

Curriculum Vitae

Michael Bottlang, Ph.D.

Research Director
Legacy Biomechanics Laboratory
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Date of Birth: November 2, 1967
Place of Birth: Radolfzell, Germany
Citizenship: German

Education

Dipl. Ing. (FH), Biomedical Technology, Polytechnic University Ulm, Germany 1994
Ph.D., Biomedical Engineering, University of Iowa, Iowa City, IA, USA. 1998

Research and Professional Experience

Research Assistant,	Laboratory for Trauma Surgery and Biomechanics Research, Ulm, Germany	1992-1993
Research Assistant,	University of Iowa, Department of Biomedical Engineering, Iowa City, IA	1995-1998
Research Director,	Biomechanics Laboratory, Legacy Clinical Research and Technology Center, Portland, OR	1999-present
Adjunct Professor,	Oregon Health and Science University, Adjunct Faculty Department of Orthopaedics and Rehabilitation, Portland, OR	2002-present
Meeting Chair,	American Society of Biomechanics, 28 th Ann. Meeting, Portland, OR	2004
Co-Chair	Osteosynthesis & Trauma Foundation, Nice, France Biomechanical Research Program	2007-present

Membership in Professional Affiliations

American Society of Biomechanics	1999-present
American Society of Mechanical Engineering	1999-present
Orthopaedic Research Society	2000-present
Orthopaedic Trauma Association, Research Member	2003-present

NIH study section ZRG1-BDCN-K Ad-Hoc Review	2005
Journal of Biomechanics	2001-present
Clinical Biomechanics	2003-present
Journal of Biomechanical Engineering	2003-present
Clinical Orthopaedic and Related Research	2004-present
Journal of Applied Biomechanics	2006-present

Patents

1. Bottlang, M, and Marsh, JL. Method and Apparatus for External Fixation of an Ankle. U.S. Patent 5,931,837, 1999.
2. Bottlang, M, Curtis Steyers, and Marsh, JL. Method and Apparatus for External Fixation of an Elbow. U.S. Patent No. 6,152,925, November 28, 2000.
3. Bottlang, M., Krieg, JC, Madey, SM, Long, WB. Method and Apparatus for Non-Invasive Stabilization of Pelvic Ring Disruptions. U.S. Patent No. 6,554,784, April 29, 2003.
4. Bottlang, M., Krieg, JC, Madey, SM, Long, WB. Apparatus and Method for Non-Invasive Stabilization of Pelvic Ring Disruptions. U.S. Patent No. 7,008,389, March 7, 2006.
5. Mohr, M, Bottlang, M, Krieg, J, Long, W, Madey, SM, Pre-contoured rib plates: System for rib fixation for fixing ribs with bone plates. 23 claims. U.S. Patent No. 7,785,355, August 31, 2010.

Patents pending

6. Bottlang, M, Madey, SM, Mohr, M. Intramedullary splints: "Method and Apparatus for Bone Fracture Fixation". 20 claims. Application to the US Patent Office. Date of deposit: February 9, 2006.
7. Bottlang M., Sommers, M: Rotationally Asymmetric Bone Screw, U.S. Patent Application No. 11/672,300, February 7th, 2007.
8. Bottlang, M, Sommers, M, Method and System for Tissue Culture. Filed on November 7, 2006 as U.S. Patent Application Serial No. 11/594,702
9. Bottlang, M, Bone screw for positive locking but flexible engagement. Filing Date: 02/15/2005, US Patent Application 11/058,935.
10. Bottlang, M, Fracture plate and method for fixation of same to a bone shaft. Filing Date: 07/11/2007, US Patent Application 11/776,238.

Technology Transfer

1. Licensing agreement for U.S. Patent 5,931,837 and U.S. Patent No. 6,152,925 with EBI, Parsippany, NY. Licensed product is actively marketed internationally. 1999-present
2. Licensing agreement for U.S. Patent No. 6,554,784 and U.S. Patent No. 7,008,389 with SAM Medical, Newport, Oregon. Licensed product is actively marketed internationally. 2003-present
3. Licensing of pending patent applications 20060085000, filed October 2004 with Synthes (USA). Licensed product (MatrixRIB) is actively marketed internationally by Synthes. 2007-present

Government & Foundation Grants Awarded: (selected from > \$2 million in revenues generated)

OTC Foundation (Osteosynthesis & Trauma Care, Zuchwil, Switzerland), "Can multi-planar fixation improve the strength of locked plating constructs? PI \$43,000	07/30/08 - 07/30/09
NIH / NEI, R01 EY018926-A1 (Downs, JC and Girkin, CA) Age-related Changes in Optic Nerve Head Structure and Biomechanics Role: Consultant (5% effort)	04/01/08 - 03/31/12
NIH / NIAMS 1R21 AR053611-01, "Evaluating and Improving an Emergent Technology for Fixation of Bone Fractures" P.I., \$ 426,000	2006-2009
NIH, R13 AR051754, National Institute of Arthritis and Musculoskeletal Skin Disease, "2004 Annual Meeting: American Society of Biomechanics", PI, \$ 13,000,	2004
The Whitaker Foundation, Conference Award, "2004 Annual Meeting: American Society of Biomechanics", PI, \$ 8,000	2004
Oral & Maxillofacial Surgery Foundation, "Efficacy and Safety of Bone Graft Harvesting from the Proximal Tibia", PI, \$ 55,000.	2004-2005
NIH, 1 R01 NS 42946. NIAMS, "An organotypic model of traumatic brain injury" PI, \$ 1,054,500,	2002-2004
U.S. Office of Naval Research, "Emergent, Non-Invasive Reduction and Stabilization of Pelvic Ring Disruptions", PI, (N00014-01-1-0132) \$ 288,000	2000-2002
Legacy Foundation, "Operative Chest Wall Fixation", PI, \$68,300	2002-2003

Legacy Foundation, “Strain assessment of Articular Cartilage”, PI, \$78,300	2001-2002
Legacy Foundation, “Cartilage Degeneration in Arthritic Joints”, PI, \$46,300	2001-2002

Industry Contract:

Over 35 individual research and testing contract with orthopaedic implant manufacturers have been completed. The total contract volume exceeded \$900,000. Research contract have been obtained from:

- DePuy Orthopaedics, Warsaw, IN, USA
- Stryker Europe, Thalwil, Switzerland
- Synthes, West Chester, PA, USA
- Mathys, Bettlach, Switzerland
- EBI / Biomed, Parsippany, NJ, USA
- Orthofix Srl., Bussolengo, Italy
- Smith & Nephew, Memphis, TN, USA
- Plus Orthopaedics Hellas, SA, Athens, Greece
- Zimmer, Orthopaedic Implant Division, Warsaw, IN, USA

Awards

Rodney K. Beals Annual Resident Research Award, 2002

Tamara Simpson, James C. Krieg, Steven M. Madey, Michael Bottlang: “Emergent Stabilization of Pelvic Ring Fractures.”

Rodney K. Beals Annual Resident Research Award, 2003

John Reid, Oliver Erne, Larry Ehmke, Michael Bottlang: “Depth-dependent relaxation of articular cartilage in unconfined compression.”

American Society of Biomechanics Microstrain Award, 2003, Toledo, OH.

Oliver Erne, John Reid, Larry Ehmke, Michael Bottlang: “Depth-dependent relaxation of articular cartilage in unconfined compression”

Best Poster in Orthopaedic Biomechanics, Bioengineering Conference, Snowbird, Utah, 2001

Frank Heuer, Tamara Simpson, James Krieg, Michael Bottlang: “Stabilization of Pelvic Ring Fractures by Circumferential compression.”

Best Poster, BS Level Competition, Bioengineering Conference, Snowbird, Utah, 2001

Mark Sommers, Christoph Roth, Harry Hall, James Krieg, Michael Bottlang: “Characterization of Lag Screw Migration Under Cyclic Loading in an Intertrochanteric Fracture Model.”

Outstanding Oral Abstract Presentation Award, The American Association of Oral and Maxillofacial

Surgeons, 90th Annual Meeting, Seattle, Washington, 2008.

Scientific Exhibit Award of Excellence, American Academy of Orthopaedic Surgeons, AAOS 2010 Annual Meeting. Bottlang M., Doornink, J, Fitzpatrick, DC, Marsh, JL, Augat, P, von Rechenberg, B, Lesser, M, Madey, SM “Effects of Construct Stiffness on Healing of Fractures Stabilized With Locking Plates”

Peer-Reviewed Publications

Full Articles

1. Doornink J, Fitzpatrick DC, Boldhaus S, Madey SM, Bottlang M. Effects of hybrid plating with locked and nonlocked screws on the strength of locked plating constructs in the osteoporotic diaphysis. *J Trauma* 69(2):411-7, 2010.
2. Bottlang M, Lesser M, Koerber J, Doornink J, von Rechenberg B, Augat P, Fitzpatrick DC, Madey SM, Marsh JL. Far cortical locking can improve healing of fractures stabilized with locking plates. *The Journal of bone and joint surgery.*92:1652-1660, 2010.
3. Fitzpatrick DC, Denard PJ, Phelan D, Long WL, Madey SM, Bottlang M. Operative stabilization of flail chest injuries: review of literature and fixation options. *Eur J Trauma Emerg Surg*, E-publication ahead of print, June 3, 2010.
4. Lujan TJ, Henderson CE, Madey SM, Fitzpatrick, DC, Marsh JL, Bottlang M. Locked plating of distal femur fractures leads to inconsistent and asymmetric callus formation. *J Orthop Trauma*, 24:156-162, 2010.
5. Gardner MJ, Krieg CK, Simpson SS, Bottlang M, Displacement after simulated pelvic ring injuries: A cadaveric model of recoil. *J Trauma* 2010, 68:1, 159-165.
6. Lujan TJ, Madey SM, Fitzpatrick DC, Byrd GD, Sanderson JM, Bottlang, M. A computational technique to measure fracture callus in radiographs. *J Biomech*, 43:792-795, 2010.
7. Bottlang M, Helzel I, Long W, Fitzpatrick DC, Madey S. Less-Invasive stabilization of rib fractures by intramedullary fixation: A biomechanical study. 2010; ISSN 1529-8809 e-publication ahead of print.
8. Bottlang, M, Helzel, I, Long, WB, Madey, SM. Anatomically contoured plates for fixation of rib fractures. *Journal of Trauma*. 2010;68 (3):611-615.
9. Girard MJ, Suh JK, Bottlang M, Burgoyne CF, Downs JC. Scleral biomechanics in the aging monkey eye. *Invest Ophthalmol Vis Sci* 2009;50-11:5226-37.
10. Helzel I, Long W, Fitzpatrick D, Madey S, Bottlang M. Evaluation of intramedullary rib splints for less-invasive stabilisation of rib fractures. *Injury* 2009;40-10:1104-10.
11. Kouvidis GK, Sommers MB, Giannoudis PV, Katonis PG, Bottlang M. Comparison of migration behavior between single and dual lag screw implants for intertrochanteric fracture fixation. *J Orthop Surg Res* 2009;4:16.
12. Girard MJA, Downs JC, Burgoyne CF, Bottlang M, Suh J-KF: Peripapillary and Posterior Scleral Mechanics, Part II – Experimental and Inverse Finite Element Characterization. *Journal of Biomechanical Engineering*, 131(5):051012, 2009.

13. Bottlang, M, Doornink, J, Fitzpatrick, DC, Madey, SM. Far cortical locking can reduce stiffness of locked plating constructs while retaining construct strength. *J Bone and Joint Surg* 91(8):1985-1994, 2009.
14. Fitzpatrick, DC, Doornink, J, Madey, SM, Bottlang, M. Relative stability of locked plating fixation in a model of the osteoporotic femoral diaphysis. *Clinical biomechanics (Bristol, Avon)* 2009;24(2):203-209.
15. Doornink, J, Fitzpatrick, DC, Boldhaus, S, Madey, SM, Bottlang, M. Hybrid fixation with locked and non-locked screws in osteoporotic diaphyseal bone. Accepted, *J Trauma*, August 2009.
16. Bottlang, M., Doornink, J., Byrd, G., Fitzpatrick, DC, Madey, SM, A non-locking endscrew can decrease fracture risk caused by locked plating in the osteoporotic diaphysis. *The Journal of bone and joint surgery*, 91(3):620-627, 2009.
17. Henderson, C., Bottlang, M., Marsh, J.L., Fitzpatrick, D.C., Madey, S.M. Does locked plating of periprosthetic supracondylar femur fractures promote bone healing by callus formation? Two cases with opposite outcomes. *The Iowa Orthopaedic Journal*, 2008, Vol 28, 73-76.
18. Bottlang, M., Mohr, M., Simon, U., Claes, L. Acquisition of full-field strain distributions on ovine fracture callus cross-sections with electronic speckle pattern interferometry. *J Biomech*, 2008, Vol 41:3, 701-5.
19. Bottlang M, Sommers MB, Lusardi TA, Miesch JJ, Simon RP, Xiong ZG. Modeling neural injury in organotypic cultures by application of inertia-driven shear strain. *J Neurotrauma*. 2007 Jun;24(6):1068-77.
20. Sommers, MB, Fitzpatrick, DC, Madey, SM, Zanderschulp, CV, Bottlang, M. A Surrogate Long-Bone Model with Osteoporotic Material Properties for Biomechanical Testing of Fracture Implants. *J Biomech*. 2007, Vol 40/15 pp 3297-3304.
21. Mohr, M, Abrams, E, Engel, C, Long, WB, and Bottlang, M. Geometry of Human Ribs Pertinent to Orthopaedic Chest-Wall Reconstruction. *J Biomech*. 2007, 40(6):1310-7.
22. Ehmke, LW, Madey, SM, Britton, BP, Bottlang, M. Antegrade Femoral Nailing Through the Trochanter: The Reamer Pathway Indicates a Helical Shape for Trochanteric Intramedullary Nails. *J Orthop Trauma*. 2006 Nov-Dec;20(10):668-74.
23. Kessler, O., Lacatusu, E., Sommers, SM, Mayr, E, Bottlang, M. Femoral Malrotation Increases Cortical Strain in the Proximal Tibia after Total Knee Arthroplasty. *Clin Biomech (Bristol, Avon)*. 2006 Jul; 21(6):603-9.
24. Bottlang, M, Erne, O, Lacatusu, E, Sommers, MS, Kessler, O. The mobile bearing of a Scorpio+ PS Knee Arthroplasty can Reduce Strain at the Proximal Tibia. *Clin Orthop Relat Res*. 2006 Jun; 447:105-11.
25. Krieg, JC, Mohr, M, Ellis, TJ, Simpson, TS, Madey, SM, Bottlang, M, Emergent Stabilization of Pelvic Ring Injuries by Controlled Circumferential Compression: A Clinical Trial. *J Trauma*, 59(3):659-64.2005.
26. Ehmke LW, Fitzpatrick DC, Krieg JC, Madey SM, Bottlang M. Lag screws for hip fracture fixation: Evaluation of migration resistance under simulated walking. *J Orthop Res.*, 2005, 23:6 , 1329-1335.
27. Bottlang, M, Letters to the editor. *J Orthop Trauma*. 2005 Jul;19(6):435.
28. Krieg, JC, Mohr, M, Mirza, AJ, Bottlang, M. Pelvic Circumferential Compression in the presence of soft-tissue injuries: A case report. *J Trauma*, 59(2):470-9, 2005.

29. Fitzpatrick, D. C., Sommers, M.B., Kam, B.C.C., Marsh, J.L., Bottlang, M.: Knee Stability After Articulated External Fixation. *Am J Sports Med.* 33: 1735-1741, 2005.
30. Engel C, Krieg JC, Madey SM, Long WB, Bottlang M. Operative Chest Wall Fixation with Osteosynthesis Plates. *J Trauma*, 2005, 58:181-186.
31. Erne, OK, Reid, JB, Sommers, M, Madey, SM, Bottlang, M. Depth-dependent strain of patellofemoral articular cartilage in unconfined compression. *J Biomech.*, 2005, 38:4, 667-72.
32. Sommers MB, Fitzpatrick DC, Kahn KM, Marsh, JL, Bottlang M. Hinged External Fixation of the Knee: Intrinsic Factors Influencing Passive Joint Motion. *J Orthop Trauma*, 18:3, 163-169, 2004.
33. Sommers MB, Roth C, Hall H, Kam BCC, Ehmke LW, Krieg JC, Madey SM, Bottlang M. Cut-out resistance of implants for perthrochanteric fracture fixation. *J Orthop Trauma*.18(6):361-368, 2004.
34. Bottlang, M, Erstversorgung von lebensbedrohlichen Beckenfrakturen. *Rettungsdienst Journal*, 01-2004, 28-30, 2004.
35. Bottlang M, Krieg JC. The pelvic fracture stabilization in the field. *Emerg Med Serv.* 2003 Sep;32(9):126-9.
36. Bottlang M, Krieg JC. Introducing the pelvic sling. Pelvic fracture stabilization made simple. *JEMS.* 2003 Sep;28(9):84-93.
37. Bottlang M, Krieg JC. Simple solutions for life-threatening injuries: Stabilizing pelvic fractures at the scene with a pelvic sling. *Emergency, Fire/Rescue and Police* 2003;3:17-18.
38. Bottlang M, Scheinberg S, Krieg JC. Pelvic sling for application in special ops medicine. *Journal of Special Operations Medicine* 2003;3:62-64.
39. Bottlang M, Krieg JC, Mohr M, Simpson TS, Madey SM. Emergent management of pelvic ring fractures by circumferential compression. *Journal of Bone and Joint Surgery* 2002;84-A:43-47.
40. Simpson T, Krieg JC, Heuer F, Bottlang M. Stabilization of pelvic ring disruptions with a circumferential sheet. *J Trauma* 2002;52:158-161.
41. Bottlang M, Simpson TS, Sigg J, Krieg JC, Madey SM, Long WB. Non-invasive reduction of open-book pelvic fractures by circumferential compression. *J Orthop Trauma* 2001;16:367-373.
42. Von Koch F, Marsh JL, Steyers CM, McKinley TO, O' Rourke M, Bottlang M. A new articulated elbow external fixator technique for difficult elbow trauma. *Iowa Orthopaedic Journal* 2001;21:13-19.
43. Bottlang M, Madey SM, Steyers CM, Marsh JL, Brown TD. Assessment of elbow joint kinematics in passive motion via electromagnetic motion tracking. *J Orthop Res* 2000;18:195-202.
44. Bottlang M, O' Rourke M, Madey SM, Steyers CM, Marsh JL, Brown TD. Radiographic determinants of the elbow rotation axis: experimental identification and qualitative validation. *J Orthop Res* 2000;18:821-828.
45. Brown TD, Bottlang M, Pederson DR, Banes AJ. Development and experimental validation of a fluid/structure interaction finite element model of a vacuum cell culture mechanostimulus system. *Comput Methods Biomech Engin* 2000;3:65-78.
46. Brown TD, Pederson DR, Bottlang M, Banes AJ. Reactive fluid stress in a vacuum-driven cell culture mechanostimulus system. *J Orthop Res* 2000; provisionally accepted:
47. Madey SM, Bottlang M, Steyers CM, Marsh JL, Brown TD. Hinged external fixation of the elbow: optimal axis alignment to minimize motion resistance. *J Orthop Trauma* 2000;14:41-47.

48. O' Rourke M, Steyers CM, Marsh JL, Bottlang M, Madey SM, Brown TD. *Articulated elbow external fixation: determinants for optimal hinge alignment*. Atlas of Hand Clinics. New York, W.B. Saunders Company, 2000.
49. Banes AJ, Weinhold P, Yang X, Tsuzaki M, Bynum D, Bottlang M, Brown TD. Gap junction regulated response of tendon cells ex vivo to mechanical loading. *Clin Orthop Rel Re* 1999;367:S356-S357.
50. Bottlang M, Marsh JL, Brown TD. Articulated external fixation of the ankle: minimizing motion resistance by accurate axis alignment. *J Biomech* 1999;32:63-70.
51. Brown TD, Bottlang M, Pederson DR, Banes AJ. Loading paradigms -- intentional and unintentional -- for cell culture culture mechanostimulus. *Am J of Med Sci* 1999;316:162-168.
52. Bottlang M, Marsh JL, Brown TD. Factors influencing accuracy of screw displacement axis detection with a D.C. based electromagnetic tracking system. *J Biomech Eng* 1998;120:431-435.
53. Bottlang M, Simmacher M, Schmitt H, Brand RA, Claes L. A cell strain system for small homogeneous strain applications. *Biomed Tech* 1997;42:305-309.

Presented Abstracts

1. Bottlang, M, Dierks E, Bell R, Madey, SM. Effect of tibial graft harvest on plateau compliance: a biomechanical study. American Association of Oral and Maxillofacial Surgeons (AAOMS) annual meeting, Seattle, Washington, USA, Sept. 2008. **Recipient of "Best Oral Presentation Award"**.
2. Helzel I, Madey SM, Fitzpatrick DC, Long WB, Bottlang M. Less-invasive fixation of rib fractures with intramedullary rib splints. American College of Surgeons (ACS) Clinical Congress 2008, San Francisco, California, USA, October 2008.
3. Helzel I, Madey SM, Fitzpatrick DC, Long WB, Bottlang M. Intramedullary splinting of rib fractures: A biomechanical evaluation. Orthopedic Trauma Association (OTA) 24th annual meeting, Denver, Colorado, USA, October 2008.
4. Doornink, JF, Fitzpatrick DC, Madey SM, Bottlang M. Fixation strength of hybrid bridge plating constructs in the osteoporotic diaphysis. Orthopedic Trauma Association (OTA) 24th annual meeting, Denver, Colorado, USA, October 2008.
5. Bottlang M, Doornink, JF, Fitzpatrick DC, Madey SM. Non-locked end screws improve the fixation strength of locked plating constructs in the osteoporotic diaphysis. Orthopedic Trauma Association (OTA) 24th annual meeting, Denver, Colorado, USA, October 2008.
6. Helzel I, Madey SM, Fitzpatrick DC, Long WB, Bottlang M. Rib fracture fixation with intramedullary splints. American College of Chest Physicians (ACCP) CHEST 2008, Philadelphia, Pennsylvania, USA, October 2008 .
7. Girard, M, Downs, CJ, Burgoyne, CF, Bottlang, M, and Suh JF. Nonlinear finite element modeling of monkey posterior sclera under intraocular pressure. Proc. ASME 2007 Summer Bioengineering Conference (SBC2007), Keystone, Colorado, USA.
8. Girard, M, Downs, JC, Burgoyne, CF, Bottlang M, Suh, JF. Anisotropic and Nonlinear Mechanical Behavior of Monkey Posterior Sclera under Intraocular Pressure, 2007 ARVO annual meeting: the aging eye, May 6-10 2007, Fort-Lauderdale Florida.
9. Bottlang, M, Haberstroh, D, Kubon, M, Boldhaus, S, Kessler, O. A tissue engineering system for in vitro mechano-stimulation and material evaluation. TERMIS North America 2007 Conference and Exhibition, Toronto, Ontario, Canada; June 2007.

10. Boldhaus S, Doornink J, Sommers M, Fitzpatrick D, Madey S, and Bottlang M. A surrogate long bone model with osteoporotic material properties for biomechanical testing of fracture. 3rd Annual Northwest Biomechanics Symposium, Eugene, OR, 2007.
11. Girard, M, Downs, CJ, Burgoyne, C, Bottlang, M, Suh, JKF. Nonlinear Finite Element Modeling of Monkey Posterior Sclera Under Intraocular Pressure. ASME Bioengineering Conference, 2007.
12. Sommers, MB, Kubon, M., Haberstroh, D, Kessler, O, Bottlang, M. A tissue engineering system for in vitro mechano-stimulation and material evaluation. 53rd Annual Meeting of the Orthopaedic Research Society, San Diego, CA, 2007.
13. Sommers, M., Kouvidis, GK, Giannoudis, PV, Stroppel, M. Fixation strength of single and double lag screw implants for intertrochanteric fracture fixation. 5th World Congress of Biomechanics, Munich, 2006.
14. Bottlang, M, Sommers, M., Johnstone, B., Long, C., Kessler, O. Bioreactor for mechano-stimulation and material property evaluation in functional tissue engineering. 5th World Congress of Biomechanics, Munich, 2006.
15. Augustin, T., Kessler, O., Bottlang, M. Characteristic strain distribution on meniscus cross-sections under axial compression. 5th World Congress of Biomechanics, Munich, 2006.
16. Mohr, M, Simon, U., Claes, L, Bottlang, M. Full-field strain acquisition on ovine fracture callus with electronic speckle pattern interferometry. 5th World Congress of Biomechanics, Munich, 2006.
17. Sommers, M, Fitzpatrick, DC, Madey, SM, Bottlang, M. Combined use of non-locked screws for plating of fractures in osteoporotic bone. 5th World Congress of Biomechanics, Munich, 2006.
18. Sommers, MB, Kroehn, S, Melaragno, A, Fitzpatrick, DC, Madey, SM, Bottlang, M. Far cortical locking delivers less-rigid biological plate fixation of fractures. Transaction, 52nd Annual Meeting, Orthopaedic Research Society, Vol. 31., March 2006.
19. Augustin, T., Lacatusu, E., Kessler, O., Bottlang, M. The effects of combined axial and torsional knee loading on meniscus strain. Transaction, 52nd Annual Meeting, Orthopaedic Research Society, Vol. 31., March 2006.
20. Augustin, T, Sommers, MB, Kessler, O, Bottlang, M. Meniscus cross-sections exhibit characteristic inhomogeneous strain distributions under axial compression. Transaction, 52nd Annual Meeting, Orthopaedic Research Society, Vol. 31., March 2006.
21. Kessler, O., Lacatusu, E., Bottlang, M., The Effect of Combined Axial and Torsional Knee Loading on Meniscus Strain, 6th ICRS Symposium, San Diego, CA, USA, 2005.
22. Bottlang, M., Augustin, T., Kessler, O., Meniscus Cross-Sections Exhibit Characteristic Inhomogeneous Strain Distributions Under Axial Compression", 6th ICRS Symposium, San Diego, CA, USA, 2005.
23. Augustin T, Kim W, Claes L., Bottlang M. Strain field acquisition on ovine fracture callus with electronic speckle pattern Interferometry. Trans 20th Congress Intern Soc Biomech , podium presentation, 2005.
24. Mirza AJ, Ehmke LW, Krieg JC, Madey SM, Bottlang M. Strain Distribution in Bone for Conventional and Locked Plate Constructs. Submitted to OTA Annual Conference, Ottawa, Ontario, Canada; February 2005.
25. Madey SM, Ehmke LW, Sommers MB, Bottlang M. Oblique Impact Testing of bicycle helmets. In Conf. Proc. ASB Conference, Portland, OR, September 2004.
26. Ehmke LW, Krieg JC, Fitzpatrick DC, Bottlang M. Fixation Strength Evaluation of Hip Implants Under Biaxial Rocking Motion. In Conf. Proc. ASB Conference, Portland, OR, September 2004.

27. Mohr M, Sommers MB, Dawson P, Steffensmeier S, Bottlang M. A dynamic model for assessment of micromotion and migration in knee arthroplasties. Transactions of the 28th Annual Meeting of the American Society of Biomechanics in Portland, Oregon, 2004.
28. Schöbel, J.F., Sommers, M.B., Bottlang, M.: Time-Lag Radiographic Assessment of Brain Distortion During Head Impact Simulation. Presented at the Annual Meeting of the American Society of Biomechanics, 2004.
29. Bormann, K., Kessler, O., Lacatusu, E., Augustin, T., Sommers, M., Bottlang, M. Effect of Internal and External Knee Rotation on Hoop Strain in the Medial Meniscus. Transactions of the 28th Annual Meeting of the American Society of Biomechanics in Portland, Oregon, 2004.
30. Kessler, O., Lacatusu, E., Erne, O.K., Vande Zandschulp, C., Bottlang, M. Proximal Tibial Strain Distribution after Mobile and Fixed Bearing Total Knee Arthroplasty, 50th Meeting of the Orthopaedic Research Society, San Francisco, CA, March 2004.
31. Ehmke LW, Polzin B, Roth C, Bottlang M. Femoral Intramedullary nailing: Geometry of the Reamed Canal. In Conf. Proc. ASB Annual Conference, Toledo, OH, September 2003.
32. Ehmke LW, Kam BC, Sommers MB, Bottlang M. Can Bone Mineral Density Predict Fixation Strength of Lag Screws for Pertrochanteric Fracture Fixation?. In Conf. Proc. ASB Annual Conference, Toledo, OH, September 2003.
33. Erne OK, Reid J, Ehmke LW, Bottlang M. Depth-Dependent Relaxation of Articular Cartilage in Unconfined Compression. In Conf. Proc. ASB Annual Conference, Toledo, OH, September 2003.
34. Bottlang M, Krieg JC, Mohr M, Polzin B. Emergent Stabilization of Pelvic Ring Fractures by Controlled Circumferential Compression. Accepted for presentation at the Annual Meeting of the Orthopaedic Trauma Association in Salt Lake City, Utah, 2003.
35. Mohr M, Kasaraneni S, Engel C, Bottlang M. Rib Geometry Pertinent to Operative Chest Wall Fixation. Proceedings of the Annual Meeting of the American Society of Biomechanics in Toledo, Ohio, 2003.
36. Raudszus, K., Kam, B., Sommers, M.B., Marsh, J.L., Bottlang, M.: Articulated External Fixation of the Knee Joint: Effect of Fixator Stiffness on Knee Motion and Ligament Stress. Proceedings of the Annual Meeting of the American Society of Biomechanics, 2003.
37. Fitzpatrick, D.C., Sommers, M.B., Raudszus, K., Kam, B., Bottlang, M.: Articulated External Fixation of the Knee: The Effect of Fixator Stiffness on Cruciate Ligament Protection. Proceedings of the Annual Meeting of the American Society of Biomechanics, 2003.
38. Kam, B.C.C., Fitzpatrick, D.C., Sommers, M.B., Bottlang, M.: Effects of articulated external knee fixation on stability and ligament protection. Presented at the American College of Surgeons Oregon Chapter, Annual meeting 2003.
39. Bottlang M., Krieg J. Emergent Stabilization of Pelvic Ring Fractures by Circumferential Compression. Trans. 19th Orthop Trauma Assoc., Salt Lake City, Utah, #WEB523, 2003.
40. Abrams E, Mohr M, Engel C, Bottlang M. Cross-sectional geometry of human ribs. Presented at the Annual ASB Meeting, Toledo, OH, 2003:
41. Bottlang M, Mohr M, Heuer F, Krieg JC, Madey SM. true magnitude of displacement in pelvic ring fractures. Presented at the Annual ASB Meeting, Toledo, OH, 2003:
42. Chu YH, Sommers MB, Rochefort WE, Miesch J, Xiong ZG, Bottlang M. Change of constitutive material properties in organotypic brain cultures in vitro. Presented at the Annual ASB Meeting, Toledo, OH, 2003.

43. Schweizer B, Claes S, Ehmke LW, Mohr M, Bottlang M. Quantification of anatomical shapes in terms of their spatial curvature profile: An accuracy validation. Presented at the Annual ASB Meeting, Toledo, OH, 2003:
44. Sommers MB, Martin K, Erne O, Bottlang M. Laser displacement sensor reports are affected by surface color and opacity. Presented at the Annual ASB Meeting, Toledo, OH, 2003:
45. Bottlang M, Krieg JC, Mohr M, Simpson TS, Madey SM. Emergent management of pelvic sling fractures by circumferential compression. Presented at the Presentation at the American Academy of Orthopaedic Surgery Annual Meeting, Dallas, TX, 2002:
46. Bottlang M, Krieg JC, Simpson T, Madey SM. True magnitude of fracture displacement in pelvic ring fractures. Presented at the 12th World Congress of SIROT, San Diego, CA, 2002:
47. Bottlang M, Sommers MB, Roth C, Hall IV, Krieg JC. Implant cut-out failure in intertrochantric fracture fixation. Presented at the 12th World Congress of SIROT, San Diego, CA, 2002:
48. Chu YH, Bottlang M. Finite element analysis of traumatic brain injury. Presented at the 10th Annual Symposium on Computer Methods in Orthopaedic Biomechanics, Dallas, TX, 2002:
49. Chu YH, Bottlang M. A model of shear-strain induced traumatic brain injury in organotypic brain slices. Presented at the American Association of Neurological Surgery 70th Annual Meeting, Chicago, IL, 2002:
50. Chu YH, Bottlang M. An organotypic brain slice model of trauma-induced brain swelling. Presented at the American Association of Neurological Surgery 70th Annual Meeting, Chicago, IL, 2002:
51. Chu YH, Bottlang M. The protective role of cerebrospinal fluid in traumatic brain injury. Presented at the American Society of Neurological Surgery 70th Annual Meeting, Chicago, IL, 2002:
52. Ehmke LW, Kam B, Sommers MB, Bottlang M. Screw and blade type hip implants produce insertion forces. Presented at the 4th World Congress of Biomechanics, Calgary, Canada, 2002:
53. Erne O, Chu YH, Miller J, Bottlang M. Comparative analysis of joint compliance by finite element analysis and electronic speckle pattern interferometry. Presented at the 4th World Congress of Biomechanics, Calgary, Canada, 2002:
54. Erne O, Chu YH, Mohr M, Miller JR, Bottlang M. full-field strain measurement on cortical bone. Presented at the 48th Meeting of the Orthopaedic Research Society, Dallas, TX, 2002:
55. Erne O, Ehmke LW, Reid J, Bottlang M. Full-field strain measurement over articular cartilage cross-sections with electronic speckle pattern interferometry. Presented at the 4th World Congress of Biomechanics, Calgary, Canada, 2002:
56. Kahn KM, Sommers M, Bottlang M, Marsh JL. Effect of tibial alignment on motion resistance in articulated external fixation of the knee. Presented at the 48th Meeting of the Orthopaedic Research Society, Dallas, TX, 2002:
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59. Martin K, Callahan D, Sommers MB, Marsh JL, Bottlang M. Radiographic landmarks of the knee flexion-extension axis. Presented at the 4th World Congress of Biomechanics, Calgary, Canada, 2002:

60. Miesch J, Sommers MB, Lan JQ, Bottlang M, Simon R, Xiong ZG. Molecular mechanism underlying swelling of mouse brain slices. Presented at the Meeting of the Society for Neuroscience, Washington, DC, 2002: 17.
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62. Sommers MB, Miesch J, Xiong ZG, Bottlang M. Swelling of organotypic brain cultures as a model for traumatic brain injury. Presented at the 4th World Congress of Biomechanics, Calgary, Canada, 2002:
63. Bottlang M, Schuetze N. Evaluation of full-field surface deformation scanning by means of quantitative electronic speckle pattern interferometry. Presented at the ASME Advances in Bioengineering Meeting, Snowbird, UT, 2001: 307-308.
64. Bottlang M, Sommers MB, Schuetze N. Quantification of spacial surface displacement y electronic speckle pattern interferomerty. Presented at the Society of Experimental Mechanics Meeting, Portland, OR, 2001: 241.
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67. Heuer F, Simpson T, Krieg JC, Bottlang M. Stabilization of pelvic ring fractures by circumferential compression. Presented at the Bioengineering Conference: American Society of Mechanical Engineering, 2001: 579-580.
68. Heuer F, Sommers M, Reid JB, Bottlang M. Estimation of cartilage thickness from joint surface scans: comparative analysis of computational methods. Presented at the ASME Advances in Bioengineering Meeting, Snowbird, UT, 2001: 569-570.
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73. Miller J, Mohr M, Bottlang M. Apparent radius of curvature of human ribs. Presented at the Meeting of the American College of Surgeons: Oregon Chapter, Bend, OR, 2001:
74. Schuetze N, Reid JB, Sommers MB, Sigg J, Bottlang M. Non-invasive quantitative compliance scanning of articular surfaces. Presented at the 47th Meeting of the Orthopaedic Research Society, San Francisco, CA, 2001: 444.
75. Simpson T, Krieg JC, Heuer F, Bottlang M. Emergent stabilization of pelvic ring fractures by circumferential compression. Presented at the 65th Meeting of the Western Orthopaedic Association, San Franciso, CA, 2001: 23.

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79. Sommers MB, Heuer F, Bottlang M. Accuracy evaluation of electromagnetic and laser-based geometry scanning procedures. Presented at the ASME Advances in Bioengineering Meeting, Snowbird, UT, 2001: 555-556.
80. Bottlang M, Marsh JL, McIff T, Brown TD. Effect of hinged external ankle fixation on fracture fragment motion. Presented at the 46th Meeting of the Orthopaedic Research Society, Orlando, FL, 2000: 466.
81. Bottlang M, Sigg J, Simpson T, Krieg JC, Madey SM. Emergent non-invasive reduction of pelvic ring disruptions. Presented at the 23rd Meeting of the American Society of Biomechanics, Chicago, IL, 2000:
82. Mohr M, Marsh JL, Brown TD, Bottlang M. Quantitative analysis of radiographic determinants of the talocrural joint axis. Presented at the 46th Meeting of the Orthopaedic Research Society, Orlando, FL, 2000: 467.
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85. Bottlang M, Madey SM, Steyers CM, Marsh JL, Brown TD. Hinged external elbow fixation: optimal axis alignment to minimize motion resistance. Presented at the 44th Meeting of the Orthopaedic Research Society, Anaheim, CA, 1999: 494.
86. Bottlang M, O'Rourke M, Marsh JL, Brown TD. Quantitative validation of radiographic landmarks for the application of articulated external fixation to the elbow and ankle joint. Presented at the Exhibit at the American Academy of Orthopaedic Surgery Annual Meeting, Anaheim, CA, 1999:
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89. Brown TD, Banes AJ, Bottlang M, Pederson DR. Nutrient depth and waveform abruptness as determinants of reactive fluid shear stresses in a vacuum-driven cell culture mechanostimulus system. Presented at the 45th Meeting of the Orthopaedic Research Society, Anaheim, CA, 1999: 633.

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91. Banes AJ, Tsuzaki M, Yang X, Faber J, Bottlang M, Pederson DR, Brown TD. Equibiaxial strain activates AP-1 and CRE transcription factors but not NF- κ B or SSRE and upregulates CX43 mRNA in tendon cells in vitro. Presented at the 44th Meeting of the Orthopaedic Research Society, New Orleans, LA, 1998: 182.
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95. Bottlang M, Madey SM, Steyers CM, Marsh JL, Brown TD. Hinged external fixation of the elbow: importance of fixator hinge position. Presented at the Orthopaedic Trauma Association, Vancouver, BC, 1998: 289.
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99. Bottlang M, Marsh JL, Brown TD. Kinematic characterization and radiographic evaluation of elbow joint rotation. Presented at the ASME Advances in Bioengineering Meeting, Dallas, TX, 1998: 211-212.
100. Bottlang M, O'Rourke M, Steyers CM, Marsh JL, Brown TD. Quantitative validation of radiographic landmarks of the elbow rotation axis. Presented at the 22nd Meeting of the American Society of Biomechanics, Waterloo, Canada, 1998: 521.
101. Bottlang M, Simnacher M, Claes L, Brand RA. A cell strain system for homogeneous strain applications. Presented at the 44th Meeting of the Orthopaedic Research Society, New Orleans, LA, 1998: 278.
102. Brown TD, Bottlang M, Pederson DR, Banes AJ. Flow field visualization in confirmation of a finite element model of nutrient medium reactive stress in a pressure-differential-driven cell culture mechanostimulus system. Presented at the 44th Meeting of the Orthopaedic Research Society, New Orleans, LA, 1998: 987.
103. Bottlang M, Marsh JL, Brown TD. Accuracy of screw displacement axis detection by D.C. electromagnetic motion tracking. Presented at the 43rd Meeting of the Orthopaedic Research Society, San Francisco, CA, 1997: 894.

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105. Bottlang M, Marsh JL, Brown TD. Pathway of instant axes rotation of the ankle joint-implications for the application of articulated external fixation. Presented at the 21st Meeting of the American Society of Biomechanics, Clemson, SC, 1997: 45-46.
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110. Pederson DR, Bottlang M, Brown TD, Banes AJ. Hyperelastic constitutive properties for polydimethyl siloxane cell culture membranes. Presented at the ASME Advances in Bioengineering, 1993: 603-609.

Scientific Exhibits

1. Bottlang, M., O'Rourke, M., Marsh, J.L., Brown, T.D., "Quantitative Validation of Radiographic Landmarks for the Application of Articulated External Fixation to the Elbow and Ankle Joint" Am Acad Orthop Surg, Annual Meeting, SE 069, Anaheim, CA, 1999.
2. Marsh, J.L., von Koch, F., McKinley, T.O., Steyers, C.M., O'Rourke, M., Bottlang, M., "Articulated Elbow External Fixation Without an Axis Pin-Technique Results". Am Acad Orthop Surg, Annual Meeting, SE54, Dallas, TX, 2002.
3. Bottlang, M., Krieg, J.C., Mohr, M., Simpson, T.S., Madey, S.M., "Emergent Management of Pelvic Ring Fractures by Circumferential Compression". Am Acad Orthop Surg., Annual Meeting, SE 49, Dallas, TX, 2002.

Expert Panel Invitations:

1. Bottlang, M. EBI Foot and Ankle Forum, May 1998, Parsippany, NJ.
2. Bottlang, M. Head Injury Prevention Symposium, November 2002. Cleveland, Ohio,

3. Bottlang, M. AIOD expert workshop on hip fracture fixation. June 2006, Murnau, Germany.
4. Bottlang, M. OTCF Expert Workshop: "Biomechanics of Locked Plating". September 2007, Mahwah, NJ.
5. Bottlang, M. Osteosynthesis and Trauma Care (OTC) Foundation: Locked Plating Symposium. June 2008. Nice, France.

Book Chapters

1. O' Rourke M, Steyers CM, Marsh JL, Bottlang M, Madey SM, Brown TD. *Articulated elbow external fixation: determinants for optimal hinge alignment*. Atlas of Hand Clinics. New York, W.B. Saunders Company, 2000.

Supervision of Thesis Students

1. Sommers, M. Model for Simulation of Hip Implant Cut-Out failure. Masters Thesis. Portland State University, 2004
2. Mohr, M. Surgical Stabilization of Flail Chest Injuries. Masters Thesis. Portland State University, 2004
3. Ehmke, L. Femoral Nail Design for Greater Trochanter Insertion. Masters Thesis. Portland State University, 2004.
4. Erne, O. Cartilage strain field assessment with Electronic Speckle Pattern Interferometry. Portland State University, 2004.
5. Shields, C. Functional tissue engineering of menisci. Project start 20006. Oregon Health & Sciences University, PhD Thesis.
6. Boldhaus, S. Assessment of fracture healing in the ovine osteotomy model, 2007. Diploma Thesis.
7. Augustin, T. Functional Characterization of Menisci, FH Munich, 2004. Diploma Thesis.
8. Bruehl, M. *Evaluation of Locked Plating Constructs in Osteoporotic Bone*, FH Giessen, 2004. Diploma Thesis.
9. Harndt, A. *Biaxial rocking motion cut-out mode: Dena bone substitutes*. FH Wilhelmshaven, 2003. Diploma Thesis.
10. Abrams, E. *Development of an intramedullary device for surgical chest-wall fixation*. FH Berlin, 2003. Diploma Thesis.
11. Raudszus, K. *Articulated external fixation of the knee: The effect of fixator stiffness on cruciate ligament protection*. TU Chemnitz, 2003. Diploma Thesis.
12. Effenberger, A. *Assessment of surface displacement in a traumatic brain injury model by time lag photography*. FH Munich, 2002. Diploma Thesis.
13. Heuer, F. *Efficacy and risk assessment associated with circumferential compression of pelvic ring fractures*. FH Anhalt, 2002. Diploma Thesis.

Media Coverage

1. Medstar TV news story, '*How a pelvic sling saved a live*' release to 200-plus TV stations including network affiliates in New York, L.A., Philadelphia, Phoenix, Chicago, Boston and Baltimore, release date January 26, 2005.
2. ASB conference in Portland: The Oregonian. Portland, September 8, 2004.
3. Brinckman J. *Legacy research pays dividend: A pelvic sling invented in Portland bodes well for the local medical industry*. The Oregonian. Portland: June 23, 2003. B1 & B3.
4. Moody R. *Legacy lab's pelvic sling heading to marketplace*. The Business Journal. Portland, OR: May 23, 2003.
5. Dworkin A. *Building a better brain test*. The Oregonian. Portland, OR: July 24, 2002. D9 & D10.
6. Dworkin A. *Team looks for better nail for the thighbone*. The Oregonian. Portland, OR: September 11, 2002. B13 & B14.
7. Hopkins-Koglin O. *Stabilizing care for pelvic trauma*. The Oregonian. Portland, OR: July 25, 2001. B1 & B2.