

Kirk Cameron McGilvray, Ph.D.

CONTACT INFORMATION

Assistant Research Professor
Orthopaedic Bioengineering Research Laboratory
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PERSONAL INFORMATION

Date of Birth: June 28, 1980
Place of Birth: Denver, Colorado
Citizenship: United States of America
Marital Status: Married

FORMAL EDUCATION

Doctor of Philosophy (*Ph.D.*) 7/2009
Department of Mechanical Engineering
Colorado State University, Fort Collins, Colorado, USA

Master of Science (*M.S.*) 12/2005
Department of Mechanical Engineering
Colorado State University, Fort Collins, Colorado, USA

Bachelor of Science (*B.S.*) 5/2004

Minor: Mathematics

Interdisciplinary Certification: Biomedical Engineering
Department of Mechanical Engineering;
Colorado State University, Fort Collins, Colorado, USA

PROFESSIONAL EXPERIENCE

Assistant Research Professor 06/2015 - Present
Colorado State University, Fort Collins, Colorado, USA
School of Biomedical Engineering
Department of Mechanical Engineering
Orthopaedic Bioengineering Research Laboratory

Research Scientist II 01/2013 - 06/2015
Colorado State University, Fort Collins, Colorado, USA
School of Biomedical Engineering
Department of Mechanical Engineering
Orthopaedic Bioengineering Research Laboratory

Research Scientist I 01/2011 - 01/2013
Colorado State University, Fort Collins, Colorado, USA
School of Biomedical Engineering
Department of Mechanical Engineering
Orthopaedic Bioengineering Research Laboratory

Postdoctoral Research Fellow 07/2009 - 01/2011
Colorado State University, Fort Collins, Colorado, USA
School of Biomedical Engineering
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Graduate Research Assistant 04/2004 - 07/2009
Colorado State University, Fort Collins, Colorado, USA
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FUNDING (Awarded)**Government Grants (Total \$2,774,101):**

Sponsor: NIH - NIAMS 1R01AR069734-01	Role: PI	Performance Dates: 07/01/2016 - 06/30/2021	Total Direct Costs: \$2,499,101
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Title: *Early Detection and Prediction of Complex Bone Fracture Healing*

Goals: Using a flexible biocompatible micro-electric-mechanical system (fs-bioMEMS) technology platform, the grant proposes to utilize a multi-sensor configuration on a single implant to measure the temporal and spatial implant strain profiles during bony healing, providing a measure of the unique *in vivo* variations with respect to the transient mechanical environment (i.e., implant strain profile) that are associated with specific implant designs and fracture type/severity combinations. The objective of the proposed work is to utilize multiple flexible sensor-implant constructs to predict the ultimate outcome of the healing process during the acute time period when applied to clinically challenging tibial and femoral fractures.

Sponsor: NIH - NIAMS 1R21AR072371-01	Role: PI	Performance Dates: 07/01/2017 - 06/30/2019	Total Direct Costs: \$275,000
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Title: *Sensor Development for Predicting Bone Allograft Incorporation*

Goals: We have recently designed a novel technique for printing the bioMEMs circuitry directly on bone (boneMEMs) and have leveraged our existing technology to produce a new class of sensors which we postulate can be used to directly monitor bone graft loading and incorporation *in vivo*.

External Grants (Total \$4,607,730):

Sponsor	Role	Performance Dates	Title	Total Direct Costs
Medtronic, Inc.	PI	2017 - 2018	Evaluation of biological response to additive titanium implants in an ovine model: A radiographic, biomechanical and histological analysis.	\$379,761
Stanford University	PI	2017 - 20178	Sheep study of engineered composite bone flap.	\$95,037
Aroa Biosurgery	PI	2017 - 2018	Evaluation of Aroa Biosurgery's Endoform collagen matrix in an ovine model of acute rotator cuff repair.	\$32,208
Nanofiber Solutions, Inc.	PI	2017 - 2018	Investigation of Nanofiber Solution's Atlas Matrix in an ovine rotator cuff model.	\$408,320
BioVentus, Inc.	PI	2017 - 2018	Evaluation of the performance of BV-265 protein in conjunction with lumbar fusion cages in an ovine spine fusion model: A pilot study.	\$121,377
Rainbow Medical, Inc.	PI	2017 - 2018	Evaluation of a novel intervertebral disc electrode for therapeutic intervention in disc degeneration.	\$284,487
Intelligent Implants, Inc.	PI	2017 - 2018	Evaluation of the efficacy and safety of a PEEK interbody spinal implant that uses direct current stimulation to enhance spinal fusion.	\$142,565
K2M, Inc.	PI	2017 - 2018	Analysis of K2M 3D printed titanium cages in an ovine cervical fusion model: A proof of concept study.	\$150,696
Stryker, Inc.	CO-PI	2017 - 2018	Evaluation of a Tritanium interbody cage in an ovine 2-level cervical interbody fusion model: A radiographic, CT, biomechanics, micro-CT and histologic analysis.	\$399,874
DSM Medical	PI	2016 - 2017	Evaluation of ColOSSIS CPC with additive within a CSD sheep model	\$29,953
Woven Orthopedics Technologies, Inc.	PI	2016 - 2017	A GLP analysis of Woven Orthopaedic's Screw Retention Technology (SRT): A biomechanical and histological assessment utilizing an <i>in vivo</i> ovine single-level posterolateral fusion (PLF) model.	\$527,107
Medtronic, Inc.	PI	2016 - 2017	Sheep interbody fusion study evaluating titanium coated PEEK supplied with electrical stimulation.	\$96,378

Sponsor	Role	Performance Dates	Title	Total Direct Costs
Osteovantage, Inc.	PI	2016 – 2017	In vivo demonstration of reliable bone formation via INDOS DCES in sheep IBF model: Pivotal Study	\$426,363
Woven Orthopedics Technologies, Inc.	PI	2016 - 2017	A GLP analysis of Woven Orthopaedic's Screw Retention Technology (SRT): A biomechanical and histological assessment utilizing an in vivo ovine metatarsal fracture model	\$408,320
Vertera Spine	PI	2016 -2017	Evaluation of Ovine Lumbar Fusion and Bone Ingrowth with Porous PEEK Device	\$114,985
Orthofix Spinal Implants	PI	2015 - 2016	Evaluation of FORZA PTC and FORZA PEEK interbody cage in an ovine 2-level lumbar interbody fusion: a radiographic, biomechanical, microCT, and histologic analyses	\$192,758
Stryker, Inc.	CO-PI	2015 - 2016	Evaluation of a novel porous Tritanium interbody cage in an ovine 2-level lumbar interbody fusion: A radiographic, CT biomechanics, microCT and histologic analyses	\$354,329
Cayenne Medical, Inc.	CO-PI	2015 – 2016	Tendon/Bone interface augmentation of primary rotator cuff repair in a sheep model: Phase 2 (GLP Study)	\$353,709
Medtronic, Inc.	CO-I	2014 – 2015	Biomechanical analysis of the OLIF25 Plate-Cage: A cadaveric study	\$89,424

PEER-REVIEWED PUBLICATIONS (journal Impact Factor¹ is noted)

- Easley JT, **McGilvray KC**, Hendrickson DA, Hackett ES. “Collateral heat generation during application of a laparoscopic vessel sealing device in horses”. Accepted to Vet Surg on 09/2017(Impact Factor: 1.4)
- Gadomski BC, **McGilvray KC**, Easley JT, Palmer RH, Jiao J, Li X, Qin YX, Puttlitz CM. “An investigation of shock wave therapy and low-intensity pulsed ultrasound on fracture healing under reduced loading conditions in an ovine model.” J Orthop Res. 2017 Aug 1. [Epub ahead of print]. (Impact Factor: 3.0)
- McGilvray KC**, Waldorff EI, Easley J, Seim HB, Zhang N, Linovitz RJ, Ryaby JT, Puttlitz CM. “Evaluation of a PEEK titanium composite interbody spacer in an ovine lumbar interbody fusion model: a biomechanical, micro-computed tomography, and histologic analyses.” Spine J. 2017 Jul 24. [Epub ahead of print]. (Impact Factor: 2.3)
- Patel VV, Wuthrich ZR, **McGilvray KC**, Lafleur MC, Lindley EM, Sun D, Puttlitz CM. “Cervical facet force analysis after disc replacement versus fusion.” Clin Biomech. 2017 May; 44:52-58. (Impact Factor: 3.2)
- PB Suh, C Puttlitz, C Lewis, BS Bal, **K McGilvray**. “The Effect of Cervical Interbody Cage Morphology, Material Composition, and Substrate Density on Cage Subsidence.” J Am Acad Orthop Surg. 2017 Feb;25(2):160-168. (Impact Factor: 3.1).
- PJ Regier, DD Smeak, **KC McGilvray**. “Security and biomechanical strength of three end-pass configurations for the terminal end of intradermal closures performed with unidirectional barbed suture material in dogs.” Am J Vet Res. 2016 Dec;77(12):1392-1400. (Impact Factor: 3.0)
- KC McGilvray**, CM Puttlitz, SH Berven, WK Hsu, TE Mroz, JT Easley. “Biomechanical and Histologic Comparison of a Novel 3-D Printed Porous Titanium Interbody Cage to PEEK.” Spine J. 2017 May 16 (10), S363-S364. (Impact Factor: 3.0)
- Jaramillo HE, Puttlitz CM, **McGilvray K**, Garcia JJ. “Characterization of the L4-L5-S1 motion segment using the stepwise reduction method.” J Biomech. 2016 May 2016 May 3;49(7):1248-54. (Impact Factor: 2.0)
- Maulucci CM, Sansur CA, Singh V, Cholewczyński A, Shetye SS, **McGilvray K**, Puttlitz CM. “Cortical bone facet spacers for cervical spine decompression: effects on intervertebral kinetics and foraminal area.” J Neurosurg Spine. 2016 Jan;24(1):69-76. (Impact Factor: 3.7)
- Nguyen KP, **McGilvray KC**, Puttlitz CM, Mukhopadhyay S, Chabasse C, Sarkar R. “Matrix Metalloproteinase 9 (MMP-9) Regulates Vein Wall Biomechanics in Murine Thrombus Resolution.” PLoS One. 2015 Sep 25;10(9). (Impact Factor: 3.2)
- Regier PJ, Smeak DD, Coleman K, **McGilvray KC**. “Comparison of volume, security, and biomechanical strength of square and Aberdeen termination knots tied with 4-0 polyglyconate and used for termination of intradermal closures in canine cadavers.” J Am Vet Med Assoc. 2015 Aug 1;247(3):260-6. (Impact Factor: 1.6)

12. **KC McGilvray**, E Unal, K Troyer, B Santoni, R Palmer, J Easley, H Demir, and C Puttlitz. "Implantable Microelectromechanical Sensors for Diagnostic Monitoring and Post-Surgical Prediction of Bone Fracture Healing." *J Orthop Res*. 2015 Oct;33(10):1439-46. (Impact Factor: 3.0)
13. Wray S, Mimran R, Vadapalli S, Shetye SS, **McGilvray KC**, Puttlitz CM. "Pedicle screw placement in the lumbar spine: effect of trajectory and screw design on acute biomechanical purchase." *J Neurosurg Spine*. 2015 May;22(5):503-10. (Impact Factor: 2.4)
14. CM Gauthier, **K McGilvray**, S Myrick, F Duerr, R Palmer. "Evaluation of the accuracy of a veterinary dynamometric wire tensioner." *VCOT* 28 (2), 104-108. (Impact Factor: 1.6)
15. Gadomski BC, **McGilvray KC**, Easley JT, Palmer RH, Santoni BG, Puttlitz CM. "Partial gravity unloading inhibits bone healing responses in a large animal model." *J Biomech*. 2014 Aug 7. 47 (12), 2836-2842 (Impact Factor: 3.1)
16. PB Suh, C Lewis, CM Puttlitz, **KC McGilvray**. "The Influence of Vertebral Endplate Density, Cage Contact Area and Cage Modulus on the Incidence of Interbody Cage Subsidence." *Spine J*. 2015 Oct;15(10) S178. (Impact Factor: 3.0).
17. Traynelis V., Sherman J., Nottmeier E., Singh V., **McGilvray K.**, Leahy P., Puttlitz C. "Kinetic analysis of anterior cervical discectomy and fusion supplemented with transarticular facet screws." *J Neurosurg Spine*. 2014 May; 20(5):485-91. (Impact Factor: 1.6)
18. Gadomski B., **McGilvray K.**, Easley J., Palmer R., Ehrhart E., Browning R., Santoni B., Puttlitz C. "An In Vivo Ovine Model of Bone Tissue Alterations in Simulated Microgravity Conditions." *J Biomech Eng*. 2014 Feb; 136(2). (Impact Factor: 2.5)
19. Webb B., **McGilvray K.**, Smirnova N., Hansen T., Norrdin R. "Effects of in utero pestivirus infection on bovine fetal bone geometry, biomechanical properties and composition." *Vet J*. 2013 Nov; 198(2):376-81. (Impact Factor: 2.2)
20. Seabaugh KA, Hubert JD, Kawcak CE, **McGilvray KC**, Santoni BG, Rao S, Baxter GM. "Effect of sequential removal of parts of the second metacarpal bone on the biomechanical stability of the equine carpus." *Vet Surg*. 2012 Oct.; 41(7):862-8. (Impact Factor: 1.7)
21. **McGilvray KC**, Santoni BG, Turner AS, Wheeler DL, Puttlitz CM. "Effects of ⁶⁰Co gamma irradiation dose on initial biomechanical properties of ovine bone- patellar tendon- bone allografts." *Cell and Tissue Banking* 2011 May;12(2):89-98. (Impact Factor: 1.2)
22. Hee CK, Dines JS, Roden CM, Wisner-Lynch LA, Turner AS, **McGilvray KC**, Lyons AS, Puttlitz CM, Santoni BG. "Augmentation of a Rotator Cuff Suture Repair Using rhPDGF-BB and a Type I Bovine Collagen Matrix in an Ovine Model." *Am J Sports Med*. 2011 May 9. (Impact Factor: 4.9)
23. **McGilvray K**, Sarkar R, Nguyen K, Puttlitz C. "A Biomechanical Analysis of Venous Tissue in its Normal and Post-Phlebotic Conditions." *J Biomech*. 2010 Nov 16;43(15):2941-7. (Impact Factor: 3.1)
24. Santoni BG, Lyons AS, **McGilvray KC**, Turner AS, Patel VV, Puttlitz CM. "Biomechanical and kinetic testing of two-level cervical disc replacement." *Minerva Ortopedica e Traumatologica* 61:1-9, 2010. (Impact Factor: N/A)
25. Santoni BG, **McGilvray KC**, Lyons AS, Bansal M, Turner AS, MacGillivray JD, Coleman SH, Puttlitz CM. "Biomechanical analysis of an ovine rotator cuff repair via porous patch augmentation in a chronic rupture model." *Am J Sports Med*. 2010 Apr;38(4):679-86. (Impact Factor: 2.3)
26. CK Hee, CM Roden, LA Wisner-Lynch, DJ Aguiar, JS Dines, AS Turner, DL Ruehlman, HK Kestler, SE Lynch, **KC McGilvray**, AS Lyons, CM Puttlitz, BG Santoni. "Evaluation of rhPDGF-BB in Combination with a Flowable Collagen Matrix for the Treatment of Acute Achilles Tendon Injury." *Foot & Ankle International* 2010 Sept;31 (9), 846-846. (Impact Factor: 1.6)
27. KK Hausler, **KC McGilvray**, UM Ayturk, CM Puttlitz, AE Hill, CW McIlwraith. "Deformation of the equine pelvis in response to in vitro 3D sacroiliac joint loading." *Equine Veterinary Journal* 41:207-12, 2009. (Impact Factor: 2.2)
28. Santoni BG, Hynes RA, **McGilvray KC**, Lyons AS, Henson MAW, Womack WJ, Puttlitz CM. "Cortical bone trajectory for lumbar pedicle screws." *The Spine Journal* 9(5):366-73, May 2009. (Impact Factor: 4.6)

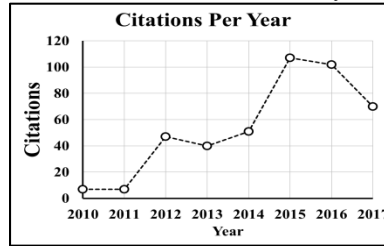
¹ Impact Factors reflect 5 Year Impact Factor data as reported on Journal Citation Reports from ISI Web of Knowledge (<http://admin-apps.webofknowledge.com/JCR/JCR?SID=3BIMhIK2MMHjGmHbJNG>) on September 10, 2017.

CITATION HISTORY OF PEER-REVIEWED PUBLICATIONS

(Data obtained from a Google Scholar search on October 29, 2017)

	All	Description
Citations	440	This is the number of Citations to all publications.
h-index	7	h-index is the largest number h such that h publications have at least h Citations
i10-index	7	i10-index is the number of publications with at least 10 Citations.

Yearly Citations to articles co-authored by KC McGilvray



REFEREED BOOK CHAPTERS

1. Waldorff EI, Fang S, Zhang N, Visal L, Imbriani M, Magalin E, Preve E, Robotti P, Raines A, Goldberg E, Jiang J, **McGilvray KC**, Easley JT, Seim HB, Puttlitz CM, Ryaby JT. “*PEEK titanium composite (PTC) for spinal implants*” in Orthopaedic Biomaterials – Advances and Applications, 2017, Editors: Li B and Webster T, Published by Springer

ABSTRACTS AND CONFERENCE PROCEEDINGS (‡ indicates an oral podium presentation)

1. K Zuehlsdorff, K Zang, T Collins, **KC McGilvray**, SP James. "Tensile Properties of UHMWPE/HA Composites." Front Range Biomedical Engineering Research Forum, Fort Collins, CO., February 2, 2005
2. K Zuehlsdorff, K Zang, T Collins, **KC McGilvray**, SP James. "Methods for Determining Tensile Properties of UHMWPE." Front Range Biomedical Engineering Research Forum, Fort Collins, CO., February 2, 2005
3. **KC McGilvray**, KC Lewis, DL Wheeler. "Effects of Irradiation Dose on the Initial Structural Biomechanical Properties of Ovine Bone-Patellar-Tendon-Bone Allografts." 51st Annual Meeting of the Orthopaedic Research Society, Washington, D.C., March 2-5, 2005.
4. CM Puttlitz, **KC McGilvray**, A Lyons, U Ayturk, AS Turner, V Patel. “Acute biomechanical implications of two-level cervical disc replacement and associated salvage procedure.” 7th Annual Meeting of the Spine Arthroplasty Society, Berlin, May 1-4, 2007.
5. ‡**KC McGilvray**, A Lyons, AS Turner, J MacGillivray, S Coleman, C Puttlitz. “Shoulder tendon repair biomechanics using a polyurethane patch in a chronic ovine defect model.” 2007 ASME Summer Bioengineering Conference, Keystone, CO, June 20-24, 2007.
6. **KC McGilvray**, Amy Lyons, AS Turner, V Patel, C Puttlitz. “Kinetic and biomechanical testing of two-level cervical disc replacement.” 2007 ASME Summer Bioengineering Conference, Keystone, CO, June 20-24, 2007.
7. CM Puttlitz, **KC McGilvray**, A Lyons, U Ayturk, AS Turner, V Patel. “Biomechanical implications of adjacent level cervical disc replacement and associated salvage procedures.” 14th International Meeting on Advanced Spine Techniques (IMAST), Paradise Island, Bahamas, July 11-14, 2007.
8. ‡**KC McGilvray**, AS Lyons, M Manjula, AS Turner, J MacGillivray, J Coleman, CM Puttlitz. "Biomechanical Analysis of a Chronic Nonacute Ovine Rotator Cuff Repair Using a Polyurethane Patch." 54th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA, March 2-5, 2008.
9. BG Santoni, RA Hynes, **KC McGilvray**, G Rodriguez-Canessa, AS Lyons, MA Henson, WJ Womack, CM Puttlitz. “Lumbar pedicle screw design and trajectory affects bone quality available for purchase and fixation mechanics.” 54th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA, March 2-5, 2008.
10. **KC McGilvray**, A Lyons, M Bansal, AS Turner, J MacGillivray, J Coleman, C Puttlitz. “Biomechanical and histological analysis of a chronic nonacute ovine rotator cuff repair using a polyurethane patch.” 54th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA, March 2-5, 2008.
11. CM Puttlitz, **KC McGilvray**, AS Lyons, BG Santoni, V Patel, AS Turner. “Kinetic implications of replacement of a cervical intervertebral disc at adjacent levels and associated salvage procedure.” 54th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA, March 2-5, 2008.
12. BG Santoni, R Hynes, MAW Henson, **KC McGilvray**, G Rodriguez-Canessa, A Lyons, M Henson, WJ Womack, CP Puttlitz. “Lumbar pedicle screw design and trajectory affects bone quality available for purchase and fixation mechanics.” 54th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA, March 2-5, 2008.
13. Santoni BG, **McGilvray KC**, Lyons AS, Patel VV, Turner AS, Puttlitz CM. “Kinetic implications of replacement of a cervical intervertebral disc at adjacent levels and associated salvage procedure.” 8th Annual Spine Arthroplasty (SAS) Meeting, Miami Beach, FL, May 6 – 9, 2008.
14. **KC McGilvray**, B Santoni, D Moynihan, M Getelman, C Puttlitz. “Acute Mechanical Evaluation of Three Shoulder Tendon Repair Suture Techniques.” 55th Annual Meeting of the Orthopaedic Research Society, Las Vegas, February 22-25, 2009.
15. ‡**KC McGilvray**, CM Puttlitz. “Mechanical characterization of deep vein thrombosis in a murine model using nanoindentation.” Eighth International Conference on Modeling in Medicine and Biology, Crete, Greece, May 26-29, 2009.

16. Santoni BG, Lyons AS, **McGilvray KC**, Seim III HB, Turner AS, Abjornson C, Puttlitz, CM. "Biomechanical and Histological Evaluation of an Allograft Anchor for Pedicle Screw Augmentation in an Ovine Model." 56th Annual Meeting of the Orthopaedic Research Society, New Orleans, LA, March 6-10, 2010.
17. Hee CK, Roden CM, Aguiar DJ, Dines JS, Turner AS, Kestler H, Lynch S, **McGilvray KC**, Lyon AS, Puttlitz CM, Santoni BG. "Evaluation of rhPDGF-BB in Combination with a Flowable Collagen Matrix for the Treatment of Acute Achilles Tendon Injury." 56th Annual Meeting of the Orthopaedic Research Society, New Orleans, LA, March 6-10, 2010.
18. Hee CK, Roden CM, Aguiar DJ, Dines JS, Turner AS, Kestler H, Lynch S, **McGilvray KC**, Lyon AS, Puttlitz CM, Santoni BG. "Rotator Cuff Repair in an Ovine Model using a Combination Product Comprised of a Type I Bovine Collagen Matrix and rhPDGF-BB." 56th Annual Meeting of the Orthopaedic Research Society, New Orleans, LA, March 6-10, 2010.
19. Santoni BG, Lyons AS, **McGilvray KC**, Seim III HB, Turner AS, Abjornson C, Puttlitz, CM. "Allograft Anchor for Pedicle Screw Augmentation in an Ovine Model: A Biomechanical and Histological Evaluation." 10th Annual Spine Arthroplasty Society (SAS), New Orleans, LA, April 27-30, 2010.
20. Hee CK, Roden CM, Aguiar DJ, Dines JS, Turner AS, Kestler H, Lynch S, **McGilvray KC**, Lyon AS, Puttlitz CM, Santoni BG. "Evaluation of rhPDGF-BB in Combination with a Flowable Collagen Matrix for the Treatment of Acute Achilles Tendon Injury." American Orthopaedic Society for Sports Medicine (AOSSM), Providence, RI, July 15-18, 2010.
21. Hee CK, Roden CM, Aguiar DJ, Dines JS, Turner AS, Kestler H, Lynch S, **McGilvray KC**, Lyon AS, Puttlitz CM, Santoni BG. "Rotator Cuff Repair in an Ovine Model using a Combination Product Comprised of a Type I Bovine Collagen Matrix and rhPDGF-BB." American Orthopaedic Society for Sports Medicine (AOSSM), Providence, RI, July 15-18, 2010.
22. KK Hausler, A Swedberg, **KC McGilvray**, SS Shetye, AS Turner, CM Puttlitz. Effects of botox on spinal kinematics in an intervertebral disc annulotomy sheep model." 57th Annual Meeting of the Orthopaedic Research Society, Long Beach, CA, January 13-16, 2011.
23. [‡]**KC McGilvray**, HV Demir, E Unal, KL Troyer, R Melik, CM Puttlitz. "In vivo fracture healing assessment using a novel bio-microelectromechanical system." 58th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA, February 4-7, 2012.
24. PD Leahy, **KC McGilvray**, J Sherman, V Traynelis, E Nottmeier, V Singh, B Murrell, V Patel, CM Puttlitz. "Analysis of anterior cervical discectomy and fusion kinematics when supplemented with facet screw instrumentation." 58th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA, February 4-7, 2012.
25. BC Gadowski, **KC McGilvray**, JT Easley, RH Palmer, CM Puttlitz. "An ovine model of simulated microgravity." NASA Human Research Program Investigators' Workshop, Houston, TX, February 14-16, 2012.
26. PD Leahy, **KC McGilvray**, J Sherman, V Traynelis, E Nottmeier, V Singh, B Murrell, V Patel, CM Puttlitz. "Kinematic assay of multi-level anterior cervical discectomy and fusion with supplementary facet screw instrumentation. Annual Meeting of the AANS/CNS Section on Disorders of the Spine and Peripheral Nerves. Orlando, FL, March 7-10, 2012.
27. PD Leahy, **KC McGilvray**, J Sherman, V Traynelis, E Nottmeier, V Singh, B Murrell, V Patel, CM Puttlitz. "Analysis of anterior cervical discectomy and fusion kinematics when supplemented with facet screw instrumentation." 80th Annual Scientific Meeting of the American Association of Neurological Surgeons, Miami, FL, April 14-18, 2012.
28. RH Palmer, J Easley, **K McGilvray**, C Puttlitz. "Development of SMART plate technology: pilot data in the ovine." 16th Congress of the European Society of Veterinary Orthopaedics and Traumatology, Bologna, Italy, September 12-15, 2012.
29. C Maulucci, C Sansur, C Puttlitz, V Singh, **K McGilvray**. "Kinematic response of cortical bone facet spacers for cervical spine decompression." 40th Annual Meeting of the Cervical Spine Research Society, Chicago, December 6-8, 2012.
30. [‡]**K McGilvray**, R Palmer, JT Easley, E Unal, HV Demir, C Puttlitz. "A novel bio-microelectrical (BioMEMs) sensor to assess the in vivo fracture healing cascade." 59th Annual Meeting of the Orthopaedic Research Society, San Antonio, TX, January 25-30, 2013.
31. **K McGilvray**, C Sansur, C Maulucci, V Singh, C Puttlitz. "A kinematic evaluation of cervical allograft facet spacers which can be used to provide indirect decompression through distraction." 59th Annual Meeting of the Orthopaedic Research Society, San Antonio, TX, January 25-30, 2013.
32. BC Gadowski, **KC McGilvray**, JT Easley, RH Palmer, CM Puttlitz. "Evaluation of a ground-based ovine model of simulated microgravity." NASA Human Research Program Investigators' Workshop, Galveston, TX, February 12-14, 2013.
33. Gadowski BC, **McGilvray KC**, Easley JT, Palmer RH, Puttlitz CM. Simulating microgravity in a large animal model. Sunriver, OR; 2013. Proc 2013 American Society of Mechanical Engineers Summer Bioengineering Conference (*Best PhD Presentation Award*)

34. ‡**K McGilvray**, HV Demir, E Unal, C Puttlitz. “A novel bio-microelectrical system for in vivo diagnostic monitoring of fracture healing.” American Society of Mechanical Engineers 2013 Summer Bioengineering Conference, Sunriver, OR, June 26-29, 2013.
35. BC Gadowski, **K McGilvray**, J Easley, R Palmer, C Puttlitz. “Simulating microgravity in a large animal model.” American Society of Mechanical Engineers 2013 Summer Bioengineering Conference, Sun River, OR, June 26-29, 2013.
36. Gadowski BC, **McGilvray KC**, Easley JT, Palmer RH, Puttlitz CM. “*Evaluation of Haversian bone fracture healing in simulated microgravity*”. Galveston, TX; March 2014. Proc 2014 NASA Human Research Program Investigators’ Workshop
37. **K McGilvray**, S Telfer, J Rafferty, A Cox, L Farr, M Mendoza, S Shetye, C Puttlitz. “Comparative Analysis of Human Lumbar and Thoracic Vertebrae Using Micro Computed Tomography (micro-CT) and the Fine Structure Analysis (fineSA®) MRI Technique.” ASBMR 2015 Annual Meeting, October 9-12, 2015 Seattle, WA
38. Gadowski BC, **McGilvray KC**, Easley JT, Palmer RH, Ruehlman D, Roberts M, Puttlitz CM. “Shock wave therapy does not enhance acute fracture strength but may accelerate formation rates under simulated microgravity conditions”. NASA Human Research Program Investigators’ Workshop; Galveston, TX, 2015.
39. Barati D, Easley JT, Palmer RH, Broomfield C, **McGilvray K**, Ehrhart EJ, Jabbari E. Cortical bone mimetic matrix for regeneration of segmental bone defects. Las Vegas, NV; March 2015. Proc of 2015 Orthopaedic Research Society Symposium
40. ‡**K McGilvray**, C Puttlitz, S Berven, W Hsu, T Mroz, J Rhee. “Biomechanical and Histologic Comparison of a Novel 3-D Printed Porous Titanium Interbody Cage to PEEK.” North American Spine Society 31st Annual Meeting, Boston, MA October 26-29, 2016
41. ‡E. Waldorff, C. Puttlitz, H. Seim, J. Easley, J. Ryaby, **K. McGilvray**. “Evaluation of a novel PEEK Titanium Composite (PTC) interbody cage in an ovine lumbar interbody fusion.” North American Spine Society 31st Annual Meeting, Boston, MA October 26-29, 2016
42. ‡P Suh, C Lewis, C Puttlitz, B. Bal, **K McGilvray**. “Determining the Weighted Impact of Factors Leading to Intervertebral Cage Subsidence.” ISASS Las Vegas, NV April 6 – April 8, 2016
43. ‡Monck S, **McGilvray KM**, Easley JT. “Biomechanical comparison of LCP fixation to a novel pedicle screw external fixation for mandibular fracture repair”. Fort Collins, CO; January 2017. CSU Research Day
44. K Labus; **K. McGilvray**; H. Demir; D. Kieser; C. Puttlitz. “An Experimental Model of Femoral Stem Loosening and Detection via Strain Sensing.” 63th Annual Meeting of the Orthopaedic Research Society, San Diego, CA, March 19-22, 2017.
45. ‡Easley JT, Palmer RH, Monck S, Broomfield C, Puttlitz C, **McGilvray KC**. “Biomechanical and Histological Evaluation of an Orthopedic Screw Retention Device using an in vivo Ovine Metatarsal Fracture Model”. Indianapolis, IN; October 2017. Proc of 2017 American College of Veterinary Surgeons Surgery Summit.
46. ‡Monck S, **McGilvray KM**, Easley JT. “Biomechanical analysis of locking compression plate fixation and a novel pedicle screw external fixation system for equine mandibular fracture repair”. Indianapolis, IN; October 2017. Proc of 2017 American College of Veterinary Surgeons Surgery Summit.
47. ‡Easley JT, **McGilvray KC**, Kusmik K, Hendrickson DA, Hackett ES. “Collateral heat generation during application of a laparoscopic vessel sealing device in horses”. Lexington, KY; July 2017. Proc of 12th International Equine Colic Research Symposium
48. ‡**McGilvray KC**, Hackett ES, Hawes M, St. Pierre P, Cummings D, Frankle M, Tashkian R, Abboud J, Getz C, Harper DH, Nason K, Puttlitz C, Easley JT. “Tendon-to-bone interface using a marrow wicking system for primary rotator cuff repair in a sheep model”. San Diego, CA; March 2017. Proc of Orthopaedic Research Society Symposium
49. **McGilvray KC**, Puttlitz CM, Berven SH, Hsu WK, Mroz TE, Easley JT, Seim HB, Rhee JM. “Bony Ingrowth Potential of 3-D Printed Porous Titanium Interbody Cages Versus PEEK Interbody Cages”. San Diego, CA; March 2017. Proc of 2016 American Association of Orthopedic Surgeons.
50. ‡Monck S, **McGilvray K**, Easley JT. “Biomechanical comparison of LCP fixation to a novel pedicle screw external fixation for mandibular fracture repair”. Snowbird, UT; March 2017. Proc of Veterinary Orthopedic Society
51. Waldorf EI, **Easley JT**, Puttlitz CM, Seim HB, Zhang N, Ryaby JT, McGilvray KC. Evaluation of a Novel PEEK Titanium Composite (PTC) Interbody Cage in an Ovine Lumbar Interbody Fusion. San Diego, CA; March 2017. Proc of Orthopaedic Research Society Symposium
52. ‡**McGilvray K**, Hackett ES, Hawes M, St. Pierre P, Frankle M, Tashjian R, Nason K, Harper DH, Puttlitz C, Easley JT. “Tendon-to-Bone Augmentation of Primary Rotator Cuff Repair in a Sheep Model”. San Diego, CA; March 2017. Proc of Orthopaedic Research Society Symposium
53. ‡Nakamura L, **McGilvray K**, Palmer RH, Baer K, Puttlitz C, Easley JT. “Evaluation of an Orthopedic Screw Retention Device Using an in vivo Ovine Metatarsal Fracture Model”. San Diego, CA; March 2017. Proc of Orthopaedic Research Society Symposium

54. ‡Monck S, **McGilvray KM**, Easley JT. Biomechanical analysis of locking compression plate fixation and a novel pedicle screw external fixation system for equine mandibular fracture repair. Indianapolis, IN; October 2017. Proc of 2017 American College of Veterinary Surgeons Surgery Summit.
55. ‡Easley JT, **McGilvray KC**, Kusmik K, Hendrickson DA, Hackett ES. Collateral heat generation during application of a laparoscopic vessel sealing device in horses. Lexington, KY; July 2017. Proc of 12th International Equine Colic Research Symposium.
56. ‡Easley JT, Palmer RH, Monck S, Broomfield C, Puttlitz C, **McGilvray KC**. Biomechanical and Histological Evaluation of an Orthopedic Screw Retention Device using an in vivo Ovine Metatarsal Fracture Model. Indianapolis, IN; October 2017. Proc of 2017 American College of Veterinary Surgeons Surgery Summit.
57. ‡Easley JT, Puttlitz C, Bisazza K, McCreedy E, Seim HB, **McGilvray K**. “Analyses of a Novel Screw Retention Technology: A biomechanical and histological assessment utilizing an ovine posterior lumbar fusion model”. Orlando, FL; October, 2017. Proc of 32nd NASS Annual Meeting (Nominated for NASS Value Award)

PEER-REVIEWED PUBLICATIONS UNDER REVIEW

1. **McGilvray KC**, Easley J, Seim HB, Regan D, Berven SH, Wellington KH, Mroz TE, Puttlitz CM. “*Bony Ingrowth Potential of 3D Printed Porous Titanium Alloy: A Direct Comparison of Interbody Cage Materials in an In Vivo Ovine Lumbar Fusion Model.*” Submitted to Spine J. 2017 Oct 27

PROFESSIONAL SERVICE

- Institutional Review Board (IRB) member, Colorado State University 2011 – Present
- AD HOC Manuscript Reviewer – The American Journal of Sports Medicine
- AD HOC Manuscript Reviewer – Sensors

PROFESSIONAL AFFILIATIONS

- American Society of Biomechanics • American Society of Mechanical Engineers (ASME) • International Society of Biomechanics • Order of Engineers • Orthopaedic Research Society (ORS) • National Society of Histotechnology (NSH) • National American Spine Society (NASS)

CURRENT JOB DESCRIPTION

80% Research Activities • 10% Service/Outreach • 10% Administrative

ACADEMIC ADVISING

Ph.D. students (Co-advisor):

Conor Sutherland	2016 – Present	Biomedical Engineering, Colorado State University
Jake Wolynski	2016 – Present	Mechanical Engineering, Colorado State University

Ph.D. students (Committee member):

Xin Huang	2016 – Present	Civil Engineering, Colorado State University
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Honors Thesis students (Advisor):

Jacob Machmer	2015	Biomedical Engineering, Colorado State University
Jake Wolynski	2016	Biomedical Engineering, Colorado State University
Amy Holcomb	2017	Biomedical Engineering, Colorado State University

TEACHING EXPERIENCE

- Guest Lecturer, Colorado State University Fall 2009-2011
Machine Design (ME 325)
- Guest Lecturer, Colorado State University Fall 2008
Materials Science (ME 531)
- Guest Lecturer, Colorado State University Fall 2008
Materials Issues in Mechanical Design (ME 532)
- Guest Lecturer, Colorado State University Spring 2007
Biomaterials (ME 573)
- Graduate Teaching Assistant, Colorado State University Fall 2006
Human Anatomy and Dissection (BS 575)
- Guest Lecturer, Colorado State University Spring / Fall 2006-2007
Biomechanics (ME 571)
- Guest Lecturer, Colorado State University Spring / Fall 2005 - 2013
Introduction to Biomedical Engineering (ME/BE 470/570)
- Graduate Teaching Assistant, Colorado State University Fall 2005
Biomechanics (ME 571)

HONORS AND AWARDS

- Walter Scott, Jr. College of Engineering Outstanding Researcher
 - Nominated Fall 2017 - (*award winner will be released November 17, 2017*)

PERSONAL STATEMENT

My career goal is to make lasting and meaningful contributions in the fields of biomedical engineering and orthopaedic clinical science. I would like to achieve this by comprehensively examining the critically important relationship(s) between biomechanics and biology following disease, trauma and surgical intervention utilizing clinically translatable comparative animal models. I believe that it is vital to expand our basic science knowledge base, and apply this information to develop/improve surgical techniques, implantable materials, and biomedical devices to aid in the treatment of complex orthopaedic conditions. One of my primary research areas is fracture healing, and I believe that by increasing our understanding of the bony fracture healing cascade, we can have a significant clinical impact and potentially improve the quality of life for millions of people worldwide.

My postdoctoral fellowship, performed under Dr. Christian Puttlitz's mentorship, focused on the *in vitro* and *in vivo* development and implementation of comparative animal models to help answer basic science questions. These fundamental research studies advanced our understanding of the biomechanical changes observed in tissues which are common secondary to disease and trauma.

I have also continued to develop an implantable micro-electro-mechanical system (bioMEMS) sensor and antenna system for monitoring and predicting *in vivo* fracture healing, with the ultimate goal being the implementation of this technology for clinical use. Ultimately, I would like to move this technology forward into the clinical milieu. I feel that this technology represents a paradigm shift in how clinicians/scientist would be able to analyze the fracture healing cascade using *in vivo* hardware strain data.

As a recently appointed Associate Research Professor at Colorado State University, it is my ambition to direct projects that amalgamate basic science and applied research endeavors. Much of my research is focused on generating data that can correlate the rate/quality of bony fracture healing in specific fracture types/severities to implant mechanics during the critically important acute time frame. These data on the course of bone healing could provide a significant impact on clinical orthopaedic practice and treatment of problematic fractures, giving clinicians the ability to diagnose if adjunctive biologic treatments are necessary and determine the onset of implant failure without radiographic information. The overarching goal of my career is to use basic science information to effect a positive change in patient care.

I am responsible for managing the day-to-day activities of the Orthopaedic Bioengineering Research Laboratory (OBRL) at Colorado State University and organizing all projects. I am the initial and direct contact for all industry partners of the OBRL, which includes internal customers such as employees, co-workers, ACUC members, and collaborative labs within CSU and external customers that include industry sponsors, GLP consultants, and MDs. I am also directly responsible for the oversight of 1 full-time employee and 2-5 student hourly employees. My efforts are aligned with clinical faculty at CSU's Veterinary Teaching Hospital, orthopaedic industry, and clinical groups (domestic and abroad) in order to facilitate bench top-to-clinic translation of research.

PROFESSIONAL REFERENCES (to be used with permission; listed alphabetically by the reference's first name)

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