculty Advisory Council, 2007-present  
Chair, School of Engineering Director Search Committee, 2006  
Dean of CEMS Search Committee, 2005  
Design TASC (Technology and Science Connection) organizational committee, 2000-2003  
Engineering summer program (undergraduate outreach), lecturer 2000

### **University Service**

Graduate College

Executive Committee, 2007-present

Biomedical Engineering Program

Co-chair, Bioengineering PhD program development committee, 2005-present  
BME Graduate Student Coordinator, 2002-present  
BME Program Steering Committee, 2002-present  
Co-Director, Summer 2003 - present  
Graduate Student Admissions Committee, 2000-present  
BME Curriculum Committee, 2000-present  
Web site creation 1999: <http://www.cems.uvm.edu/bme/>

Material Science Program

Curriculum Committee, 2003-present  
EPSCoR Polymer and Composites Group, 2005 conference planning committee

University of Vermont Faculty Senate

ME Senator, 2003-2006  
Executive Nominating Committee, 2003

UVM High Performance Computing Center, planning committee, 2003

Department of Defense EPSCoR, UVM internal grant proposal review, 2003

UVM Studies Committee, Dismissal Hearings, January 7 & 10, 2003

Department of Defense EPSCoR, UVM internal grant proposal review, 2002

Dept. of Orthopaedics & Rehab., Institutional NRSA post-doctoral training grant admissions committee, 2002

Science and Technology Governor's Institute Careers Night, Panelist, June 30, 2004

UVM Faculty Mentoring Program, Mentor, 2005