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Department of Orthopaedics and Rehabilitation
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Degrees

B.S., Materials Science and Engineering, 5/90, University of Michigan, Ann Arbor, MI
M.S., Biomedical Engineering, 5/92, Case Western Reserve University, Cleveland, OH
Ph.D., Biomedical Engineering, 1/95, Case Western Reserve University, Cleveland, OH

Employment

5/89–8/89 Laboratory Technician
5/90–6/90
Composite Materials and Structures Center, Michigan State University, East Lansing, MI

- Test mechanical and interfacial properties of polymer composites
- Make polymer composite prepregs and layups

7/90–5/92 Research Assistant/M.S. Student
Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH
Thesis: "Design of Polymer Composite Orthopaedic Implants"

- Mechanical testing and failure analysis of spinal plates
- Photoelastic stress analysis of spinal plates and fracture fixation plates

6/92–8/94 Research Assistant/Ph.D. Student
Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH
Dissertation: "Finite Element Design of a Mechanical Testing Method for Polymer Composite Femoral Stems"

- Parametric studies of implanted femoral stem systems, using mathematical models
- Finite element analysis of femoral stems implanted in femurs and mechanical testing devices
- Finite element analysis of mechanical testing device viability

8/94–5/96 Research Associate
Biomechanics Research Laboratory, Department of Orthopaedics and Rehabilitation, University of Miami, Miami, FL

- Research and develop spine implants and surgical instruments
- Mechanically test cadaver spines for effects of decompressive surgery and spine implants
- Investigate relationships between spinal surgery preoperative, intraoperative, and postoperative followup findings
- Prepare FDA 510(k) Notifications
- Prepare grants

5/96–6/01 Assistant Research Scientist
7/01–9/02 Associate Research Scientist
10/02–Present Associate Research Engineer
Department of Orthopaedics & Rehabilitation, University of Iowa, Iowa City, IA

- Perform basic and applied research on orthopaedic biomechanics problems which present critical or unusually difficult obstacles to understanding, and which involve the development of new theories or methodologies, with complete responsibility for all aspects of the research project
- Develop new proposals for research and obtain support for new or continuing research activities
- Prepare research results for presentation and publication
- Assist students, residents, and faculty with research and mechanical testing
- Train and conduct continuing research education for junior investigators, potential investigators, and support personnel
- Supervise undergraduate employees
- Maintain materials testing machines and other laboratory equipment

Journal articles / book chapters

1. Heiner AD, Brown SA. (1994). Effects of design and screw torque on stresses in spinal and fracture fixation plates: A photoelastic study. In JP Harvey, RF Games (Eds.) *Clinical and Laboratory Performance of Bone Plates, ASTM STP 1217* (pp.10–22). Philadelphia: American Society for Testing and Materials.

2. Heiner AD, Brown SA, Davy DT. Effects of mechanical testing device variables on polymer composite femoral stem strains. Biomaterials. 1996;17(23):2211–2217.

3. Schnieders MJ, Dave SB, Morrow D, Heiner AD, Pedersen DR, Brown TD. Assessing the accuracy of a prototype drill guide for fibular graft placement in femoral head necrosis. Iowa Orthop. J. 1997;17:58–63. PMCID: 2378111

4. Heiner AD, Zhang Y, Pedersen DR, Brown TD. Harvest site and loading direction as determinants of the flexural rigidity of human fibular bone grafts. J. Musculoskeletal Res. 1998;2(4):273–281.

5. Heiner AD, Poggie RA, Brown TD. Flexural rigidity of laboratory and surgical substitutes for human fibular bone grafts. J. Musculoskeletal Res. 1998;2(4):267–272.

6. Heiner AD, Brown TD. Subchondral plate deflection in femoral head osteonecrosis: Effect of a structural graft. Orthop. Trans. 1998–1999;22(3):680.

7. Scifert CF, Brown TD, Pedersen DR, Heiner AD, Callaghan JJ. Direct physical validation of a finite element model of total hip dislocation. Orthop. Trans. 1998–1999;22(3):780.

8. Otto JK, Brown TD, Heiner AD, Pedersen DR, Callaghan JJ. Characterization of the dynamic response of a piezoresistive contact stress sensor. Orthop. Trans. 1998–1999;22(3):900.

9. Scifert CF, Brown TD, Pedersen DR, Heiner AD, Callaghan JJ. Development and physical validation of a finite element model of total hip dislocation. Comput. Methods Biomech. Biomed. Engin. 1999;2:139–147.

10. Anderson DA, Schnieders MJ, Heiner AD, Pedersen DR, Brown TD, Brand RA. A surgical guide to accurately place pins or grafts within the femoral head. J. Musculoskeletal Res. 1999;3(3):233–237.

11. Zhang Y, Ahn PB, Fitzpatrick DC, Heiner AD, Poggie RA, Brown TD. Interfacial frictional behavior: Cancellous bone, cortical bone, and a novel porous tantalum biomaterial. J. Musculoskeletal Res. 1999;3(4):245–251.

12. Otto JK, Brown TD, Heiner AD, Pedersen DR, Callaghan JJ. Static and dynamic response of a multiplexed-array piezoresistive contact sensor. Experimental Mechanics. 1999;39:317–23.

13. Beardsley CL, Heiner, AD, Brandser EA, Marsh JL, Brown TD. High density polyetherurethane foam as a fragmentation and radiographic surrogate for cortical bone. Iowa Orthop. J. 2000;20:24–30. PMCID1888748.

14. Callaghan JJ, Heiner AD, Brown TD. The basic science of impaction allografting in revision hip surgery. Instr. Course Lect. 2000;49:103–10.

15. Bouschlicher MR, Heiner AD. Polymerization shrinkage force with xenon short arc or QTH photoillumination. J. Dent. Res. 2001;80:253.

16. Heiner AD, Brown TD. Structural properties of a new design of composite replicate femurs and tibias. J. Biomech. 2001;34(6):773–782.

17. Heiner AD, Brown TD. A physical model for simulating fusion of impaction-grafted morselized cancellous bone. J. Biomech. 2001;34(6):811–814.

18. Heiner AD, Brown TD, Rossin V, Buckwalter JA. Frictional insertion kinetics of bone biopsy needles. J. Biomech. Eng. 2001;123(6):629–634.

19. Haft GF, Heiner AD, Callaghan JJ, Dorr LD, Wan Z, Long W, Longjohn DB, Brown TD. Polyethylene liner cementation into fixed acetabular shells. J. Arthroplasty. 2002;17(4S1):167–70.

20. Brown MD, Holmes DC, Heiner AD. Measurement of cadaver lumbar spine motion segment stiffness. Spine. 2002;27(9):918–22.

21. Brown MD, Holmes DC, Heiner AD, Wehman KF. Intraoperative measurement of lumbar spine motion segment stiffness. Spine. 2002;27(9):954–8.

22. Brown MD, Wehman KF, Heiner AD. The clinical usefulness of intraoperative spinal stiffness measurements. Spine. 2002;27(9):959–61.

23. Zhang Y, Putnam AW, Heiner AD, Callaghan JJ, Brown TD. Reliability of detecting prosthesis/cement interface radiolucencies in total hip arthroplasty. J. Orthop Res. 2002;20:683–687.

24. Haft GF, Heiner AD, Dorr LD, Brown TD, Callaghan JJ. Investigation of surgical variables in polyethylene liner cementation into a fixed acetabular shell: A mechanical study. J. Bone Joint Surg. Am. 2003;85(6):1100–1110.

25. Heiner AD, Martin JA. Cartilage responses to a novel triaxial mechanostimulatory culture system. J. Biomech. 2004 May;37(5):689–695.

26. Martin JA, Brown TD, Heiner AD, Buckwalter JA. Post-traumatic osteoarthritis: The role of accelerated chondrocyte senescence. Biorheology. 2004;41:479–491.

27. Martin JA, Brown TD, Heiner AD, Buckwalter JA. Chondrocyte senescence, joint loading, and osteoarthritis. Clin. Orthop. Relat. Res. 2004 Oct;(427 Suppl):S96–S103.

28. Heiner AD, Callaghan JJ, Brown TD. A laboratory simulation for morselized bone graft fusion: Apparent modulus under operatively-based femoral impaction kinetics. J. Biomech. 2005 Apr;38(4):811–818.

29. Wolf BR, Heiner AD, Albright JP, Nepola JV. Excessive radiofrequency application: Effects on capsular tissue in an animal model. J. Shoulder Elbow Surg. 2005;14(2):149–156.

30. Heiner AD, Callaghan JJ, Brown TD. Stability of fused vs. nonfused THA femoral impaction grafts. J. Orthop. Res. 2007;25(3):351–360. NIHMS65924.

31. Heiner AD, Rudert MJ, McKinley TO, Fredericks DC, Bobst JA, Tochigi Y. In vivo measurement of translational stiffness of rabbit knees. J. Biomech. 2007;40(10):2313–2317. PMCID2080615.

32. Beecher BR, Martin JA, Pedersen DR, Heiner AD, Buckwalter JA. Antioxidants block cyclic loading induced chondrocyte death. Iowa Orthop. J. 2007;27:1–8. PMCID2150661.

33. Heiner AD, Lundberg HJ, Baer TE, Pedersen DR, Callaghan JJ, Brown TD. Effects of episodic subluxation events on third body ingress and embedment in the THA bearing surface. J. Biomech. 2008; 41(10):2090–2096. PMC2572990.

34. Heiner AD, Callaghan JJ, Brown TD. Stability differentials for proximal versus distal fusion of THA femoral impaction grafts. J. Arthroplasty. 2008;23(6):921–926. NIHMS68813.

35. Heiner AD. Structural properties of fourth-generation composite femurs and tibias. J. Biomech. 2008;41:3282–3284.

Abstracts / Presentations

1. Heiner AD, Brown SA. Stresses in spinal and fracture fixation plates: Effects of design and screw torque. *14th Annual Canadian Biomaterials Society Meeting*, p. 29–30, 1993.

2. Heiner AD, Brown SA, Davy DT. Design of a mechanical testing method for polymer composite femoral stems. *Society for Biomaterials 20th Annual Meeting and Exposition,* 17:59, 1994.

3. Heiner AD, Brown TD, Schnieders MJ. Structural behavior of composite fiberglass surrogate vs. natural human femoral heads: Implications for avascular necrosis modeling. *21st Annual Meeting of the American Society of Biomechanics*, p. 302, 1997.

4. Heiner AD, Brown TD. Subchondral plate deflection in femoral head osteonecrosis: Effect of a structural graft. *44th Annual Meeting of the Orthopaedic Research Society,* 23:63, 1998.

5. Scifert CF, Brown TD, Pedersen DR, Heiner AD, Callaghan JJ. Direct physical validation of a finite element model of total hip dislocation. *44th Annual Meeting of the Orthopaedic Research Society*, 23:403, 1998.

6. Otto J, Brown TD, Heiner AD, Pedersen DR, Callaghan JJ. Characterization of the dynamic response of a piezoresistive contact stress sensor. *44th Annual Meeting of the Orthopaedic Research Society*, 23:808, 1998.

7. Heiner AD, Poggie RA, Brown TD. Flexural rigidity of laboratory and surgical substitutes for human fibular bone grafts. *1998 North American Congress on Biomechanics,* 3:497, 1998.

8. Otto JK, Brown TD, Heiner AD, Callaghan JJ. Boltzmann heredity integrals as a means to compensate for drift in a contemporary piezoresistive contact stress sensor. *1998 North American Congress on Biomechanics,* 3:189, 1998.

9. Martin JA, Heiner AD, Brown KD, Schroeder A, Brand RA, Buckwalter JA. Mechanical stress induces PROMMP-3 protein expression in human articular cartilage. *45th Annual Meeting of the Orthopaedic Research Society*, 24:624, 1999.

10. Otto JK, Brown TD, Heiner AD, Callaghan JJ. Heredity integral drift compensation in piezoresistive contact stress sensors. *45th Annual Meeting of the Orthopaedic Research Society*, 24:957, 1999.

11. Zhang Y, Putnam AW, Heiner AD, Callaghan JJ, Brown TD. Reliability of detecting stem/cement interface radiolucencies in THA. *45th Annual Meeting of the Orthopaedic Research Society*, 24:910, 1999.

12. Brown TD, Pedersen DR, Heiner AD, Brand RA, Poggie RA, Christie MJ. Biomechanics of femoral head osteonecrosis: Natural history and head-preserving surgical management. *66th Annual Meeting of the American Academy of Orthopaedic Surgeons,* p. 238, 1999.

13. Beardsley CL, Heiner AD, Marsh JL, Brown TD. Mechanical characterization of a bone fracture surrogate. *23rd Annual Meeting of the American Society of Biomechanics,* p98, 1999.

14. Heiner AD, Brown TD, Rossin V, Buckwalter JA. Frictional insertion kinetics of bone biopsy needles. *46th Annual Meeting of the Orthopaedic Research Society,* 25:1106, 2000.

15. Otto JK, Brown TD, Heiner AD, Callaghan JJ. Torque requirements to initiate mobility of a rotating platform total knee. *46th Annual Meeting of the Orthopaedic Research Society,* 25:195, 2000.

16. Heiner AD, Martin JA. The triaxial compression vessel: A novel mechanically active culture system for cartilage explants. *24th Annual Meeting of the American Society of Biomechanics,* p. 15–16, 2000.

17. Otto JK, Brown TD, Heiner AD, Callaghan JJ. Experimental investigation of bearing motion initiation in a rotating platform total knee. *24th Annual Meeting of the American Society of Biomechanics,* p. 125–126, 2000.

18. Poggie RA, Cohen R, Christie M, Heiner AD, Brown TD. Biomechanical analysis and clinical study of a porous tantalum implant for intervening in femoral head AVN. *2000 Annual ARCO Meeting and International Symposium,* p. 23, 2000.

19. Heiner AD, Brown TD, Poggie RA. Structural efficacy of a novel porous tantalum implant for osteonecrosis grafting. *47th Annual Meeting of the Orthopaedic Research Society,* 26:480, 2001.

20. Otto JK, Heiner AD, Callaghan JJ, Brown TD. Flexion dependent contact mechanics of a rotating platform total knee. *47th Annual Meeting of the Orthopaedic Research Society,* 26:1084, 2001.

21. Haft GF, Heiner AD, Callaghan JJ, Brown TD. Stability of acetabular liners cemented into cementless shells. *68th Annual Meeting of the American Academy of Orthopaedic Surgeons,* PE350, February 2001.

22. Heiner AD, Brown TD. A physical model for simulating fusion of impaction-grafted morselized cancellous bone. *Society for Biomaterials 27th Annual Meeting and Exposition,* 24:246, 2001.

23. Bouschlicher MR, Heiner AD. Dental resin composite polymerization shrinkage force with xenon short arc or QTH photoillumination. *Society for Biomaterials 27th Annual Meeting and Exposition,* 24:433, 2001.

24. Haft G, Callaghan JJ, Heiner AD, Brown TD. Stability of acetabular liners cemented into cementless shells. *Mid-America Orthopaedic Association 19th Annual Meeting,* p. 208, 2001.

25. Otto JK, Callaghan JJ, Brown TD, Heiner AD. Torque friction requirements to initiate motion at the secondary bearing knee replacements. *Mid-America Orthopaedic Association 19th Annual Meeting,* p. 266, 2001.

26. Heiner AD, Martin JA. Cartilage responses to stress in a novel triaxial mechanical stress culture system. *4th Combined Meeting of the Orthopaedic Research Societies of the U.S.A, Canada, Europe and Japan* #141, June 2001.

27. Nadzadi ME, Heiner AD, Callaghan JJ, Brown TD. Dislocation mechanics of constrained liner and bi-polar THA designs. *4th Combined Meeting of the Orthopaedic Research Societies of the U.S.A, Canada, Europe and Japan* #280, June 2001.

28. Nadzadi ME, Heiner AD, Callaghan JJ, Brown TD. Failure mechanisms of constrained liners and bi-polar THA design. *25th Annual Meeting of the American Society of Biomechanics*, p. 163, 2001.

29. Haft GF, Heiner AD, Callaghan JJ, Dorr LD, Brown TD. Cementation of polyethylene liner into a fixed acetabular shell: A mechanical model to evaluate optimal mechanical construct. *11th Annual Meeting of the American Association of Hip and Knee Surgeons*, November 9–11, 2001.

30. Beardsley CL, Brown TD, Heiner AD. Express fracture toughness testing of annular cortical bone specimens. *48th Annual Meeting of the Orthopaedic Research Society*, 27:552, 2002.

31. Wolf BR, Heiner AD, Albright JP, Nepola JV, Fredericks DC. The effect of cumulative application of thermal energy on capsular tissue in an in vitro model. *Society for Biomaterials 28th Annual Meeting and Exposition*, 25:346, 2002.

32. Beardsley CL, Brown TD, Heiner AD. Express fracture toughness testing of annular cortical bone specimens. *Society for Biomaterials 28th Annual Meeting and Exposition*, 25:316, 2002.

33. Wolf BR, Heiner AD, Albright JP, Nepola JV, Fredericks DC. The effect of cumulative application of thermal energy on capsular tissue in an in vitro model. *Mid-America Orthopaedic Association 20th Annual Meeting*, #41, 2002.

34. Callaghan JJ, Haft GF, Heiner AD, Brown TD, Dorr LD, Johnston RC. Cementation of polyethylene liner into a fixed acetabular shell: A mechanical model to evaluate optimal mechanical construct. *115th Annual Meeting of the American Orthopaedic Association,* Victoria, BC, Canada, June 1–4, 2002, Poster #3.

35. Martin J, Heiner AD. Shear stress stimulates oxidant production in human cartilage explants. *IV World Congress of Biomechanics,* August 4–9, 2002, Calgary, Alberta, Canada, p. 919.

36. McKinley TO, Rudert MJ, Lundberg HJ, Tochigi Y, Heiner AD, Brown TD. Dynamic contact pressure changes in pilon fractures with articular surface stepoff. *49th Annual Meeting of the Orthopaedic Research Society*, February 2–5, 2003, New Orleans, Louisiana, p. 0108.

37. Wolf BR, Heiner AD, Albright JP, Nepola JV. The effect of cumulative application of thermal energy on capsular tissue in an in vitro model. *49th Annual Meeting of the Orthopaedic Research Society,* February 2–5, 2003, New Orleans, Louisiana, p. 1169.

38. Heiner AD, Haft GF, Dorr LD, Brown TD, Callaghan JJ. A biomechanical analysis of polyethylene liner cementation into a fixed metal acetabular shell. *49th Annual Meeting of the Orthopaedic Research Society*, February 2–5, 2003, New Orleans, Louisiana, p. 1367.

39. Heiner AD, Haft GF, Callaghan JJ, Dorr LD, Brown TD. A biomechanical analysis of polyethylene liner cementation into a fixed metal acetabular shell. *Roy J. and Lucille A. Carver College of Medicine / College of Public Health / VA Medical Center Research Week 2003* Faculty/Staff Poster #48, April 1–4, 2003.

40. Heiner AD, Brown TD. Structural properties of an improved re-design of composite replicate femurs and tibias. *Society for Biomaterials 29th Annual Meeting and Exposition*, April 30–May 3, 2003, Reno, Nevada, 26:702.

41. Heiner AD, Haft GF, Dorr LD, Brown TD, Callaghan JJ. Parameters influencing strength of new liner cementation into fixed acetabular shells. *Society for Biomaterials 29th Annual Meeting and Exposition*, April 30–May 3, 2003, Reno, Nevada, 26:708.

42. Beecher BR, Martin JA, Heiner AD, Buckwalter JA. Antioxidants block mechanical stress-induced cell death in human articular cartilage. *Roy J. and Lucille A. Carver College of Medicine 2003 Medical Student Research Symposium*, September 5, 2003, Iowa City, Iowa. Abstract and Poster Presentation #4.

43. Heiner AD, Brown TD, Callaghan JJ. Quantification of surgeon impaction of morselized cancellous bone in revision THA. *27th Annual Meeting of the American Society of Biomechanics*, September 25–27, 2003, Toledo, Ohio. Abstract #80 and Poster Presentation #21.

44. Heiner AD, Brown TD, Grosland NM. Apparent modulus of fused vs. unfused femoral impaction grafts. *27 th Annual Meeting of the American Society of Biomechanics*, September 25–27, 2003, Toledo, Ohio. Abstract #57, Podium Presentation #10.

45. Heiner AD, Brown TD, Callaghan JJ. Apparent modulus of fused vs. unfused femoral impaction grafts. *7 th World Biomaterials Congress*, May 17–21, 2004, Darling Harbour, Sydney, Australia. Abstract #809, Podium Presentation, Scientific Program #2615.

46. Martin JA, Heiner AD, Beecher BR, Brown TD. Shear-stress-induced chondrocyte death is reduced by antioxidant treatment. *Proceedings of the 28 th Annual Meeting of the American Society of Biomechanics*, September 8–11, 2004, Portland, Oregon. Abstract #124.

47. Heiner AD, Callaghan JJ, Brown TD. Apparent modulus of fused vs. unfused femoral impaction grafts. *5 th Combined Meeting of the Orthopaedic Research Societies of the U.S.A., Canada, Japan and Europe*, October 10–13, 2004, Banff, Alberta, Canada. Poster Presentation #259.

48. Martin JA, Heiner AD, Beecher BR, Brown TD. Shear-stress-induced chondrocyte death is reduced by antioxidant treatment. *5 th Combined Meeting of the Orthopaedic Research Societies of the U.S.A., Canada, Japan and Europe*, October 10–13, 2004, Banff, Alberta, Canada. Poster Presentation #289.

49. Kallemeyn (Vos) NA, Grosland NM, Pedersen DR, Martin JA, Heiner AD, Brown TD. Heterogeneity of shear stress modulation in triaxial compression of cartilage. *1st Annual*

Upper Midwest ASB Regional Student Meeting, November 12–13, 2004, Minneapolis, MN. Session: Bone and Soft Tissue Characterization , Paper #10. Best Poster Award.

50. Kallemeyn (Vos) NA, Grosland NM, Pedersen DR, Martin J, Heiner AD, Brown TD. Heterogeneity of shear stress modulation in triaxial compression of cartilage. *9th World Congress of the Osteoarthritis Research Society International,* December 2–5, 2004, Chicago, Illinois, Poster Presentation #254, Abstract #S103.

51. Martin JA, Heiner AD, Buckwalter JA. High shear stress induces p53 expression and apoptosis in cartilage explants. *9th World Congress of the Osteoarthritis Research Society International,* December 2–5, 2004, Chicago, Illinois, S47.

52. Vos N, Grosland NM, Pedersen DR, Martin J, Heiner AD, Brown TD. Heterogeneity of shear stress modulation in triaxial compression of cartilage. *9th World Congress of the Osteoarthritis Research Society International,* December 2–5, 2004, Chicago, Illinois, S103.

53. Martin JA, Heiner AD, Buckwalter JA: High shear stress induces p53 expression and apoptosis in cartilage explants. *Society for Biomaterials 30th Annual Meeting and Exposition: New Applications and Technologies,* April 27–30, 2005, Memphis, Tennessee. Poster Presentation #408.

54. Heiner AD, Rudert MJ, McKinley TO. A device to measure in vivo translational and rotational laxity of rabbit knees. *XXth Congress of the International Society of Biomechanics and 29th Annual Meeting of the American Society of Biomechanics,* July 31–August 5, 2005, Cleveland, Ohio. Abstract #1004, Knee Mechanics 2, Podium Presentation.

55. Kallemeyn NA, Grosland NM, Pedersen DR, Martin JA, Heiner AD, Brown TD. A finite element analysis of cartilage in cyclic triaxial compression. *XXth Congress of the International Society of Biomechanics and 29th Annual Meeting of the American Society of Biomechanics,* July 31–August 5, 2005, Cleveland, Ohio. Osteoarthritis and Cartilage: Abstract #568, Poster Presentation #65.

56. Martin JA, Heiner AD, Buckwalter JA. High shear stress induces p53 expression and apoptosis in cartilage explants. *XXth Congress of the International Society of Biomechanics and 29th Annual Meeting of the American Society of Biomechanics,* July 31–August 5, 2005, Cleveland, Ohio. Osteoarthritis and Cartilage: Abstract #424, Poster Presentation #64.

57. Heiner AD, Rudert MJ, McKinley TO, Fredericks DC, Bobst JA, Tochigi Y. In vivo measurement of translational and rotational laxity of rabbit knees. *10th World Congress on Osteoarthritis,* December 8–11, 2005, Boston, Massachusetts. pp. S47, Poster Presentation #P75.

58. Beecher BR, Martin JA, Heiner AD, Buckwalter JA. Vitamin E blocks shear stress-induced chondrocyte death in articular cartilage. *52nd Annual Meeting of the Orthopaedic Research Society,* March 19–22, 2006, Chicago, Illinois. Poster Presentation #1517.

59. Heiner AD, Rudert MJ, McKinley TO, Fredericks DC, Bobst JA, Tochigi Y. In vivo measurement of translational and rotational laxity of rabbit knees. *52nd Annual Meeting of the Orthopaedic Research Society*, March 19–22, 2006, Chicago, Illinois. Poster Presentation #547.

60. Kallemeyn NA, Grosland NM, Pedersen DR, Martin JA, Heiner AD, Brown TD. A poroelastic finite element analysis of cartilage in dynamic triaxial compression. *52nd Annual Meeting of the Orthopaedic Research Society*, March 19–22, 2006, Chicago, Illinois. Poster Presentation #1524.

61. Heiner AD, Callaghan JJ, Brown TD. Stability of fused vs. nonfused THA femoral impaction grafts. *30th Annual Meeting of the American Society of Biomechanics*, September 6–9, 2006, Blacksburg, Virginia. Abstract ID#28, Session: Bone, Podium Presentation.

62. Heiner AD, Callaghan JJ, Brown TD. Regional bone fusion for THA femoral impaction grafts. 30th *Annual Meeting of the American Society of Biomechanics*, September 6–9, 2006, Blacksburg, Virginia. Abstract ID#30, Session: Prosthetics, Podium Presentation.

63. Hecht BA, Martin JA, Pedersen DR, Heiner AD, Amendola R, Buckwalter JA. Oxidant pre-conditioning protects cartilage from mechanically-induced cell death. *53rd Annual Meeting of the Orthopaedic Research Society*, February 11–14, 2007, San Diego, California. Abstract Submission 3022A10781, Podium Presentation #115, Session 21: Chondrocyte Mechanotransduction.

64. Fakhry A, Tan SC, Heiner AD, Dircks HW, Dehkordi-Vakil FH. In-vitro testing of the retentive properties of prefabricated attachments used to retain implant overdentures. *IADR/AADR/CADR 85th General Session and Exhibition*, March 21–24, 2007, New Orleans, Louisiana. Abstract and Poster Presentation.

65. Heiner AD, Brown TD, Callaghan JJ. Stability differential for proximal vs. distal fixation of THA femoral impaction grafts. *53rd Annual Meeting of the Orthopaedic Research Society*, February 11–14, 2007, San Diego, California. Abstract Submission 1477A28976, Poster Presentation #1747.

66. Heiner AD, Brown TD. Frictional coefficients of a new bone ingrowth structure. *53rd Annual Meeting of the Orthopaedic Research Society*, February 11–14, 2007, San Diego, California. Abstract Submission 3367A20077, Poster Presentation #1623.

67. Martin JA, Pedersen DR, Heiner AD, Buckwalter JA, Brown TD. N-acetyl cysteine protects cartilage from loading-induced proteoglycan loss. *53rd Annual Meeting of the Orthopaedic Research Society*, February 11–14, 2007, San Diego, California. Abstract Submission 3055A18930, Poster Presentation #566.

68. McKinley TO, Heiner AD, Bobst JA, Rudert MJ, Brown TD. In vivo measurement of instability in rabbit knees. *53rd Annual Meeting of the Orthopaedic Research Society*, February 11–14, 2007, San Diego, California. Abstract Submission 2250A5118. Poster Presentation #817.

69. Heiner AD, Lundberg HJ, Baer TE, Pedersen DR, Callaghan JJ, Brown TD. Episodic subluxation increases third body ingress and embedment in the THA bearing surface. *31 st Annual Meeting of the American Society of Biomechanics,* August 22–25, 2007, Stanford, California. Abstract ID #263. Podium 3: Bone I.

70. Heiner AD. Structural properties of fourth-generation composite femurs and tibias. *54th Annual Meeting of the Orthopaedic Research Society,* March 2–5, 2008, San Francisco, California. Abstract ID: 387589, Poster Presentation #1670, Session 40: Bioinert Biomaterials.

71. Heiner AD, Lundberg HJ, Baer TE, Pedersen DR, Callaghan JJ, Brown TD. Episodic subluxation increases third body ingress and embedment in the THA bearing surface. *54th Annual Meeting of the Orthopaedic Research Society,* March 2–5, 2008, San Francisco, California. Abstract ID: 387622, Poster Presentation #: 1902, Session 44: Implant Wear.

72. Heiner AD. Structural properties of fourth-generation composite femurs and tibias. *The North American Congress on Biomechanics (NACOB 2008),* August 5–9, 2008, Ann Arbor, Michigan. Abstract ID 12. Poster Presentation: Session I.

73. Heiner AD, Brown TD. Scratching vulnerability of conventional vs. highly crosslinked polyethylene liners with embedded third body particles. *The North American Congress on Biomechanics (NACOB 2008),* August 5–9, 2008, Ann Arbor, Michigan. Abstract ID 87. Poster Presentation: Session II.

74. TochigiY , McKinley TO, Heiner AD, Fredericks DC, Bobst JA, Martin JA, Rudert MJ, Brown TD. A rabbit knee model of controlled instability. *OARSI World Congress on Osteoarthritis 2008,* September 18–20, 2008, Rome, Italy. Abstract 07-A-490-OARSI, Poster Presentation #80.

75. Heiner AD, Brown TD. Scratching vulnerability of conventional vs. highly crosslinked polyethylene liners with reproducibly embedded third body particles. *55th Annual Meeting of the Orthopaedic Research Society,* February 22–25, 2009, Las Vegas, Nevada. Abstract ID: ORS2009-0915. Poster Presentation #2352, Poster Session 64: Arthroplasty—Implant Wear.

76. Tochigi Y, McKinley TO, Vaseenon T, Fredericks DC, Heiner AD, Martin JA, Rudert MJ, Brown TD. Degree of joint instability determines severity of cartilage degeneration in rabbit knees. *55th Annual Meeting of the Orthopaedic Research Society,* February 22–25, 2009, Las Vegas, Nevada. Abstract ID: ORS2009-3220. Poster Presentation #1115, Poster Session 28: Osteoarthritis Animal Models.

Grant Support / Research Funding / Contracts

04/01/1996–04/30/2000 USDHHS, National Institutes of Health 5 R01 AR035788
Thomas D. Brown, Ph.D. (PI)
"Structural Efficacy of Bone Grafting in Osteonecrosis"
$822,380 (Co-Investigator)

10/01/1997– 01/01/1999	Implex Corporation. "Prototype Testing of Hedrocel Rods for Treatment of AVN" $17,200 Total Costs (Principal Investigator)
04/01/1998–06/30/2002	Pacific Research Laboratories, Incorporated. "Structural Properties of Third-Generation Composite Femurs and Tibias" $28,850 (Principal Investigator)
06/01/1998–03/01/1999	Implex Corporation "Fatigue Testing of Hedrocel AVN Grafts" $7,682 (Principal Investigator)
10/1/1998–08/01/1999	Allegiance Healthcare Corporation "Frictional Insertion Kinetics of Bone Biopsy Needles" $9,240 (Principal Investigator)
01/1/1999–06/30/1999	University of Iowa Central Investment Fund for Research Enhancement "An In-Vitro Model of Morselized Cancellous Bone Reconstitution" $9,080 (Principal Investigator)
01/01/1999–06/30/1999	University of Iowa Central Investment Fund for Research Enhancement "Effects of Mechanical Stress on Cartilage Metabolism: A Novel In Vitro Approach" $8,530 (Co-Principal Investigator)
04/24/2000–03/31/2006	USDHHS, National Institutes of Health 5 R01 AR046601 Thomas D. Brown, Ph.D. (PI) "Nonlinear Computational Biomechanics of the Hip" $2,598,478 Total Costs (Co-Investigator)
05/01/2001–02/28/2006	USDHHS, National Institutes of Health 5 R03 AR046863 "Revision THA Impaction Grafts: Effects of Bone Fusion" $220,500 Total Costs (Principal Investigator)
07/15/2002–02/28/2007	University of Iowa College of Dentistry – Dows Institute for Dental Research Ali Fakhry, D.M.D., M.S. (PI) "Study in the Retention of Ball Attachments Used for Implant-Related Overdentures" $19,471 Total Costs (Co-Investigator)
09/05/2002–03/31/2007	USDHHS, National Institutes of Health 5 R01 AR047653 Thomas D. Brown, Ph.D. (PI)

	"Mechanisms of Third Body Acceleration of THA Wear" $1,145,208 (Co-Investigator)
09/16/2002 – 08/31/2008	USDHHS, National Institutes of Health (SCOR) 5 P50 AR048939 "Pathogenesis and Prevention of Post-Traumatic OA" $4,647,276 Total Costs (Investigator)
06/15/2006–08/15/2006	Smith & Nephew, Incorporated M. James Rudert, Ph.D. (PI) "Investigation of Dislocation Kinematics of Oxinium THA Components" $14,154 (Investigator)
06/01/2006–05/31/2007	Smith & Nephew, Incorporated "Frictional Coefficient Testing of Bone Ingrowth Structures" $7,583 (Principal Investigator)
06/01/2007–08/31/2007	Pacific Research Labs, Incorporated "Structural Properties of Fourth-Generation Composite Femurs and Tibias" $12,250 Total Costs (Principal Investigator)
09/10/2007–08/31/2012	USDHHS, National Institutes of Health (CORT) 5 P50 AR055533 Joseph A. Buckwalter, M.D. (PI) "New Approaches to Assess and Forestall Osteoarthritis in Injured Joints" $7,435,286 Total Costs (Biomechanics & Imaging Core Investigator)

Honors

12/86 William J. Branstrom Prize. Top 5% of first-semester freshmen
3/87 Jule and Avery Hopwood Award in Creative Writing
12/88 Tau Beta Pi National engineering honor society
Offices held: Coordinating Vice President, Tutoring Chairman
4/90 Outstanding Achievement Award in Undergraduate Materials Science and Engineering
5/90 James B. Angell Scholar. Perfect scholastic record for two consecutive terms
7/90 NIH Training Grant recipient
9/92 NSF Fellowship recipient
5/93 ASTM F-4 Committee 1993 Best Student Paper Competition
Paper title: "Effects of Design and Screw Torque on Stresses in Spinal and Fracture Fixation Plates: A Photoelastic Study."

Professional Societies

American Society of Biomechanics
Orthopaedic Research Society
Society for Biomaterials