

Joseph E. Hale
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Education

1991	Ph.D.	Biomedical Engineering	University of Iowa	Iowa City, IA
1988	M.S.	Bioengineering	Clemson University	Clemson, SC
1983	B.S.	Mechanical Engineering	Boston University	Boston, MA

Research and Professional Experience

8/06 – present **MEDICAL DEVICES CONSULTANT**
Provide technical and business support services for medical device companies, including pre-clinical testing, data analysis, regulatory guidance, clinical study design, upstream market strategy, and business development strategy.

6/14 – present **ADJUNCT FACULTY / INSTRUCTOR**
University of Minnesota, Technological Leadership Institute, Minneapolis, MN
Developed curriculum and Course Director for 3 semester practicum for master's degree program in Medical Device Innovation.

8/14 – present **ASSOCIATE DIRECTOR, INNOVATION FELLOWS PROGRAM**
University of Minnesota, Medical Devices Center, Minneapolis, MN
Assist Program Director with primary responsibility for establishing/maintaining external relationships and mentoring second year Fellows.

9/08 - 8/09 **SENIOR INNOVATION FELLOW**
University of Minnesota, Medical Devices Center, Minneapolis, MN
Inaugural class of Medical Device Innovation Fellowship; intensive training program in medical devices innovation and entrepreneurship, resulting in 16 intellectual property disclosures and multiple patent filings.

9/05 – 7/06 **SENIOR SCIENTIST / APPLIED RESEARCH MANAGER**
Spineology, Inc., Oakdale, MN
Direct research efforts to support development, FDA approval and marketing of a spinal implant for vertebral fracture repair and intervertebral fusion applications.

9/02 – 6/04 **SENIOR SCIENTIST**
Raymedica, Inc., Bloomington, MN
Develop/execute research protocols for development of an artificial intervertebral disc nucleus replacement.

9/97 – 4/02 **RESEARCH ENGINEER**
Minneapolis Sports Medicine Center, Biomechanics Laboratory, Minneapolis, MN
Assist Director in establishing new research laboratory. Responsible for definition and execution of experimental test procedures, analysis of data, and preparation of funding applications and publications.

7/99 – 12/07 **ADJUNCT ASSISTANT PROFESSOR / INSTRUCTOR**
Department of Biomedical Engineering and Program in Physical Therapy,
University of Minnesota, Minneapolis, MN
Instructor for Advanced Biomechanics (BMEn5201, Spring 2001 and 2002)
and Advanced Kinesiology (PMed8135, Fall 2003, 2005 and 2007).

5/97 - 6/05 **CONSULTANT**
Food and Drug Administration (DHHS), Washington, D.C.
Voting member of Orthopedic and Rehabilitation Devices Advisory Panel for the Center for Devices and Radiological Health.

8/93 - 7/97 **ASSISTANT PROFESSOR OF ORTHOPAEDICS and BIOMEDICAL ENGINEERING**
DIRECTOR, ORTHOPAEDIC BIOMECHANICS LABORATORY
University of Virginia, Charlottesville, VA
Responsible for establishing/directing Biomechanics Research Laboratory, securing funding for research projects, and instructing residents and graduate students.

1/92 - 7/93 **POST-DOCTORAL FELLOW**
University of Virginia, Dept. of Biomedical Engineering, Charlottesville, VA
Research of pressure related aspects of soft-tissue injury as part of Rehabilitation Engineering Center for wheelchair mobility.

Patents

Catheter Insertion Sterilization, U.S. Patent #8,933,416, January 13, 2015.

Treatment and Placement Device for Sinusitus Applications, U.S. Patent #8,435,261, May 7, 2013.

System and Method for Reducing Environmental Crematorial Release of Mercury from Mercury-Containing Dental Amalgam, U.S. Patent #8,402,619, March 26, 2013.

Shoulder Arthrometer, U.S. Patent #6,390,994, May 21, 2002.

Additional U.S. and WO patents pending.

Journal Publications

Van Kampen RJ, Thoreson AR, Knutson NJ, **Hale JE**, Moran S: Comparison of a New Intramedullary Scaffold to Volar Plating for Treatment of Distal Radius Fractures. *Journal of Orthopaedic Trauma* 27(9):535-541, 2013.

Chhabra AB, **Hale JE**, Milbrandt TA, Carmines DV, Degnan GG: The Biomechanical Efficacy of an Internal Fixator for the Treatment of Distal Radius Fractures. *Clinical Orthopaedics* 393:318-325, 2001.

Gooch HL, **Hale JE**, Fujioka H, Balian G, Hurwitz SR: Alterations of Cartilage and Collagen Expression During Fracture Healing in Experimental Diabetes. *Connective Tissue Research* 41(2):81-91, 2000.

Funk JR, **Hale JE**, Carmines DV, Gooch HL, Hurwitz SR: Biomechanical Evaluation of Early Fracture Healing in Normal and Diabetic Rats. *Journal of Orthopaedic Research* 18(1):126-132, 2000.

Hale JE and Anderson DD: Contact Pressures at Osteochondral Donor Sites in the Knee [letter; comment]. *American Journal of Sports Medicine* 27(2):267-268, 1999.

Hall GW, Crandall JR, Carmines DV, **Hale JE**: Rate Independent Characteristics of an Arthroscopically Implantable Force Probe in the Human Achilles Tendon. *Journal of Biomechanics* 32(2):203-207, 1999.

Brown TD, Hurlbut PT, **Hale JE**, Gibbons TA, Caldwell NJ, Marsh JL, Nepola JV: Effects of Imposed Hindfoot Constraint on Ankle Contact Mechanics for Displaced Lateral Malleolar Fractures. *Journal of Orthopaedic Trauma* 8(6):511-519, 1994.

Hale JE and Vaughan CL: Some Problems in using a Polyvinylidene Fluoride Transducer for the Intra-Articular Determination of Joint Contact Stress. *Journal of Engineering in Medicine*, 207:127-131, 1993.

Hale JE, Rudert MJ, Brown TD: Indentation Assessment of Biphasic Mechanical Property Deficits in Size-Dependent Osteochondral Defect Repair. *Journal of Biomechanics*, 26(11):1319-1326, 1993.

Caldwell NJ, **Hale JE**, Rudert MJ, Brown TD: An Algorithm for Approximate Crinkle Artifact Compensation in Pressure-Sensitive Film Recordings. *Journal of Biomechanics* 26(8):1001-1010, 1993.

Hale JE and Brown TD: Contact Stress Gradient Detection Limits of Pressensor Film. *Journal of Biomechanical Engineering* 114:352-357, 1992.

Brown TD, Pope DF, **Hale JE**, Buckwalter JA, Brand RA: Effects of Osteochondral Defect Size on Cartilage Contact Stress. *Journal of Orthopaedic Research* 9:559-567, 1991.

Book Chapters

Ray CD, **Hale JE** and Norton BK: Prosthetic Disc Nucleus Partial Disc Replacement: Pathobiological and Biomechanical Rationale for Design and Function. In: *Dynamic Reconstruction of the Spine*, edited by D.H. Kim, F. Camissa and R. Fessler, Thieme, 2006.

Anderson DD, Adams DJ and **Hale JE**: Mechanical Effects of Forces Acting on Bone, Cartilage, Ligaments, and Tendon. In: *Biomechanics and Biology of Movement*, edited by B.M. Nigg, B.R. MacIntosh and J. Mester, Human Kinetics, 2000.

Hale JE: Biomaterials. In: *Orthopaedic Surgery: The Essentials*, edited by J.E. Imbriglia and M.E. Baratz, New York: Thieme, 1999.

Selected Abstracts and Conference Presentations (from 50 total)

- Strassmair M, Rikli D, Schmidt J, Erli H, **Hale J**, Schmidt A, Walsh T, Moran S: A Novel, Multi-Planar and Less Invasive Approach to Distal Radius Fracture Fixation – A Prospective Case Series. Proc. 28th Annual Meeting of the Orthopaedic Trauma Association (Minneapolis, MN), Oct 3-6, 2012.
- van Kampen RJ, Thoreson AR, Knutson NJ, **Hale JE**, Moran SL: A Biomechanical Comparison of Intramedullary and Volar Plate Fixation of Distal Radius Fractures. Proc. 27th Annual Meeting of the Orthopaedic Trauma Association (San Antonio, TX), Oct 12-15, 2011.
- van Kampen RJ, Thoreson AR, Knutson NJ, **Hale JE**, Moran SL: A New Intramedullary Device for Distal Radius Fracture Fixation – Biomechanical Comparison to Volar Plating. Deutsche Gesellschaft für Handchirurgie (DGH; Bonn, Germany) Oct 6-8, 2011.
- Hale JE**, Wolfe SJ, Backus CK: Application of Granular Mechanics to a Novel Biological Vertebral Augmentation Device. Design of Medical Devices Conference (University of Minnesota), April 19-21, 2006.
- Hale JE**, Norton BK, Bauer LJ, Ross SE, Hutton WC: Positional Stability Testing of a Prosthetic Disc Nucleus Device. Accepted for presentation at the 28th Annual Meeting of the American Society of Biomechanics (Portland, OR), Sept. 8-11, 2004.
- Hale JE**, Norton BK, Bauer LJ, Ross SE, Hutton WC: Positional Stability of the PDN-SOLO Prosthetic Disc Nucleus Device – An In Vitro Biomechanical Evaluation. Proc. 4th annual meeting of the Spinal Arthroplasty Society (Vienna), May 4-7, 2004.
- Hale JE**, Norton BK, Ross SE, Hutton WC: Biomechanical Evaluation of Expulsion Forces for Paired and Single Prosthetic Disc Nucleus Device Designs. Proc. 27th Annual Meeting of the American Society of Biomechanics (Toledo, OH), Sept. 25-27, 2003.
- Stangier SD, **Hale JE**, Anderson DD: Dynamic Testing of Rat Achilles Tendon. Trans. IV World Congress of Biomechanics (Calgary), 2002.
- Vogelpohl L, Anderson DD, **Hale JE**, Stangier SD, Guanche CA: Increasing Age Slows Recovery of Function Following Achilles Tendon Injury in the Rat. Trans. IV World Congress of Biomechanics (Calgary), 2002.
- Roemmich JN, Rogol AD, **Hale JE**, Nagy TR, Gower BA, Lubahn DB, Rissman EF: Exercise Augments Bone Mineral Independent Of The Estrogen Receptor-Alpha In Female Mice. Proc. annual meeting of the American College of Sports Medicine, 2002.
- Panek TJ, **Hale JE**, Anderson DD, Guanche CA, Freehill MQ, Buss DD: Pressurization of the Glenoid to Increase Cement Penetration in Total Shoulder Arthroplasty. Proc. 69th Annual Meeting of the American Academy of Orthopaedic Surgeons (Dallas, TX), Feb. 13-17, 2002, Vol. 3, p. 514.
- Hale JE**, Panek TJ, Guanche CA, Anderson DD, Buss DD: Cement Penetration Associated with Pressurization of the Glenoid in Total Shoulder Arthroplasty. Proc. 24th Annual Meeting of the American Society of Biomechanics (Chicago, IL), July 19-22, 2000.
- Hale JE**, Anderson DD, Johnson GA, Magovern JA: An Assessment of the Pull-Through Strength and Fatigue Properties of a New Sternal Closure Technique. Proc. 23rd Annual Meeting of the American Society of Biomechanics, Oct. 20-23, 1999.
- Hale JE**, Anderson DD, Johnson GA: A Polyurethane Foam Model for Characterizing Suture Pull-Through Properties in Bone. Proc. 23rd Annual Meeting of the American Society of Biomechanics, Oct. 20-23, 1999.
- Magovern JA, Johnson GA, **Hale JE**, Anderson DD: Mechanical Testing of a New Method for Reinforced Sternal Closure. 13th Annual Meeting of the European Association for Cardio-Thoracic Surgery, Sept. 5-8, 1999.

- Hale JE**, Anderson DD, Johnson GA: Characterization of a polyurethane foam model for testing stainless steel suture pull-through in bone. ASME Summer Bioengineering Conference, June 16-20, 1999.
- Hale JE**, Chhabra AB, Degnan GG, Milbrandt TA, Carmines DV: Is Internal Plating of Complex Distal Radius Fractures Biomechanically Equivalent to External Fixation? Proc. 3rd Triennial International Hand and Wrist Biomechanics Symposium, Sept. 9, 1998.
- Funk J, **Hale J**, Carmines D, Gooch HL, Hurwitz SR: Biomechanical Evaluation of Fracture Healing in Normal and Diabetic Rats. Proc. 21st Annual Meeting of the American Society of Biomechanics, Sept. 24-27, 1997.
- Hall G, Klopp G, Crandall J, Carmines D, **Hale, J**: Rate Independent Characteristics of an Arthroscopically Implantable Force Probe in the Human Achilles Tendon. Proc. 21st Annual Meeting of the American Society of Biomechanics, Sept. 24-27, 1997.
- Roemmich JN, Rogol AD, **Hale JE**, Lubahn DB, Rissman EF: Bone Strain Independently Augments Bone Mineral in Pubertal Mice with the Disrupted Estrogen Receptor Gene. American Society for Bone and Mineral Research, Sept. 10-14, 1997.
- Gooch HL, Hurwitz SR, Funk J, **Hale JE**, Carmines D, Thakur RK, Anderson P, Balian G: Alteration of Cartilage Expression in Fracture Healing in Experimental Diabetes. Trans. 43rd Annual Meeting of the Orthopaedic Research Society, Feb. 9-13, 1997.
- Hale JE**, Thanapipatsiri S, Fenton D, Chan DPK: Biomechanical Evaluation of Transverse Process Fixation of the Thoracic Spine. Proc. 20th Annual Meeting of the American Society of Biomechanics, Oct. 17-19, 1996.
- Hale JE**, Carmines DV, Baker CL: Comparison of Pullout Characteristics for Two Tapered Bone Screws. Proc. 20th Annual Meeting of the American Society of Biomechanics, Oct. 17-19, 1996.
- Ke JH, Chan DPK, Wang GJ, **Hale JE**: Biomechanical Effects of Spinal Fusion on Adjacent Motion Segments. Trans. 42nd Annual Meeting of the Orthopaedic Research Society, Feb.18-22, 1996.
- Brown TD, Hurlbut PT, **Hale JE**, Gibbons TA, Caldwell NJ, Marsh JL, Nepola JV: Effects of Imposed Hindfoot Constraint on Contact Mechanics of Displaced Lateral Malleolar Fractures. Trans. 40th Annual Meeting of the Orthopaedic Research Society, Feb. 21-24, 1994.
- Hale JE** and Brown TD: Geometry Dependent Changes in the Biomechanics of Osteochondral Defect Repair. 17th Annual Meeting of the American Society of Biomechanics, Oct. 21-23, 1993.
- Brown TD, **Hale JE**, Rudert MJ, Anderson DD, Pope DF, Huber-Betzer H, Mohler CG, Caldwell NJ, Brand RA: Biomechanics of Local Articular Incongruities. 1992 International Symposium Biomedical Engineering in the 21st Century, Sept. 23-26, 1992.
- Mohler CG, **Hale JE**, Rudert MJ, Brand RA, Brown TD, Buckwalter JA: Size-Dependent Relations Between Contact Stresses, Histomorphometry, and Repair Tissue Properties in Healing Osteochondral Defects. Trans 38th Annual Meeting of the Orthopaedic Research Society, Feb. 17-20, 1992.
- Hale JE**, Rudert MJ, Mohler CG, Brown TD: Biphasic Constitutive Characterization of Osteochondral Repair. Trans 38th Annual Meeting of the Orthopaedic Research Society, Feb. 17-20, 1992.
- Hale JE**, Brown TD, Rudert MJ, Mohler CG, Brand RA, Buckwalter JA: Alterations of Contact Stress and Tissue Histomorphometry in Size-Dependent Osteochondral Defect Repair. Proc 15th Annual Meeting of the American Society of Biomechanics, Oct. 16-18, 1991.
- Brown TD, Pope DF, **Hale JE**, Buckwalter JA, Brand RA: Cartilage Contact Stress as a Function of Osteochondral Defect Size. Trans. 37th Annual Meeting of the Orthopaedic Research Society, March 4-7, 1991.
- Hale JE** and Vaughan CL: A Polyvinylidene Fluoride Transducer for the Intra-Articular Determination of Joint Contact Forces. Proc. Seventh Southern Biomedical Engineering Conference, 1988. (recipient of Best Student Paper award)

Honors and Awards

American Society of Biomechanics Predoctoral Young Scientist Award (1991)
 University of Iowa, Iowa Fellowship (1988 - 1991)
 Student Paper Award, Southern Biomedical Engineering Conference (1988)
 Clemson University Alumni Fellowship (1986 - 1987)
 Outstanding Young Men of America (1984)
 Boston University Scarlet Key Honorary Activities Award (1983)
 Tau Beta Pi, National Engineering Honor Society (1982)
 National Society of Professional Engineers Scholarship (1979 - 1983)
 Boston University Academic Scholarship (1979 - 1983)
 Dean's List, Boston Univ. College of Engineering (1979 - 1983)
 Eagle Scout

Professional Affiliations

Engineer-in-Training (EIT) registration, Massachusetts (1983)
 American Society of Biomechanics, member (1989 – present)
 Executive Board / Newsletter Editor (1995 - 2000)
 ASB Newsletter editorial board (1992 - 2000)
 American Society of Mechanical Engineers, member (1991 – present)
 Ad Hoc Biomechanical Standards Committee (1998 – 2003)
 Orthopaedic Research Society, member (1992 – present)
Ad hoc reviewer for:
 Journal of Orthopaedic Research, John Wiley & Sons
 Journal of Biomechanics, Pergamon Press
 Journal of Biomechanical Engineering, American Society of Mechanical Engineers
 American Journal of Sports Medicine, American Orthopaedic Society for Sports Medicine
 American Journal of Veterinary Research, American Veterinary Medical Assoc.
 IEEE Transactions on Rehabilitation Engineering
 Associate Editor for special issue of ASME *Journal of Biomechanical Engineering* focusing on design of medical devices, 2005

Community Involvement

National Ski Patrol (1995 - present)
 Certified Senior Patroller, Hill Chief, member of Welch Village (MN) ski patrol
 Maplewood (MN) Fire Department, volunteer (2000 – present), Captain (2007 – present)
 Certified Firefighter I/II, HAZMAT Tech., Emergency Medical Tech. (MN), NAUI SCUBA/Rescue Diver
 Boy Scouts of America (2004 – present)
 Volunteer adult leader: Den Leader (2004 – 2008), Scoutmaster (2010 – present), Cubmaster (2011 – 2015)
 FIRST Robotics League (2009 – present)
 Volunteer Judge
 Music ministry (instrumentalist), St. Peter's Catholic Church, North St. Paul, MN (1998 – present)
 Habitat for Humanity International, volunteer (1989 – present)
 Board of Directors; Construction Committee Chair for first home, Fluvanna Co. (VA) affiliate
 Construction crew leader, Twin Cities affiliate (1998-present)