



Joel M. Bach, Ph.D.

Education

- Ph.D. University of California, Davis – 1995
Biomedical Engineering
Dissertation Title: “Strain in the Anteromedial and Posterolateral Bundles of the Anterior Cruciate Ligament Under the Application of External and Muscular Loads”
Advisor: Prof. Maury L. Hull
- B.S. State University of New York at Buffalo - 1987
Aerospace Engineering

Employment History

Current Positions

- 2005 – Present **Associate Professor**
Division of Engineering
Colorado School of Mines
- 2005 – Present **Associate Director**
Bioengineering and Life Sciences Program
Colorado School of Mines
- 2004 – Present **Director**
Center for Intelligent Biomedical Devices and Musculoskeletal Systems
Colorado School of Mines
- 2009 – Present **Clinical Associate Professor**
Department of Orthopaedics
University of Colorado Denver

Past Positions

- 2006 – 2008 **Associate Professor**
Department of Orthopaedics
University of Colorado Denver
- 1998 – 2008 **Director, Orthopaedic Biomechanics Labs**
Department of Orthopaedics
University of Colorado Denver
- 1998 – 2006 **Assistant Professor**
Department of Orthopaedics
University of Colorado at Denver and Health Sciences Center
- 2001 – 2005 **Assistant Professor**
Division of Engineering
Colorado School of Mines
- 2004 – 2005 **Acting Associate Director**
Bioengineering and Life Sciences Program
Colorado School of Mines
- 2003 – 2004 **Assistant Director**
Bioengineering and Life Sciences Program
Colorado School of Mines

- 2001 – 2002 **Adjunct Professor**
Department of Mechanical Engineering
University of Colorado, Boulder
- 1998 – 2001 **Faculty Affiliate**
Department of Mechanical Engineering
Colorado State University
- 1999 – 2001 **Adjunct Professor**
Department of Engineering
University of Denver
- 1997 – 1998 **Acting Director**
University of California Ergonomics Program
University of California, San Francisco
- 1997 – 1998 **Consulting Biomedical Engineer**
von Haenel & Associates
Sacramento, California
- 1997 – 1998 **Assistant Research Engineer**
Division of Occupational and Environmental Medicine, Department of Medicine
University of California, San Francisco
- 1994 – 1998 **Lecturer**
School of Public Health
University of California, Berkeley
- 1994 – 1997 **Post Doctoral Fellow**
Division of Occupational and Environmental Medicine, Department of Medicine
University of California, San Francisco.
- 1991 – 1993 **Associate Instructor**
Department of Mechanical and Aeronautical Engineering
University of California, Davis
- 1989 – 1994 **Graduate Research Assistant**
Department of Mechanical and Aeronautical Engineering
University of California, Davis
- 1987 – 1989 **Graduate Research Assistant**
Department of Mechanical and Aerospace Engineering
State University of New York at Buffalo.
- 

Professional Societies

- American Society of Biomechanics (ASB)
- American Society of Mechanical Engineers (ASME)
- ASTM International (ASTM)
- International Society of Biomechanics (ISB)
- International Society for Computer Assisted Orthopaedic Surgery (CAOS-International)
- Orthopaedic Research Society (ORS)

Professional Activities and Service

International

- ASTM International subcommittee for Standard Practice for Measuring and Reporting Accuracy of Computer Assisted Orthopaedic Surgical Systems, Chairman 2004 – present
- 5th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, Session Chair 2005
- 6th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, Session Chair 2006
- 7th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, Session Chair 2007
- Journal of Electromyography and Kinesiology, Editorial Board 2005 – 2006

National

- 2001 ASME International Mechanical Engineering Conference & Exposition, Session Chair 2001

State – Colorado

- Colorado Alliance for Bioengineering (CAB), Member 1999 – present
 Executive Board Member 2003 – present

Institutional – Colorado School of Mines

- Bioengineering Seminar Series, Coordinator 2005 – present
- Curriculum Committee, Member 2003 – 2007
- Curriculum and Research Committee, Bioengineering and Life Sciences Program, Chairman 2003 – present

Institutional – University of Colorado Denver

- Bioengineering Steering Committee, Member 2000 – present

Departmental – Engineering, Colorado School of Mines

- Mechanical Engineering Seminar Series, Coordinator 2009 – present
- Graduate Committee 2001 – present
- Thesis Committees

M. Dace, M.S.	2001
K. Anderson, M.S.	2003
C. Hammill, M.S.	2003
K. Jones, M.S.	2006
T. Holz, M.S.	2007
K. Peeke, M.S.	2007
S. Lewandowski, M.S.	2007
M. Wennogle, M.S.	2007
H. Hoops, M.S.	2007
P. Le, M.S.	2007
A. Babb, M.S.	2007
K. Desens, M.S.	2008
J. Smith, M.S.	2008

Departmental – Orthopaedics, University of Colorado Denver

- Academic Council 2003 – 2008
- Curriculum Committee 2003 – 2008
- Research Committee 1999 – 2008

Departmental – Mechanical Engineering, University of Colorado, Boulder

- Thesis Committees J. Cooke, M.S. 2001

Local

- Denver Metropolitan Science Fair. Judge 2001 – 2005

Research Proposal Reviewer

- American Institute of Biological Sciences (U.S. Army, U.S. Navy) 2001 – present
- Centers for Disease Control (CDC) 2005, 2007
- Colorado Advanced Software Institute 2000, 2001
- Science and Technology Foundation – Portugal 2005

Journal Article Reviewer

- American Journal of Sports Medicine 1999 – present
- Annals of Biomedical Engineering 1997 – present
- Clinical Orthopaedics and Related Research 2001 – present
- Journal of Biomechanical Engineering 1998 – present
- Journal of Biomechanics 1997 – present
- Journal of Bone and Joint Surgery 2006 – present
- Journal of Electromyography and Kinesiology 2005 – present



Conference Abstract Reviewer

- American Society of Biomechanics 2003
- American Society of Mechanical Engineers, Bioengineering Division 2006
- Orthopaedic Research Society 2002

Textbook Reviewer

- John Wiley & Sons, Inc. 2003, 2005
- McGraw-Hill 2004
- Prentice Hall 2004

Teaching and Related Activities

Courses Taught

- Prosthetic and Implant Engineering (EGGN498/BELS498/EGES598/BELS598)
Colorado School of Mines. Spring 2006, Fall 2008
- Computer Aided Engineering (EGGN 413)
Colorado School of Mines. Fall 2004
- Biomedical Instrumentation (BELS430/EGGN430, BELS530/EGES530)
Colorado School of Mines. Spring 2003 – 2005,
2007
- Dynamics (Undergraduate, EGGN 315)
Colorado School of Mines. Fall 2002, 2003
- Musculoskeletal Biomechanics (BELS425/EGGN425, BELS525/EGGN525)
Colorado School of Mines. Spring 2002 – 2007,
2009
- Introduction to Biomedical Engineering (Undergraduate BELS420, Graduate EGGS598),
Colorado School of Mines. Fall 2001 – 2008
- Musculoskeletal Biomechanics (Undergraduate MCEN4228, Graduate 5228)
University of Colorado, Boulder. Spring 2000&2001
- Orthopaedic Residents In-Service Basic Science Training (co-taught w/ multiple faculty)
University of Colorado Denver. 1998 – present
- Dynamics Laboratory (Undergraduate, ENG102L)
University of California, Davis. Spring 1991 – 1993

Other Teaching Experience

- Nature and Human Values (LIHU100), 1 lecture on Bioethics
Colorado School of Mines. Fall 2006
- Movement Science II (DPTR6102), 1 lecture and 1 lab
University of Colorado at Denver and Health Sciences Center Summer 2006
- Introduction to Orthopaedics (Ortho6620), 1 lecture each year
University of Colorado at Denver and Health Sciences Center Spring 1999,
Spring 2004
- Introduction to Solid Biomechanics (Graduate, EGES598A), 1 lecture
Colorado School of Mines. Spring 2001
- Bioengineering (Graduate, ME570), 2 lectures
Colorado State University Fall 1999
- Ergonomics (PH269C), 1 lecture
University of California, Berkeley Spring 1997

Occupational Biomechanics, 2 lectures University of California, Berkeley	Fall 1996
Dynamics Laboratory (Undergraduate, ENG102L), Head Teaching Assistant University of California, Davis	Spring & Fall 1990 Fall 1991, 1992
Manufacturing Processes (Undergraduate, EME050), Teaching Assistant University of California, Davis	Fall 1990
Engineering Graphics in Design (Undergraduate, ENG004), Teaching Assistant University of California, Davis	Spring 1990

Workshops and Short Courses

“Evolution of Computer Assisted Orthopaedic Surgery“, Fall Orthopaedic Summit on Minimally Invasive Surgery, Keystone, Colorado	September 2005
“Scientific and Engineering Advances in Orthopaedic Medicine“. On the Edge of Knowledge, Golden, Colorado	June 2004
“The Human Machine: Biomechanics in Daily Life“, The Davidson Workshop, Golden, Colorado	June 2002
“Computer Assisted Surgical Planning“, Children's Orthopaedic Day, Denver, Colorado	April 2001
“Biomechanics of Sports, Sports Medicine for the Primary Care Provider“, Breckenridge, Colorado	June 2000

Research Funding

Effect of Arm Support Design on Shoulder Muscle Activity and Muscle Oxygenation. Office Ergonomics Research Committee. <i>Co-investigator.</i> \$10,000.	1995-1998
EMG Activity of the Thenar Musculature During Pipetting Tasks. Rainin Corporation. <i>Principal Investigator.</i> \$25,000.	1996-1998
Ergonomic Effects of a Split Keyboard Design Incorporated into a Notebook Computer. Samsung Corporation. <i>Principal Investigator.</i> \$14,000.	1996-1997
Tendon Force During Occupational Hand Activities. National Institutes of Occupational Health. <i>Co-investigator.</i> \$209,783.	1998-2002
Networked 3D Virtual Human Anatomy, Phase II. National Library of Medicine. <i>Co-investigator.</i> \$3,076,072.	1999-2001
Evaluation of New Processing Technique for Bone Graft Samples. AlloSource. <i>Principal Investigator.</i> \$2,835.	2001
Effects of ACL Graft Preconditioning on Knee Joint Kinematics. National Institutes of Health, Summer Research Trainee Grant. <i>Faculty Advisor.</i> \$4,500.	2001

Determination of the Functional Axis of Flexion-Extension in the Human Knee: An In-Vitro Investigation. National Institutes of Health, Summer Research Trainee Grant. <i>Faculty Advisor.</i> \$4,500.	2001
Testing of a New Formulation of Bone Cement. Hospital for Special Surgery. <i>Principal Investigator.</i> \$3,528.	2001
The Role of the Iliotibial Band and Biceps Femoris in Controlling Abnormal Varus and External Rotation in the Knee: A Biomechanical Study. American Orthopaedic Society for Sports Medicine. <i>Co-principal Investigator.</i> \$25,000.	2001-2002
Biomechanics of Hip Stem Pullout. DePuy Orthopaedics a J&J Company. <i>Principal Investigator.</i> \$10,080.	2002-2003
Biomechanical Evaluation of the Effects of Fracture of the Lateral Process of the SubTalar Joint on Articular Pressure. Aspen Foundation for Sports Medicine, Education & Research. <i>Principal Investigator.</i> \$22,360.	2002-2003
The Effect of Varying Screw Insertion Angles on Pullout Strength with an Internal Fixator with Locked Unicortical Screws. AO North America. <i>Co-Principal Investigator.</i> \$5,000.	2002
Alignment of the Functional Axis of Flexion-Extension in TKA National Institutes of Health, Summer Research Trainee Grant. <i>Faculty Advisor.</i> \$4,500.	2002
Serving Humanity: Engineers Improving the World Through Regional, National, and International Community Service. The William and Flora Hewlett Foundation. <i>Co-investigator.</i> \$1,249,866.	2003-2007
Determination of the Cylindrical Axis of Flexion-Extension in the Human Knee: An In-Vitro Investigation National Institutes of Health, Summer Research Trainee Grant. <i>Faculty Advisor.</i> \$4,500.	2003
Identification and Validation of the Concept of a Mechanical Axis in the Human Lower Extremity National Institutes of Health, Summer Research Trainee Grant. <i>Faculty Advisor.</i> \$4,500.	2003
Peak Performance Motion Analysis Equipment Donation Microsoft Corporation <i>Principal Investigator,</i> \$70,000.	2003
Electromagnetic Tracking Equipment Donation Medtronic Surgical Navigation Technologies <i>Principal Investigator,</i> \$31,000	2004

Development of a Leg Analog for Use in Testing Knee Braces DJ Orthopaedics <i>Principal Investigator.</i> \$22,860.	2005
ACL Brace Testing Using a Soft Tissue Analog and Cadaver Construct DJ Orthopaedics <i>Principal Investigator.</i> \$5,386.50.	2005
Development of Cylindrical Axis Fitting Program for the Medtronic StealthStation Medtronic Surgical Navigation Technologies <i>Principal Investigator,</i> \$51,310	2005-2007
Development of a Pelvic Coordinate System for Use with the Medtronic Stealth Station Surgical Navigation System Medtronic Surgical Navigation Technologies <i>Principal Investigator,</i> \$73,360	2005-2007
Effects of Computer Assisted Technique in Acetabular Cup Positioning for Total Hip Arthroplasty Zimmer, Inc. <i>Co-Principal Investigator,</i> \$55,274	2005-2006
A Study of Alignment in TKA Around a Single Flexion Axis Stryker Leibinger <i>Co-Principal Investigator,</i> \$68,575.	2005-2007
A Research Partnership Between Encore Medical and UCD Orthopaedics Encore Medical, LP <i>Co-Principal Investigator,</i> \$250,000.	2005-2008

Research Supervision

Graduate Students

Alton W. Clark, M.S. (1998)

Mechanical Engineering, University of California Berkeley, w/Prof. Rempel)

Thesis: Design and evaluations of a device for accurately controlling finger posture and fingertip loading vector during in vivo tendon force experiments

J. Quinn Campbell, M.S. (2001)

Mechanical Engineering, University of Colorado, Boulder

Jennifer Kellogg, M.S. (2001)

Aerospace Engineering, University of Colorado, Boulder

Eric T. Hansen, M.S. (2004)

Engineering Systems, Colorado School of Mines, w/Prof. Shoureshi

Thesis: Development, Calibration, and Evaluation of a Telemetric Transducer for Patellofemoral Force Measurement in a Human Knee

Kerry Jones, M.S. (2006)

Engineering Systems, Colorado School of Mines

Thesis: Development of a Soft Tissue Analog for Use in Cadaveric Knee Brace Testing

Jodi Kiefer, M.S. (2006)

Engineering Systems, Colorado School of Mines

Katherine Peeke, M.S. (2007)

Engineering Systems, Colorado School of Mines

Thesis: Study of Alignment in Total Knee Arthroplasty Around a Single Flexion Axis Evaluated for Helical and Conical Axes

Tara N. Holz, M.S. (2007)

Engineering Systems, Colorado School of Mines

Thesis: The Extensor Mechanism, Patellofemoral Contact Mechanics, and Kinematics of the Knee in Four Conditions: Healthy, ACL Deficient, Implanted PCL Sparing and Sacrificing.

Sara L. Lewandowski, M.S. (2007)

Engineering Systems, Colorado School of Mines

Thesis: Development of a Pelvic Reference Frame for Image-Guided Computer-Assisted Total Hip Arthroplasty

Heather E. Hoops, M.S. (2007)

Engineering Systems, Colorado School of Mines

Thesis: The Neuromuscular Response of the Lumbar Spine to Varying Rest Durations Between Cyclic Flexion Periods (research supervised by Prof. Solomonow)

Anthony J. Babb, M.S. (2007)

Engineering Systems, Colorado School of Mines

Thesis: A Comparative Study of the Anteroposterior, Cylindrical, Posterior Condylar, and Transepicondylar Axes for Femoral Implant Positioning in Total Knee Arthroplasty

Kelly Desens, M.S. (2008)

Engineering Systems, Colorado School of Mines

Thesis: In Vivo Prediction of Modular Component Sizing, Orientation, and Range of Motion, for Total Hip Arthroplasty

Jennifer Smith, M.S. (2008)

Engineering Systems, Colorado School of Mines, w/ Prof. Weiss

Thesis:

Zachary Weimer, M.S. (2008)

Engineering Systems, Colorado School of Mines

Nikolas Flannery, M.S. (2008)

Engineering Systems, Colorado School of Mines

Jerome Rifkin, M.S. (in progress)

Department of Mechanical Engineering, University of Colorado Boulder, w/Prof Carlson

Thesis: title TBD

Post-Doctoral Fellows

Kazayoshi Gamada, Ph.D. (University of Colorado Denver) 2003 – 2005

Orthopaedic Fellows

Lance Snyder, M.D.	(Sports Medicine, University of Colorado Denver, w/Dr. E. McCarty)	2005
KG Swan, M.D.	(Sports Medicine, University of Colorado Denver, w/Dr. E. McCarty)	2006
Dave Rabalais, M.D.	(Sports Medicine, University of Colorado Denver, w/Dr. E. McCarty)	2006
Brian Kerr, M.D.	(Sports Medicine, University of Colorado Denver, w/Dr. E. McCarty)	2007
Brett Gibson, M.D.	(Sports Medicine, University of Colorado Denver, w/Dr. E. McCarty)	2008
Kevin Honig, M.D.	(Sports Medicine, University of Colorado Denver, w/Dr. E. McCarty)	2008

Medical Residents (affiliation, graduation year)

Thomas Dwyer, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. D. Eckhoff)	2000
Andreas Souerbry, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. S. Morgan)	2001
Todd Oliver, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. M. Erickson)	2002
Michael Repine, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. S. Morgan)	2004
Kareem Sobky, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. J. Wolf)	2006
Monica Alberts, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. S. Morgan)	2006
Roger Murkin, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. S. Morgan)	2007
Laura DiMatteo, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. S. Morgan)	2008
Hector Mejia, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. M. Dayton)	2008

Ryan Koonce, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. S. Morgan)	2010 (expected)
Jon Bravman, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. A. Vidal)	2010 (expected)
Jason Stonebeck, M.D.	(Orthopaedics, University of Colorado Denver, w/Dr. W. Smith)	2011 (expected)

Medical Students (affiliation, graduation year)

B. Tompkins	(M.D., University of Colorado Health Sciences Center)	2000
L. DiMatteo	(M.D., UCD, w/Dr. D. Eckhoff)	2003
E. Baca	(M.D., UCD, w/Dr. D. Eckhoff)	2003
C. Hartshorn	(M.D., University of Colorado Denver)	2004
D. Sloss	(M.D., University of Colorado Denver)	2004
J. Brauer	(M.D., University of Colorado Denver)	2005
S. Geraghty	(M.D., University of Colorado Denver)	2005
R. Alizadeh	(M.D., University of Colorado Denver)	2006
C. Hogan	(M.D., University of Colorado Denver)	2006
S. Gilbert	(M.D., University of Colorado Denver)	2007
B. Gustave	(M.D., University of Colorado Denver)	2009 (expected)
C. Hancock	(M.D., University of Colorado Denver)	2010 (expected)
M. Winston	(M.D., University of Kansas Medical Center)	2010 (expected)

Undergraduate Students (affiliation, years supervised)

J. Cech	(B.S., Mechanical Engineering, CU Boulder)	2001
S. Douherty	(B.S., Mechanical Engineering, CU Boulder)	2001
T. Nicklas	(B.S., Mechanical Engineering, CU Boulder)	2001
V. Ruedebusch	(B.S., Mechanical Engineering, Denver University)	2001
L. Stumme	(B.S., Engineering, Colorado School of Mines)	2001
L. Borgstede	(B.S., Mechanical Engineering, Colorado State University)	2002
K. Huelson	(B.S., Mathematical and Computer Sciences, CSM)	2003
T. Doucette	(B.S., Kinesiology, CU Boulder, w/Dr. Eckhoff)	2003-5
K. Smith	(B.S., Engineering, Colorado School of Mines)	2005
K. Desens	(B.S., Engineering, Colorado School of Mines)	2005
D. Grabski	(B.S., Engineering Physics, Colorado School of Mines)	2005-6
K. Cowley	(B.S., Engineering, Lafayette College)	2005-7
G. Peacher	(B.S., Spanish, Trinity College)	2005-7
M. Peddle	(B.S., Engineering, Colorado School of Mines)	2006-7

Refereed Journal Publications

1. Bach, JM; Hull, ML; A New Load Application System for In Vitro Study of Ligamentous Injuries to the Human Knee Joint, *Journal of Biomechanical Engineering*, Vol. 117, No. 4, 1995, pp. 373-382.
2. Bach, JM; Patterson, HA; Hull, ML; Direct Measurement of Strain in the Posterolateral Bundle of the Anterior Cruciate Ligament, *Journal of Biomechanics*, Vol. 30, No. 3, 1997, pp. 281-283.
3. Rempel, DM; Bach, JM; Gordon, L; Levinsohn, DG; Effects of Pronation/Supination on Carpal Tunnel Pressure, *Journal of Hand Surgery*, Vol. 23A, No. 1, 1998, pp. 38-42.
4. Keir, PJ; Bach, JM; Rempel, DM; Fingertip Loading and Carpal Tunnel Pressure: Differences Between Pinching and Pressing Tasks, *Journal of Orthopaedic Research*, Vol. 16, No. 1, 1998, pp. 112-115.
5. Bach, JM; Hull, ML; Strain Inhomogeneity in the Anterior Cruciate Ligament Under Application of External and Muscular Loads, *Journal of Biomechanical Engineering*. Vol. 120, No. 4, 1998, pp. 497-503.
6. Keir, PJ; Bach, JM; Rempel, DM; Effects of Finger Posture on Carpal Tunnel Pressure During Wrist Motion. *Journal of Hand Surgery*, Vol. 23A, No. 6, 1998, pp. 1004-1009.
7. Bach, JM; Hull, ML; Strain of the Anterior Cruciate Ligament Increases Linearly with Quadriceps Contraction. *Skiing Trauma and Safety: Twelfth Volume, ASTM STP 1345*, R. Johnson, Ed., American Society for Testing and Materials, West Conshohocken, PA, 1999, pp. 94-104.
8. Keir, PJ; Bach, JM; Rempel, DM; Effect of Computer Mouse Design and Task on Carpal Tunnel Pressure. *Ergonomics*, Vol. 42, No. 10, 1999, pp. 1350-1360.

9. McDuffee, LA; Stover, SM; Bach, JM; Taylor, KT; An In Vitro Biomechanical Investigation of an Equine Interlocking Nail. *Veterinary Surgery*, Vol. 29, No. 1, 2000, pp. 38-47.
10. Keir, PJ; Bach, JM; Flexor Muscle Incursion into the Carpal Tunnel: A Mechanism for Increased Carpal Tunnel Pressure? *Clinical Biomechanics*, Vol. 15, No. 5, 2000, pp. 301-305.
11. Eckhoff, D.G.; Dwyer, T.F.; Bach, J.M.; Spitzer, V.M.; Reining, K.D.; Three-Dimensional Morphology of the Distal Part of the Femur Viewed in Virtual Reality, *Journal of Bone and Joint Surgery*, Vol. 83-A, Supplement 2, Part I, 2001, pp. 43-50.
12. Eckhoff, D.G.; Bach, J.M.; Spitzer, V.M.; Reining, K.D.; Bagur, M.; Baldini, T; Rubenstein, D; Humphries, S; 3-D Morphology and Kinematics of the Distal Femur Viewed in Virtual Reality: Part II; *Journal of Bone and Joint Surgery*, Vol. 85-A, Supplement 4, 2003, pp. 97-104.
13. Alizadeh RI, Eckhoff DG, Samson MM, Doucette TK, Hogan CA, Bach JM; Axial and rotational alignment of the leg; *Biomedical Science Instrumentation*, Vol. 40, 2004, pp.290-6.
14. Erickson, M.; Oliver, T.; Baldini, T.; Bach, J.M.; Biomechanical Assessment of Conventional Unit Rod Fixation Versus a Unit Rod Pedicle Screw Construct: A Human Cadaver Study; *Spine*, Vol 29, No. 12, 2004, pp 1314-1319.
15. Asundi, KR; Bach, JM; Rempel, DM; Thumb Force and Muscle Loads Are Influenced by Pipetting Tasks and Pipette Design; *Human Factors*. Vol. 47, No. 1, 2005, pp. 67-76.
16. Eilert, RE, Hill, K; Bach, J; Greater Trochanteric Transfer for the Treatment of Coxa Brevis. *Clinical Orthopaedics and Related Research*, Vol 434, 2005, pp 92-101.
17. Eckhoff, DG; Bach, JM; Spitzer, VM; Reining, KD; Bagur, MM; Baldini, TH; Flannery; NMP; Three-Dimensional Mechanics, Kinematics, and Morphology of the Knee Viewed in Virtual Reality; *Journal of Bone and Joint Surgery. Am.*, Dec 2005, 87, pp. 71 - 80.
18. Robinson, M; Eckhoff, DG; Reining, KD; Bagur, MM; Bach, JM; Variability of Landmark Identification in Total Knee Arthroplasty; . *Clinical Orthopaedics and Related Research*, Vol 442, 2006, pp 57-62.
19. Keir, PJ; Bach, JM; Hudes, M; Rempel, DM; Guidelines for Wrist Posture Based on Carpal Tunnel Pressure Thresholds; *Human Factors*, Vol 49, No 1, February 2007, pp 88-99.
20. Eckhoff, D; Hogan, C; DiMatteo, L.; Robinson, M; Bach, J; Difference Between the Epicondylar and Cylindrical Axis of the Knee; *Clinical Orthopaedics and Related Research*, Vol 461, 2007, pp 238-244.
21. Rempel, DM; Keir, PJ; Bach, JM; The Effect of Wrist Posture on Carpal Tunnel Pressure while Typing, *Journal of Orthopaedic Research*, , Vol. 26, No. 9, 2008, pp. 1269-1273.

Book Chapters

1. Stiehl, JB; Bach, J; Heck, DA; Validation and Metrology in CAOS; in *Navigation and MIS in Orthopedic Surgery*, Stiehl, Konermann, Haaker, DiGioia, Eds.; Springer Medizin Verlag, Heidelberg, Germany, 2007. pp 68-78.

Other Publications

1. Bach, JM; Strain in the Anteromedial and Posterolateral Bundles of the Anterior Cruciate Ligament Under the Application of External and Muscular Loads. Ph.D. Dissertation, University of California, Davis, 1995.
2. DiGioia, AM; Mor, AB; Jaramaz, B; Bach, JM; Accuracy and Validation for Surgical Navigation Systems. *American Academy of Orthopaedic Surgeons, American Association of Orthopaedic Surgeons, Bulletin*, Vol 53, No 5, Oct 2005, 10-13.

Refereed Abstracts and Presentations

1. Bach, JM; Patterson, HA; Hull, ML; A Test Protocol for an Empirical Model to Predict Knee Ligament Injury, Presented at the 10th Meeting of the International Society for Skiing Trauma and Safety, April 1991.
2. Medige, J.; Diao, E.; Hatano, I.; Bach, J.; Strain Distribution in the Human Forearm and the Effects of Ulnar Head Resection, Presented at the 38th Annual Meeting of the Orthopaedic Research Society, 1992.
3. Bach, JM; Hull, ML; Evaluation of a New Apparatus for the Testing and Simulation of the Human Knee Joint, Presented at the 11th Meeting of the International Society for Skiing Trauma and Safety, April 1993.
4. Bach, JM; Hull, ML; A New Apparatus for the Testing of the Human Knee Joint, Presented as a poster at the Second World Congress of Biomechanics, July 1994.

5. Bach, JM; Patterson, HA; Hull, ML; The Effects of Musculature on the Mechanics of Knee Ligamentous Injuries in Alpine Skiing, Presented at the Second World Congress of Biomechanics, July 1994.
6. Bach, JM; Hull, ML; A New Load Application System for In Vitro Study of Ligamentous Injuries to the Human Knee Joint, Presented at the American Society of Mechanical Engineers Winter Annual Meeting, November 1994.
7. Bach, JM; Hull, ML; The Effects of Musculature on Strain Developed in the Anterior Cruciate Ligament, Presented at 12th Meeting of the International Society for Skiing Trauma and Safety, April 1995.
8. Bach, JM; Patterson, HA; Hull, ML; Strain in the Anteromedial and Posterolateral Bands of the ACL Over the Full Range of Flexion, Presented at the American Society of Biomechanics, August 1995.
9. Rempel, D.M.; Bach, J.M.; Levinsohn, D.G.; Gordon, L.; Effect of Pronation/Supination on Carpal Tunnel Pressure, Presented at the 50th Annual Meeting of the American Society for Surgery of the Hand, September 1995.
10. Bach, JM; Patterson, HA; Hull, ML; Direct Measurement of Strain in the Posterolateral Bundle of the ACL, Presented at the American Society of Mechanical Engineers Winter Annual Meeting, November 1995.
11. Bach, JM; Hull, ML; Differences in Strain in the Anteromedial and Posterolateral Bundles of the ACL Under Application of Anterior and Muscular Loads, Presented at the IXth Biennial Conference of the Canadian Society for Biomechanics, August 1996.
12. Keir, P.J.; Bach, J.M.; Engstrom, J.W.; Rempel, D.M.; Carpal Tunnel Pressure: Effects of Wrist Flexion/Extension, Presented at the 20th Annual Meeting of the American Society of Biomechanics, October 1996.
13. Bach, J.M.; Engstrom, J.W.; Rempel, D.M.; Influence of Thumb Posture On Carpal Tunnel Pressure, Presented at the 20th Annual Meeting of the American Society of Biomechanics, October 1996.
14. Bach, JM; Hull, ML; Differences in Strain in the Anteromedial and Posterolateral Bundles of the ACL Under Application of Axial and Muscular Loads, Presented at the 20th Annual Meeting of the American Society of Biomechanics, October 1996.
15. Bach, JM; Hull, ML; Can Vigorous Quadriceps Contraction Lead to ACL Failure?, Presented at the American Society of Mechanical Engineers Winter Annual Meeting, November 1996.
16. Rempel, D.M.; Keir, P.J.; Bach, J.M.; The Dose-Response Relationship of Wrist Posture and Carpal Tunnel Pressure, Presented as a poster at the 43rd Annual Meeting of the Orthopaedic Research Society, February 1997.
17. Bach, J.M.; Rempel, D.M.; The Effect of Metacarpal and Interphalangeal Flexion on Carpal Tunnel Pressure, Presented as a poster at the 43rd Annual Meeting of the Orthopaedic Research Society, February 1997.
18. Dennerlein, J.T.; Rempel, D.M.; Dio, E.; Mote, C.D.; Bach, J.M.; In Vivo Tendon Tension Measurement, Presented at The Fifth Annual Symposium on Computational Methods in Orthopaedic Biomechanics, Orthopaedic Research Society, February 1997.
19. Keir, P.J.; Bach, J.M.; Rempel, D.M.; Effects of Finger Posture on Carpal Tunnel Pressure During Wrist Motion, Presented as a poster at the 43rd Annual Meeting of the Orthopaedic Research Society, March 1998.
20. Eckhoff, D.G.; Dwyer, T.F.; Bach, J.M.; Spitzer, V.M.; Reinig, K.; 3-D Morphology of the Distal Femur Viewed in Virtual Reality, Presented as a Scientific Exhibit at the 68th Annual Meeting of the American Academy of Orthopaedic Surgeons, March 2001.
21. Erickson, M; Oliver, T; Erickson, M; Baldini, T; Bach, J.M.; Biomechanical Assessment of Conventional Unit Rod Fixation Versus a Unit Rod/Pedicle Screw Construct: A Human Cadaver Study, Presented as a poster at the 69th Annual Meeting of the American Academy of Orthopaedic Surgeons, February 2002.
22. Eckhoff, D.G.; Bach, J.M.; Spitzer, V.M.; Reinig, K. Baldini, T.; 3-D Morphology of the Distal Femur Viewed in Virtual Reality, Presented as a Scientific Exhibit at the 69th Annual Meeting of the American Academy of Orthopaedic Surgeons, February 2002.
23. DiMatteo, L.A.; Eckhoff, D.E.; Spitzer, V.M.; Reinig, K.D.; Rubinstein, D.; Bagur, M.M.; Bach, J.M.; Evaluation of the Trans-Epicondylar Axis, Cylindrical Axis, and Morphology of the Distal Femur with Volumetric Computed Tomography Data and 3-D Virtual Space, Presented at The Eleventh Annual Symposium on Computational Methods in Orthopaedic Biomechanics, Orthopaedic Research Society, February 2003.
24. Geraghty, S.R.; Eckhoff, D.E.; Eckhoff, K.M.; Eckhoff, H.C.; Samson, M.M.; Bach, J.M.; Variability in the Mechanical Axis of the Leg; Presented as a poster at the 49th Annual Meeting of the Orthopaedic Research Society, February 2003.

25. Eckhoff, D.G.; Bach, J.M.; Baldini, T.H.; Spitzer, V.M.; Reinig, K.D.; Bagur, M.M.; Humphries, S.; Flannery, N.M.P.; 3-D Morphology and Kinematics of the Distal Femur Viewed in Virtual Reality; Presented as a Scientific Exhibit at the 70th Annual Meeting of the American Academy of Orthopaedic Surgeons, February 2003.
26. Stumme, L.D.; Baldini, T.H.; Jonassen, E.A.; Bach, J.M.; Emissivity of Bone; Presented as a poster at the American Society of Mechanical Engineers 2003 Summer Bioengineering Conference, June 2003.
27. Repine, M.; Morgan, S.J.; Baldini, T.H.; Bach, J.M.; The Effect of Screw Insertion Angles on Pullout, Torsion, and Cantilver Bending Strength with an Internal Fixator with Locked Unicortical Screws; Presented at the Orthopaedic Trauma Association 19th Annual Meeting, October 2003.
28. Hogan, CA; Eckhoff, DG; Baldini, T; Flannery, N; Doucette, T, Spitzer, V; Reinig, C; Rubenstein, D; Bagur, M; Bach, JM; Cylindrical Flexion-Extension (FE) Axis of the Knee; Presented as a poster at the 50th Annual Meeting of the Orthopaedic Research Society, March 2004.
29. Alizadeh, RI; Eckhoff, DG; Samson, MM; Doucette, TK; Hogan, CA; Bach, JM; Correlation Between Axial And Rotational Alignment Of The Leg; Presented as a poster at the Rocky Mountain Bioengineering Symposium, April 2004.
30. Eckhoff, D.G., Geraghty, S.R., Eckhoff, K.M., Eckhoff, H.C., Samson, M., Bach, J.M.: "Variability in the Mechanical Axis of the Leg." Presented at the 56th Annual Meeting, Association of Bone and Joint Surgeons, June 2004.
31. Eckhoff, D.G., Geraghty, S.R., Eckhoff, K.M., Eckhoff, H.C., Samson, M., Bach, J.M.: "Variability in the Mechanical Axis of the Leg." Presented as a poster at the 117th Annual Meeting American Orthopaedic Association, June 2004.
32. Eckhoff, D.G.; Bach, J.M.; Bagur, M.M.; Flannery, N.M.P.; Baldini, T.H.; Reinig, K.D.; Spitzer, V.M.; 3-D Mechanics, Kinematics, and Morphology of the Knee Viewed in Virtual Reality; Presented as a Scientific Exhibit at the 72nd Annual Meeting of the American Academy of Orthopaedic Surgeons, February 2005.
33. Patel, V; Baldini, T; Holz, T; Pradhan, B; Bach, J; Size Does Matter: Adjacent Level Facet Forces Relative to Pedicle Screw Head Size, Presented at the Scoliosis Research Society 12th International Meeting on Advanced Spinal Techniques, July 2005.
34. Alberts, M.S.; Repine, M; Morgan, S.J.; Baldini, T.H.; Stumme, L.D.; Bach, J.M.; The Effect of Screw Insertion Angles on Plate Failure in Pullout, Torsion, and Cantilever Bending Strength in a Locked Unicortical Screw Model; Presented at the 7th Biennial Meeting of the Ruth Jackson Orthopaedic Society, October 2005.
35. Alberts, M.S.; Repine, M; Morgan, S.J.; Baldini, T.H.; Stumme, L.D.; Bach, J.M.; The Effect of Screw Insertion Angle on Pullout Strength in a Locked Plate Model; Presented as a Poster at the 73rd Annual Meeting of the American Academy of Orthopaedic Surgeons, March 2006.
36. Cowley, K; Eckhoff, DE; Bach, JM; Baseline Accuracy Of Optical And Magnetic Surgical Navigation Systems; Presented as a poster at the 52nd Annual Meeting of the Orthopaedic Research Society, March 2006.
37. DiMatteo, LA; Hogan, CA; Eckhoff, DE; Doucette, TK; Rubinstein,D; Baldini, TH; Bach, JM; Functional Flexion Axis Of The Knee In 3-D Space; Presented as a poster at the 52nd Annual Meeting of the Orthopaedic Research Society, March 2006.
38. Eckhoff, DG; Bach, JM; Bagur, MM; Rubinstein, D; Reinig, KD; Baldini, TH; Spitzer, VM; 3-D Morphology and Mechanics of the Knee Referenced in Computer-assisted Surgical Navigation; Presented as a Scientific Exhibit at the 73rd Annual Meeting of the American Academy of Orthopaedic Surgeons, March 2006.
39. Sobky, K; Wolf, J; Baldini, T; Thomas, K; Bach, J; Biomechanical Comparison of Different Volar Fracture Fixation Plates for Distal Radius Fractures; Presented at the 37th Annual Meeting of the American Association for Hand Surgery, January 2007.
40. Mejia, H; Dayton, MR; Baldini, T; Peacher, G; Williams, A; Borchard, K; Bach, JM; Accuracy of Image-Based Computer Assisted Surgery In Acetabular Cup Placement for Supine Two-Incision Total Hip Arthroplasty; Presented as a poster at the 53rd Annual Meeting of the Orthopaedic Research Society, February 2007.
41. Gustave, BW; Eckhoff, DE; Lewandowski, SL; Peacher, G; Van Gerven D.P. Bach, JM; Differences Between Left and Right Acetabular Anteversion and Abduction; Presented as a poster at the 53rd Annual Meeting of the Orthopaedic Research Society, February 2007.
42. McCarty, EC; Snyder, RL; Gines, JL; Baldini, TH; Bach, JM; How Many Anchors are Necessary for Adequate Fixation of Simple Type II SLAP Lesions?; presented at the 6th Biennial ISAKOS (International Society of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine) Congress, May 2007.

43. Lewandowski, S; Bach, JM; Development of a Pelvic Coordinate System for Use with Surgical Navigation; Presented as a poster at 7th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, June 2007.
44. Dayton, MR; Mejia, H; Baldini, T; Peacher, G; Williams, A; Bach, JM; Differential Accuracy of Various Image-Based Methods in Computer Assisted Surgery for Cup Placement in Supine Two-Incision Total Hip Arthroplasty; Presented as a poster at 7th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, June 2007.
45. Bach, JM; Barrera, OA; Kazanzides, P; Haider, H; Evaluation of the Draft CAOS Standard; Presented as a poster at 7th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, June 2007.
46. Mihalko, W; Phillips, M; McQueen, D; Bach, J; Nogler, M; Krackow, K; The Functional Flexion Axis of the Knee as a Basis for Femoral Component Positioning during TKA, Presented at the 54th Annual Meeting of the Orthopaedic Research Society, March 2008.
47. Lewandowski, S; Bach, JM; Development of a Pelvic Reference Frame for Image-Guided Computer-Assisted Total Hip Arthroplasty; Presented as a poster at the 54th Annual Meeting of the Orthopaedic Research Society, March 2008.
48. Bach, JM; Baldini, TH; Adaptation of a Knee Joint Testing System to Testing of the Spine; Presented at the American Society of Mechanical Engineers 2008 Summer Bioengineering Conference, June 2008.
49. Winston, MJ; Hancock, C; Bach, JM; Davidson, BS; Baldini, T; Eckhoff, DG; Difference between the Transepicondylar Line and Cylindrical Axis of the Knee Relative to the Femoral and Tibial Mechanical Axes; to be presented as a poster at the 55th Annual Meeting of the Orthopaedic Research Society, February 2009.
50. Baldini, T; DiMatteo, L; Morgan, S; Williams, A; Phillips, G; Bach, J; Comparison of Locked and Non-Locked Plate Fixation in Osteoporotic and Normal Bone; to be presented as a poster at the 55th Annual Meeting of the Orthopaedic Research Society, February 2009.

Invited Presentations

1. Design and Implementation of a New Load Application System for In Vitro Study of Ligamentous Injuries to the Human Knee Joint, with H.A. Patterson and M.L. Hull, UC Davis Bioengineering Symposium, University of California - Davis, Davis, CA. May 1994.
2. Effect of Pronation/Supination on Carpal Tunnel Pressure, with D.M. Rempel, Marconi Computer Input Device Research Conference, Marshall, CA. January 1996.
3. Injury Mechanics of the Anterior Cruciate Ligament, Biomedical Engineering Graduate Group, University of California - Davis, Davis, CA. February 1996.
4. Effects of Typing Posture on Carpal Tunnel Pressure, with D.M. Rempel, Marconi Computer Input Device Research Conference, Marshall, CA. April 1997.
5. Carpal Tunnel Pressure During Typing and Mousing, Occupational Medicine Grand Rounds, Division of Occupational and Environmental Medicine, University of California - San Francisco, San Francisco, CA. August 1997.
6. Knee Biomechanics, Departmental Seminar, Department of Engineering, University of Denver, Denver, CO., May 1999.
7. Orthopaedic Biomechanics, Biomedical Engineering Program Seminar, Department of Mechanical Engineering, Colorado State University, Fort Collins, CO., October 1999.
8. Knee Ligament Injury Biomechanics, Guest Seminar, American Society of Mechanical Engineers, University of Colorado - Boulder, Boulder, CO., February 2000.
9. Introduction to Orthopaedic Biomechanics, Guest Seminar, Biomedical Engineering Society, University of Colorado - Boulder, Boulder, CO., March 2000.
10. Engineering in Orthopaedics, Departmental Seminar, Engineering Division, Colorado School of Mines, Golden, CO. January 2002.
11. ACL Injuries: Why so many, and what can be done about them? Kinesiology Department Colloquium. University of Colorado - Boulder, Boulder, CO. March 2002.
12. Orthopaedic Biomechanics. Intelligent Biomedical Devices and Musculoskeletal System (IBDMS), Semi-Annual Industry Advisory Board (IAB) Meeting, Denver, CO. May 2002.

13. Innovations in Orthopaedic Medicine. Physics Department Colloquium. Colorado School of Mines, Golden, CO. November 2002.
14. The Potential for Patient Specific Orthopaedic Implants, IEEE Denver Annual Meeting, Denver, CO. March 2004.
15. Orthopaedic Biomechanics at Colorado School of Mines and University of Colorado Health Sciences Center. Medtronic Surgical Navigation Technologies, Louisville, CO. April 2003.
16. Computers in Orthopaedics. Departmental Seminar, Department of Engineering, University of Denver, Denver, CO., October 2003.
17. Orthopaedic Biomechanics at Colorado School of Mines. Colorado Orthopaedic Research Retreat, Medtronic Surgical Navigation Technologies, Louisville, CO. January 2004.
18. When Good Knees Go Bad. Departmental Seminar, Department of Engineering, University of Denver, Denver, CO., April 2005.

Other Abstracts and Presentations

1. Shoureshi, R; Bach, JM; Biomechanical Issues for Exoskeletons; DARPA Exoskeletons for Human Performance Augmentataion, July 2001.
2. Flannery, NMP; DiMatteo, LA; Eckhoff, DE; Spitzer, VM; Reinig, KD; Rubinstein, D; Bagur, MM; Baldini, TH; Bach, JM; Comparing the Mechanical Flexion Axis to the Trans-Epicondylar and Cylindrical Axes of the Knee; CAB Bio-Expo 2002, Colorado Alliance for Bioengineering, December 2002.
3. Stumme, LD; Baldini, TH; Jonassen, EA; Bach, JM; Bone Emmissivity; CAB Bio-Expo 2002, Colorado Alliance for Bioengineering, December 2002.
4. Geraghty, SR; Eckhoff, DE; Eckhoff, KM; Eckhoff, HC; Samson, MM; Bach, JM; Variability in the Mechanical Axis of the Leg; CAB Bio-Expo 2002, Colorado Alliance for Bioengineering, December 2002.
5. Alizadeh, RI; Eckhoff, DG; Samson, MM; Doucette, TK; Hogan, CA; Bach, JM; Correlation Between Axial and Rotation Alignment of the Leg; BioWest 2003; Colorado Alliance for Bioengineering and the Colorado Biotechnology Association, Aurora, CO. October 2003.
6. Hogan, CA; Eckhoff, DG; Baldini, T; Flannery, N; Doucette, T, Spitzer, V; Reinig, C; Rubenstein, D; Bagur, M; Bach, JM; Cylindrical Model for the Flexion-Extension (FE) Axis of the Knee; BioWest 2003; Colorado Alliance for Bioengineering and the Colorado Biotechnology Association, Aurora, CO. October 2003.
7. Flannery, NMP; Baldini, TH; Bach, JM; Investigation of the Relationship Between the Mechanical Flexion Axis, Trans-Epicondylar Axis, and Cylindrical Axis of the Knee; BioWest 2003; Colorado Alliance for Bioengineering and the Colorado Biotechnology Association, Aurora, CO. October 2003.

Awards and Honors

- “Best of Show,” for the Scientific Exhibit 3-D Morphology of the Distal Femur Viewed in Virtual Reality. Donald G. Eckhoff, M.D.; Thomas F. Dwyer, M.D.; Joel M. Bach, Ph.D.; Victor M. Spitzer, Ph.D.; and Karl Reinig, Ph.D., American Academy of Orthopaedic Surgeons 2001 Annual Meeting.
- “Second Place in the Doctoral Student Poster Competition,” for the Poster Correlation Between Axial And Rotational Alignment Of The Leg. Ramin I. Alizadeh, B.S.; Donald G. Eckhoff, M.D.; Mary M. Samson, M.S.; Terra K. Doucette, B.S.; Craig A. Hogan, B.S.; Joel M. Bach, Ph.D., Rocky Mountain Bioengineering Symposium, April 2004.
- “Best Paper,” for the paper Difference Between the Epicondylar and Cylindrical Axis of the Knee. Eckhoff, D; Hogan, C; DiMatteo, L.; Robinson, M; Bach, J; The Associate of Bone and Joint Surgeons, April 2007.