Kevin M. Labus, Ph.D.

Curriculum Vitae

CURRENT POSITION

Assistant Research Professor and Principal Investigator
Orthopaedic Bioengineering Research Laboratory
Department of Mechanical Engineering
School of Biomedical Engineering
Colorado State University
1374 Campus Delivery
Fort Collins, CO 80523-1374
Mobile: 317-509-4559
Email: Kevin.Labus@colostate.edu

PERSONAL INFORMATION

Date of Birth: August 5, 1988
Place of Birth: Indianapolis, IN
Citizenship: United States of America

FORMAL EDUCATION

Doctor of Philosophy *(Ph.D.)*, Bioengineering August, 2016
School of Biomedical Engineering
Colorado State University, Fort Collins, Colorado, USA
Dissertation: "Constitutive Modeling of the Biaxial Mechanics of Brain White Matter"
Advisor: Dr. Christian Puttlitz.

Bachelor of Science *(B.S.)*, Mechanical Engineering May, 2011
Department of Mechanical Engineering
University of Notre Dame, Notre Dame, Indiana, USA

POFESSIONAL EXPERIENCE

Assistant Research Professor and Principal Investigator 2023 - present
Orthopaedic Bioengineering Research Laboratory
Department of Mechanical Engineering
Colorado State University, Fort Collins, Colorado, USA

Research Scientist II 2021 - 2023
Orthopaedic Bioengineering Research Laboratory
Department of Mechanical Engineering
Colorado State University, Fort Collins, Colorado, USA

Research Scientist I 2018 - 2021

Orthopaedic Bioengineering Research Laboratory
Department of Mechanical Engineering
Colorado State University, Fort Collins, Colorado, USA

Postdoctoral Research Fellow 2016 - 2018
Orthopaedic Bioengineering Research Laboratory
Department of Mechanical Engineering
Colorado State University, Fort Collins, Colorado, USA

Graduate Research Assistant 2011 - 2016
Orthopaedic Bioengineering Research Laboratory
School of Biomedical Engineering
Department of Mechanical Engineering
Colorado State University, Fort Collins, Colorado, USA

Graduate Teaching Assistant 2013 - 2016
Department of Mechanical Engineering
Colorado State University, Fort Collins, Colorado, USA

Undergraduate Research Assistant 2010 - 2011
Department of Mechanical Engineering
University of Notre Dame, Notre Dame, Indiana, USA

Reliability Engineering Summer Intern 2009 - 2009
Eli Lilly & Company
Indianapolis, Indiana, USA

Camp Counselor 2008 - 2008
Jewish Community Center
Indianapolis, Indiana, USA

PEER-REVIEWED PUBLICATIONS

1. C Thomas, **K Labus**, B.C. Gadomski, N Phillips, J Mitchell, L Goodrich, B Nelson. "Fresh versus cryopreserved osteochondral allografts: Are they similar in biomechanical and histological characteristics at 90 days and 1 year?" *Journal of Cartilage & Joint Preservation*. In Review.

2. **Labus KM**, Dunn J, Ilic M, Notaros BM, McGilvray KC, Puttlitz CM. "Direct electromagnetic coupling enables remote monitoring of bone healing in an exploratory clinical study of tibial fractures." *Science Translational Medicine*. In Review.

3. Johnson J, Gadomski B, Regan D, Johnson J, Nelson B, McGilvray K, **Labus K**, Romeo A, Easley J. "Biomechanical enhancement in rotator cuff repairs: the impact of innovative nanofiber technology." *JSES International*. 2024. DOI: https://doi.org/10.1016/j.jseint.2024.08.203.

4. Schmitz C, Alt C, Wuerfel T, Milz S, Dinzey J, Hill A, Sikes KJ, Burton L, Easley J, Stewart HL, Puttlitz C, Gadomski BC, **Labus K**, Pearce DA, Maffulli N, Alt EU. "New, biomechanically sound tendon tissue after injection of uncultured, autologous, adipose derived regenerative cells in partial Achilles tendon defects in rabbits." *bioRxiv*. 2024. 02.18.580890. DOI: https://doi.org/10.1101/2024.02.18.580890.

5. Brekhus C, **Labus K**, Seguin B, Puttlitz C, Gadomski B. "Patient-specific finite element modeling for fracture risk prediction in a canine model of osteosarcoma." *Annals of Translational Medicine*. 2024. 12(1):5-5. DOI: 10.21037/atm-23-1699.

6. **Labus KM**, Wolynski J, Easley J, Stewart HL, Ilic M, Notaros B, Zagrocki T, Puttlitz CM, McGilvray KC. "Employing Direct Electromagnetic Coupling to Assess Acute Fracture Healing: An Ovine Model Assessment." *Injury*. 2023. 111080. DOI: 10.1016/j,injury.2023.111080.

7. Johnson JW, Gadomski B, **Labus KM**, Stewart H, Nelson B, Seim H, Regan D, von Stade D, Kelly C, Horne P, Gall K, Easley J. "Novel 3D printed lattice structure titanium cages evaluated in an ovine model of interbody fusion." *JOR Spine*. 2023. E1268. DOI: 10.1002/jsp2.1268.

8. Kuiper JP, Puttlitz CM, Rawlinson JE, Dobbs R, **Labus KM**. "A mechanical evaluation of polyvinyl alcohol hydrogels for temporomandibular joint disc replacement." *Frontiers in Physics*. 2022. 10:928579. Doi: 10.3389/fphy.2022.928579.

9. Liu W, **Labus KM**, Ahern M, LeBar K, Avazmohammadi R, Puttlitz CM, Wang Z. "Strain-dependent stress relaxation behavior of healthy right ventricular free wall." *Acta Biomaterialia*. 2022. 152:290-299.

10. JG Wolynski, MM Ilic, **KM Labus**, BM Notaros, CM Puttlitz, KC McGilvray. "Direct Electromagnetic Coupling to Determine Diagnostic Bone Fracture Stiffness." Annals of Translational Medicine. 2022. 10(9):510.

11. Liu W, Nguyen-Truong M, LeBar K, **Labus KM**, Gray E, Ahern M, Neelakantan S, Avazmohammadi R, McGilvray KC, Puttlitz CM, Wang Z. "Multiscale Contrasts Between the Right and Left Ventricle Biomechanics in Healthy Adult Sheep and Translational Implications." *Front. Bioeng. Biotechnol.* 2022. 10: 857638.

12. BC Gadomski, **KM Labus**, H Stewart, B Nelson, CM Puttlitz, KC McGilvray, DP Regan, JT Easley. "A Large Animal Model for Orthopaedic Foot and Ankle Research." Frontiers in Veterinary Medicine 9, 2022.

13. Wolynski JG, Ilic MM, Notaros BM, **Labus KM**, Puttlitz CM, McGilvray KC. "Vivaldi antennas for contactless sensing of implant deflections and stiffness for orthopaedic applications." *IEEE Access.* 2021. 10: 1151-1161.

14. Wolynski JG, **Labus KM**, Easley JT, Notaros BM, Ilic MM, Puttlitz CM, McGilvray KC. "Diagnostic Prediction of Ovine Fracture Healing Outcomes via a Novel Multi-Location Direct Electromagnetic Coupling Antenna." *Ann Transl Med*. 2021 Aug. 9(15): 1223.

15. Gadomski B, **Labus K**, Puttlitz C, McGilvray K, Regan D, Nelson B, Seim H, Easley J. "Evaluation of lumbar spinal fusion utilizing Recombinant Human Platelet Derived Growth Factor-B Chain Homodimer (rhPDGF-BB) Combined with a Bovine Collagen/ β-Tricalcium Phosphate (β-TCP) Matrix in an Ovine Model." *JOR Spine*. 2021 July. 4(3): e1166.

16. Yang Y, **Labus K**, Gadomski B, Bruyas A, Easley J, Nelson B, Palmer R, McGilvray K, Regan D, Puttlitz C, Stahl A, Maloney W, Gardner M. "Osteoinductive 3D Printed Scaffold Healed 5 cm Segmental Bone Defects in the Ovine Metatarsus." *Scientific Reports*. 2021. 11(1): 1-12.

17. Yang YP, Gadomski B, Bruyas A, Easley J, **Labus K**, Nelson B, Palmer R, McGilvray K, Puttlitz C, Regan D, Stahl A, Lui E, Li J, Moeinzadeh S, Kim S, Maloney W, Gardner M. "Investigation of a Prevascularized Bone Graft for Large Defects in the Ovine Tibia." *Tissue Engineering Part A.* 2021. 27(23-24): 1458-1469.

18. Liu W, Nguyen-Truong M, Ahern M, **Labus K**, Puttlitz C, Wang Z. "Different Passive Viscoelastic Properties Between the Left and Right Ventricles in Healthy Adult Ovine." *J. Biomech. Eng*. 2021.

19. **Labus KM**, Kuiper JP, Rawlinson J, Puttlitz CM. "Mechanical characterization and viscoelastic model of the ovine temporomandibular joint disc in indentation, uniaxial tension, and biaxial tension." *J. Mech Behav. Biomed. Mater.* 2021. 116:104300.

20. Liu W, Nguyen-Truong M, **Labus K**, Boon J, Easley J, Monnet E, Puttlitz C, Wang Z. "Correlations between the right ventricular passive elasticity and organ function in adult ovine." *J. Interg. Cardiol.* 2020. 6:1-6.

21. **Labus KM,** Sutherland C, Notaros BM, Ilic MM, Chaus G, Keiser D, Puttlitz CM. "Direct Electromagnetic Coupling for Non-Invasive Measurements of Stability in Simulated Fracture Healing." *J. Orthop. Res.* 2019. 37(5):1164-1171.

22. **Labus KM**, Notaros BM, Ilic MM, Sutherland C, Holcomb A, Puttlitz CM. "A Coaxial Dipole Antenna for Passively Sensing Object Displacement and Deflection for Orthopaedic Applications." *IEEE Access.* 2018. 6:68184-68194

23. **Labus KM** and Puttlitz CM. "Viscoelasticity of Brain Corpus Callosum in Biaxial Tension." *J. Mech. Phys. Solids.* 2016 Nov. 96:591-604.

24. **Labus KM** and Puttlitz CM. "An Anisotropic Hyperelastic Constitutive Model of Brain White Matter in Biaxial Tension and Structural-Mechanical Relationships." *J. Mech. Behav. Biomed. Mater*. 2016 Sep. 62:195-208.

25. Han SK, Chen CW, **Labus KM**, Puttlitz CM, Chen Y, Hsieh AH. "Optical Coherence Tomographic Elastography Reveals Mesoscale Shear Strain Inhomogeneities in the Annulus Fibrosus." *Spine*. 2016 Jul. 1;41(13):E770-7.

26. Dreischarf M, Zander T, Shirazi-Adl A, Puttlitz CM, Adam CJ, Chen CS, Goel VK, Kiapour A, Kim YH, **Labus KM**, Little JP, Park WM, Wang YH, Wilke HJ, Rohlmann A, Schmidt H. "Comparison of Eight Published Static Finite Element Models of the Intact Lumbar Spine: Predictive Power of Models Improves When Combined Together." *J. Biomechanics*. 2014 Jun. 47(8), 1757-1766.

27. **Labus KM**, Han SK, Hsieh AH, Puttlitz CM. "A Computational Model to Describe the Regional Interlamellar Shear of the Annulus Fibrosus." *J Biomech Eng*. 2014 Apr. 136(5), 051009.

CITATION HISTORY OF PEER-REVIEWED PUBLICATIONS

Citation data obtained from a Google Scholar search on Jan 02, 2025.

	All	**Since 2020**	**Description**
Citations	799	562	Total citations to all publications
h-index	11	11	*h* publications having at least *h* citations
i10-index	14	12	Number of publications with at least 10 citations

ABSTRACTS & CONFERENCE PROCEEDINGS

* indicates an oral podium presentation.

1. SH Lee, R Lu, Z Li, A Mauriello, L Burton, K Sikes, L Pezzanite, D Koch, **K Labus**, B Gadomski, J Easley, R Tran, SC Heo. "Advanced Citrate-based Anionic Scaffolds For Growth Factor Binding In Bone Regeneration." Orthopaedic Research Society 2025 Annual Meeting. Phoenix, AZ, Feb. 2025.

2. C Thomas, **K Labus**, B Gadomski, N Phillips, J Mitchell, L Goodrich, B Nelson. "Extending the Shelf-Life of Articular Cartilage Transplants: Cryopreserved vs Fresh Osteochondral Allografts." University of Colorado Orthopedic Research Symposium, October 2024.

3. **K Labus**, J Dunn, M Ilic, B Notaros, K McGilvray, C Puttlitz. "Monitoring tibial fracture healing via telemetric bending." Orthopaedic Trauma Association Annual Meeting, Montreal, Canada, October, 2024.

4. H Mahmoud, C Puttlitz, **K Labus**. "The Material Tuning of Annealing PVA Hydrogels for the Application of TMJ Disc Replacement." 7th TERMIS World Congress, Seattle, WA, June 2024.

5. H Mahmoud, C Puttlitz, **K Labus**. "The Material Tuning of Annealing PVA Hydrogels for the Application of TMJ Disc Replacement." Summer Biomechanics, Bioengineering, and Biotransport Conference, Lake Geneva, WI, June 2024.

6. *A Bonilla, K Lebsock, J Johnson, **K Labus**, B Gadomski, H Stewart, H Seim, C Abjornson, V Patel, J Easley. "Safety Evaluation and Functional Testing of Antimicrobial-Coated Spinal Stabilization Devices." Global Spine Congress 2024. Bangkok, Thailand, May, 2024.

7. A Bonilla, K Lebsock, J Johnson, **K Labus**, B Gadomski, H Stewart, H Seim, C Abjornson, V Patel, J Easley. "Safety and Functionality Assessment of Antimicrobial Surface-Modified Spinal Stabilization Devices." Orthopaedic Research Society 2024 Annual Meeting. Long Beach, CA, Feb. 2024.

8. ***K Labus**, J Dunn, M Ilic, B Notaros, K McGilvray, C Puttlitz. "Predictive Monitoring of Tibial Fracture Healing via Telemetric Bending Measurements." Military Health Sciences Research Symposium. Kissimmee, FL, Aug 2023.

9. *M Ilic, A Golubović, J Wolynski, **K Labus**, C Puttlitz, K McGilvray, B Notaroš. "Improved Wireless Position-Detection of Metallic Plates in Orthopaedic Applications." 2023 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, Portland, OR, Jul 2023.

10. ***K Labus**, J Kuiper, C Puttlitz. "Tribological Assessment of PVA Hydrogels as Interpositional Implant Materials in the Temporomandibular Joint." Summer Biomechanics, Bioengineering, and Biotransport Conference, Vail, CO, June 2023.

11. *J Kuiper, R Dobbs, J Easley, C Puttlitz, **K Labus**. "Development of an Artificial Temporomandibular Joint Disc Replacement and Surgical Strategy." Summer Biomechanics, Bioengineering, and Biotransport Conference, Vail, CO, June 2023.

12. **K Labus**, K McGilvray, B Notaros, M Ilic, J Dunn, C Puttlitz. "Predicting Fracture Healing by Measuring Compliance Via Direct Electromagnetic Coupling." Summer Biomechanics, Bioengineering, and Biotransport Conference, Vail, CO, June 2023.

13. C Brekhus, **K Labus**, B Seguin, C Puttlitz, B Gadomski. "Fracture Risk Prediction Using Finite Element Modeling in a Canine Model of Osteosarcoma." Summer Biomechanics, Bioengineering, and Biotransport Conference, Vail, CO, June 2023.

14. *J Kuiper, R Dobbs, J Easley, C Puttlitz, **K Labus.** "Polyvinyl alcohol hydrogels for temporomandibular joint disc replacement" 60th Rocky Mountain Bioengineering Symposium, Fort Collins, CO, April 2023.

15. C Brekhus, **K Labus**, C Puttlitz, B Seguin, B Gadomski "Finite element modeling for fracture risk prediction in osteosarcoma using a canine model." 60th Rocky Mountain Bioengineering Symposium, Fort Collins, CO, April 2023.

16. C Brekhus, **K Labus**, C Puttlitz, B Seguin, B Gadomski. “Animal-specific Finite Element Modeling for the Prediction of Fracture Risk in a Canine Model of Osteosarcoma.” 68th Annual Meeting of the Orthopedic Research Society; Dallas, TX, 2023.

17. ***K Labus**, J Dunn, M Ilic, B Notaros, K McGilvray, C Puttlitz. “Predicting tibial fracture healing via telemetric bending measurements.” 1st Triennial Meeting International Orthopaedic Trauma Association 2022. Amsterdam, Netherlands. Dec 2022.

18. C Brekhus, **K Labus**, B Seguin, C Puttlitz, B Gadomski. “Animal-Specific Finite Element Modeling for the Prediction of Fracture Risk in a Canine Model of Osteosarcoma." Human-Animal Translation Science Research Symposium. Fort Collins, CO. 2022.

19. ***K Labus,** J Wolynski, J Easley, H Stewart, B Notaros, M Ilic, K McGilvray, C Puttlitz. “Monittoring Healing via Bending Measurements in an Ovine Metatarsus Fracture Model with Intramedullary Nail Fixation.” World Congress of Biomechanics 2022, Taipei, Taiwan, July 2022.

20. *W Liu, **K Labus**, M Ahern, R Avazmohammadi, C Puttlitz, Z Wang. “Computational Modeling of the Passive Anisotropic Viscoelastic Behavior of Ovine Right Ventricles.” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 2022.

21. ***K Labus**, J Johnson, L Goodrich, K McGilvray, C Puttlitz, B Gadomski. “Comparison of Fresh and Cryopreserved ProChondrixCR® Thin Osteochondral Allograft Mechanics in Explant Conditions.” International Cartilage Regeneration and Joint Preservation Society World Congress (ICRS) 2022, Berlin, Germany; April 2022.

22. JP Kuiper, **K Labus**, C Puttlitz; “Mechanical Characterization of The Ovine Temporomandibular Joint Capsule and Articular Cartilage”. Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

23. B Gadomski, **K Labus**, C Puttlitz, K McGilvray, H Seim, B Nelson, K Bisazza, J Easley, J Shum, G Hooper, T Woodfield; “Additive manufactured titanium interbody cages with macro pore architecture show comparable bone formation to PEEK with graft in an ovine lumbar fusion model”. Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

24. KJ Sikes, JW Johnson, **K Labus**, C Puttlitz, K McGilvray, D Regan, BC Gadomski, H Stewart, BS Margulies, J Easley; “Evaluation of a noel small molecule bone graft in a rabbit epicondylar defect model”. Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

25. J Johnson, **K Labus**, C Puttlitz, K McGilvray, D Regan, K Sikes, J Easley, B Margulies, B Gadomski; “Evaluation of a novel drug eluting bone graft in a lapine posterolateral fusion model”. Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

26. J Johnson, **K Labus**, C Puttlitz, K McGilvray, D Regan, K Sikes, J Easley, B Margulies, B Gadomski; “Evaluation of the osteogenic potential of a novel drug eluting carrier in a lapine

posterolateral fusion model". Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

27. K Bisazza, B Gadomski, **K Labus**, H Stewart, B Nelson, C Puttlitz, K McGilvray, D Regan,L Brinker, J Easley; "Distal carpal stabilization in an ovine preclinical model of foot and ankle surgery". Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

28. K Bisazza, K McGilvray, K Selberg, **K Labus**, B Gadomski, B Margulies, J Easley; "Evaluation of a nove Naloxone-treated collagen implant in a rabbit model of posterior lumbar intertransverse fusion". Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

29. JG Wolynski, **KM Labus**, BM Notaros, MM Ilic, CM Puttlitz, KC McGilvray; "Diagnostic Fracture Stiffness Quantification By Direct Electromagnetic Coupling". Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

30. KJ Sikes, JW Johnson, **K Labus**, CM Puttlitz, K McGilvray, D Regan, B Gadomski, H Stewart, BS Margulies, JT Easley; "Evaluation of A Novel Small Molecule Bone Graft In A Rabbit Epicondylar Defect Model". Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

31. **K Labus**, J Johnson, L Goodrich, K McGilvray, C Puttlitz, B Gadomski; "Biomechanical Effects of Cryopreservation on ProChondrix CR® Thin Osteochondral Allografts". Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

32. **K Labus**, JG Wolynski, BM Notaros, MM Ilic, J Dunn, KC McGilvray, CM Puttlitz; "Monitoring Healing in Tibia Fracture Patients via Bending with Direct Electromagnetic Coupling Sensing". Orthopaedic Research Society (ORS) 2022, Tampa, Florida; February 2022.

33. ***Labus KM**, Kuiper JP, Puttlitz CM. "Mechanical Characterization and Constitutive Modeling of Ovine Temporomandibular Joint Disc." Summer Biomechanics, Bioengineering and Biotransport Conference. June, 2020.

34. ***Labus KM**, McGilvray K, Chaus G, Puttlitz CM. "Measurement of Fracture Stability via Electromagnetic Coupling to Monitor Healing: Benchtop and Pilot Patient Tests." Summer Biomechanics, Bioengineering and Biotransport Conference. June, 2020.

35. *Wolynski JG, **Labus KM**, Puttlitz CM, Easley JT, McGilvray KC. "Fracture Healing Diagnosis by Direct Electromagnetic Coupling in an Ex Vivo Model." Summer Biomechanics, Bioengineering and Biotransport Conference. June, 2020.

36. *Wolynski JG, **Labus KM**, Puttlitz CM, Easley JT, McGilvray KC. "Early Fracture Healing Prediction by In Vivo Direct Electromagnetic Coupling." Summer Biomechanics, Bioengineering and Biotransport Conference. June, 2020.

37. *W Liu, M Nguyen-Truong, **K Labus**, C Puttlitz, Z Wang. “Different Viscoelastic Properties Between the Left and Right Ventricles in Healthy Adult Ovine.” Summer Biomechanics, Bioengineering and Biotransport Conference. June, 2020.

38. *M Ngyuyen-Truong, W Liu, C Doherty, **K Labus**, C Puttlitz, Z Wang. “Transmural Differences in the Anisotropic Mechanical Behavior of Interventricular Septum in Adult Sheep.” Summer Biomechanics, Bioengineering and Biotransport Conference. June, 2020.

39. *Palmer RH, Gadomski BC, **Labus KM**, McGilvray KC, Nelson BB, Stewart HL, Puttlitz CM, Easley JT. “Evaluation of a Novel, Resorbable Interference Screw for CrCL Reconstruction.” Veterinary and Comparative Orthopaedics and Traumatology. May, 2020.

40. **Labus KM**, Kuiper J, Puttlitz CM. “Mechanical Characterization of Ovine Temporomandibular Joint Disc in Indentation and Biaxial Tension.” Orthopaedic Research Society. Feb, 2020.

41. Gadomski BC, **Labus KM**, McGilvray K, Belson B, Palmer R, Stewart H, Puttlitz CM, Easley J. “Development of a novel, resorbable interference screw for tendon attachment.” Orthopedic Research Society. Feb, 2020.

42. *Gadomski BC, **Labus KM**, Puttlitz C, McGilvray K, Seim H, Nelson B, Easley J. “Evaluation of lumbar spinal fusion utilizing recombinant human platelet derived growth factor-B chain homodimer combined with bovine collagen/β-tricalcium phosphate in an ovine model.” Orthopedic Research Society. Feb, 2020.

43. Wolynski JG, **Labus KM**, Puttlitz CM, McGilvray KC. “Early Fracture Healing Prediction by Non-Invasive Multi-Location Direct Electromagnetic Coupling.” Orthopedic Research Society. Feb, 2020.

44. **Labus KM**, Puttlitz CM. “Monitoring Simulated Fracture Healing via Non-Invasive Electromagnetic Coupling Measurement.” Extremity War Injuries, Society of Military Orthopaedic Surgeons. Jan, 2020.

45. Wolynski JG, Brodin E**, Labus KM**, Puttlitz CM, McGilvray K. “Fracture Healing Diagnosis and Prediction by Direct Electromagnetic Coupling Antennae.” Extremity War Injuries, Society of Military Orthopaedic Surgeons. Jan, 2020.

46. Nguyen-Truong M, Liu W, Doherty C, **Labus K**, McGilvray K, Puttlitz C, Wang Z. “Anisotropic Behavior and Transmural Differences of Interventricular Septum in Adult Sheep.” Circulation. Nov, 2019.

47. **Labus KM**, Puttlitz CM. “Diagnostic Monitoring and Prediction of Fracture Healing via Non-Invasive Measurement of Mechanical Stability in Bending.” Orthopaedic Research Society. Feb, 2019.

48. Liu W, Nguyen-Truong M, **Labus KM**, Gray E, McGilvray K, Puttlitz CM, Wang Z. "Different Anisotropic Biomechanical Behavior of Left and Right Ventricles in Adult Sheep." Circulation. Nov, 2018.

49. Nguyen-Truong M, **Labus KM**, Liu W, McGilvray K, Puttlitz CM, Wang Z. "Distinct Biaxial Mechanical Properties between Right and Left Ventricles in Healthy Adult Sheep." Experimental Biology. April 21-25, 2018.

50. Liu W, **Labus KM**, Nguyen-Truong M, McGilvray K, Puttlitz CM, Wang Z. "A Constitutive Model of Ovine Left and Right Ventricles Biaxial Mechanical Properties." Experimental Biology. April 21-25, 2018.

51. **Labus KM**, McGilvray KC, Puttlitz CM. "Monitoring Fracture Healing via Non-invasive Electromagnetic Sensing of Mechanical Stability." Orthopaedic Research Society. Mar 10-13, 2018.

52. **Labus KM**, McGilvray KC, Demir HV, Kieser D, Puttlitz CM. "An Experimental Model of Femoral Stem Loosening and Detection via Strain Sensing." Orthopaedic Research Society. Mar 19-22, 2017.

53. **Labus KM**, García JJ, Puttlitz CM. "Modeling the Biaxial Mechanics of Brain White Matter." Summer Biomechanics, Bioengineering and Biotransport Conference. June 17-20, 2015.

54. ***Labus KM**, Orozco GA, García JJ, Puttlitz CM. "An Anisotropic Model of the Biaxial Mechanics of Brain White Matter." 7th World Congress of Biomechanics. July 6-11, 2014.

55. *Dreischarf M, Zander T, Shirazi-Adl A, Puttlitz CM, Adam CU, Clayton J, Chen CS, Goel VK, Kiapour A, Kim YH, **Labus KM**, Little JP, Park WM, Wang YH, Wilke HJ, Rohlmann A, Schmidt H. "Comparison of Eight Published Lumbar Spine Finite Element Models." 7th World Congress of Biomechanics. July 6-11, 2014.

56. *Hsieh AH, Han S, Hwang D, Chen C, Chou C, **Labus KM**, Yu M, Puttlitz CM, Chen Y. "Spatial and Temporal Considerations of Cellular Mechanobiology in the Intervertebral Disc." 7th World Congress of Biomechanics. July 6-11, 2014.

57. **Labus KM**, Hsieh AH, Puttlitz CM. "Lamellar and Interlamellar Shear Compared Across Regions of the Annulus Fibrosus." ASME Summer Bioengineering Conference. June 26-29, 2013.

INVITED LECTURES AND PRESENTATIONS

1. **K Labus**. "Temporomandibular Disc Replacement." 19th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, Vancouver, Canada, July, 2024.

2. **K Labus**. "Fracture Monitoring via Direct Electromagnetic Coupling & Temporomandibular Joint Characterization and Implant Development." Seminar, School of Biomedical Engineering, Colorado State University. March, 2024.

3. **K Labus**. "Development of an Artificial Temporomandibular Joint Disc Replacement." Research in Progress Seminar, Translational Medicine Institute, Colorado State University. September, 2023.

RESEARCH SUPPORT SUMMARY

Federal / State Research Awards					
Year	**Number of Studies as PI**	**Number of Studies as Co-I**	**Total Funding as PI**	**Total Funding as Co-PI**	**Total Funding**
2020	-	4	-	$1,812,972	$1,812,972
2021	-	-	-	-	$0
2022	-	-	-	-	$0
2023	2	-	$680,950	-	$680,950
2024	-	-	-	-	$0
TOTAL	**2**	**4**	**$680,950**	**$1,812,972**	**$2,493,922**

Other External Research Support					
Year	**Number of Studies as PI**	**Number of Studies as Co-I**	**Total Funding as PI**	**Total Funding as Co-PI**	**Total Funding**
2020	-	-	-	-	$0
2021	-	-	-	-	$0
2022	2	-	$363,529	-	$363,529
2023	13	-	$1,789,863	-	$1,789,863
2024	-	4	-	$2,343,400	$2,343,400
TOTAL	**15**	**4**	**$2,153,392**	**$2,343,400**	**$4,496,792**

Overall Funding	
Total Funding as PI	**$2,834,342**
Total Funding as Co-PI	**$4,156,372**
Total Funding	**$6,990,714**

FEDERAL / STATE RESEARCH AWARDS

Active Funding:

NIH-NIDCR: R56DE032760
Role: PI
Total Costs: $513,750
Dates: 2023-2024
Title: *A Novel Fiber Embedded Hydrogel Temporomandibular Joint Disc Replacement*
The goal of this project is to develop a hydrogel TMJ disc replacement via characterization of the TMJ biomechanical environment, implant material testing, and evaluation in a large animal model.

Colorado OEDIT (Advanced Industries): DO 2023-2274 (Includes internal cost share)
Role: PI
Total Costs: $167,200
Dates: 2023-2025
Title: *A Fiber Embedded Hydrogel to Replace the Temporomandibular Joint Disc in a Pilot Ovine Study*
The objective of the study is to develop an interpositional implant to replace diseased or damaged TMJ discs.

DOD CDMRP Research Agreement dated 8/15/2020
Role: Co-I (PI: Safranski)
Total Costs: $1,310,331
Dates: 2020-2024
Title: *Development of a Dynamic compression fusion device for lower extremity salvage of the diabetic foot*
The objective of this project is to develop a dynamic compression midfoot fusion device capable of enhanced bone fusion for salvage reconstruction of the diabetic foot.

Completed Funding:

NIH-NIAMS: R21AR077323
Role: Co-I (PI: Puttlitz)
Total Costs: $347,641
Dates: 2020-2024
Title: *A telemedicine approach for monitoring fracture healing via direct electromagnetic coupling*
The goal of this project is to use a direct electromagnetic coupling sensing technology to monitor healing in tibia fracture patients by developing an at-home system and testing this in a clinical patient cohort.

Colorado OEDIT (Advanced Industries): CTGG1 2020-2697
Role: Co-I (PI: Puttlitz)
Total Costs: $75,000
Dates: 2020-2022
Title: *Direct Electromagnetic Coupling for Diagnostic Prediction of Fracture Healing*
The goal of this project is to develop sensor improvements to a direct electromagnetic coupling sensing technology for monitoring healing fracture patients and to test in a pilot animal study.

Translational Medicine Institute, Colorado State University: TAP Award
Role: Co-I (PI: Puttlitz)
Total Costs: $80,000
Dates: 2020-2022
Title: *Direct Electromagnetic Coupling for Diagnostic Prediction of Fracture Healing*
The goal of this project is to develop sensor improvements to a direct electromagnetic coupling sensing technology for monitoring healing fracture patients and to test in a pilot animal study. (Cost share with OEDIT GTGG1 2020-2697).

Pending Funding:

DOD - Subcontract (Johns Hopkins University)
Role: PI
Total Costs: $931,201
Title: Long Bone Fracture Healing Prediction Using Electromagnetic Resonance Coupling of Orthopaedic Hardware

DOD - Subcontract (MedShape Solutions, Inc.)
Role: PI
Total Costs: $556,909
Title: Non-Invasive Measurements of Arthrodesis Healing and Weight Bearing to Enable Rapid Administration of Non-Union Therapies and Optimize Rehabilitation

NIH
Role: Co-I (PI: Prawel)
Total Costs: $404,206
Title: Inducing Controlled Strain into a Bone Regeneration Scaffold in a Critical Defect In-Vivo

DOD – Subcontract (Stanford University)
Role: Co-PI
Total Cost: $465,162
Title: A novel bioactive bone graft for accelerated bone repair and regeneration

DOD – Subcontract (OsteoCure Therapeutics, Inc.)
Role: Co-PI
Total Costs: $925,545
Title: Adenosine delivery to accelerate fracture healing and recovery

DOD – Subcontract (BioTissue)
Role: Co-PI
Total Costs: $105,292
Title: A novel treatment of full thickness cartilage defects with a resorbable polymer/hyaluronan implant (Chondrotissue) combined with bone marrow stimulation

NIH – Subcontract (Tissuerate, Inc.)
Role: Co-PI
Total Costs: $715,479
Title: A novel bioactive bone graft to accelerate bone regeneration in large bone defects

NIH – Subcontract (Cytex Therapeutics, Inc.)
Role: Co-PI
Total Costs: $824,987
Title: Age-relevant biomimetic rotator cuff repair in a chronic disease model

NIH – Subcontract (OrthoPreserve)
Role: Co-PI
Total Costs: $394,096
Title: Pre-clinical assessment of a minimally invasive meniscus implant to delay arthritis: SBIR phase 2

DOD – Subcontract (Sparta BioPharma)
Role: Co-PI
Total Costs: $679,739
Title: Functional Assessment of Hydrogel-Titanium OsteoChondral Implant

OTHER EXTERNAL FUNDING SUPPORT

Funding as Principal Investigator or Co-PI

Year	Sponsor	Title	Co-PI	Amount
2022	Intelligent Implants	Safety and efficacy evaluation of PEEK/Metal interbody fusion device using direct current electrical stimulation to aid fusion	J Easley	$301,607
2022	Ankasa	GLP safety and dose range finding evaluation of ART353-L in an aged sheep interbody spinal fusion model	J Easley	$61,922
2023	Trace Ortho	Evaluation of a Percutaneous Tendon Fastener in an Ovine Rotator Cuff Model	J Easley	$87,705

2023	CollaMedix, Inc.	Investigation of Two Easily-Deployed Regenerative Scaffolds for Augmentation of Rotator Cuff Repair	J Easley	$59,318
2023	RevBio	Evaluation of Tetranite (TN) for Vertebral Compression Fractures (VCFs) in an Ovine Model - A Pilot Study	J Easley	$177,723
2023	HAPPE	Evaluation of a Porous and Bioavtice PEEK Interbody Cage in an Ovine Model	J Easley	$121,844
2023	Acuitive	Evaluation of Optimal Osteochondral Plug for Osteochondral Defect Repair in a Caprine Model - A Pilot Study	J Easley	$153,817
2023	Garwood	Assessment of Surgical Technique and Functionality of a Novel Device to Reduce Bioburden in an Ovine PJI Model - Pilot Study Phase II	J Easley	$94,570
2023	Embody	Investigation of a Novel Embody Suture in a Rotator Cuff Repair Model	J Easley	$347,344
2023	Novadip	Evaluation of Xenogenic Safety Response of NVDX3 in an Ovine PLF	J Easley	$96,561
2023	Acuitive	Screeninf of an Interpositional Scaffold for Rotator Cuff Repair in an Ovine Model - A Pilot Study	J Easley	$138,679
2023	Magsorbeo	Evaluation of a Akesorb Maxillofacial System for repair of frontal bone fractures in an ovine model: Pilot Study	J Easley	$50,034
2023	Curiteva	Osteoinductive Muscle Pouce Pilot Study	J Easley	$105,494
2023	Wise	Expandable Percutaneous Spinal Cord Stimulation Device in an Ovine Model- Pilot Study	J Easley	$111,345
2023	Amphix	Assessment of BMP Dosing in Amphix Bio Putty in an Ovine Interbody Lumbar Fusion Model	J Easley	$245,429

Funding as Co-Investigator

Year	Sponsor	Title	PI	Amount
2024	OTS Medical, Ltd.	Evaluation of a novel bone/suture anchor repair of an ovine glenoid bone defect in a Bankart lesion	J Easley	$379,720

2024	Nexilis AG	Safety of the Immediate Stabilization System for bone reinforcement in monosegmental fusion of vertebrae in the lumbar spine of sheep: A GLP Study	J Easley	$1,402,155
2024	Ossiform	Evaluation of the safety and effectiveness of a novel b-TCP device in a rabbit femoral defect model relative to a predicate: a 26 week study	K Sikes	$143,285
2024	Ossiform	Evaluation of the safety and effectiveness of a novel b-TCP device in a rabbit femoral defect model relative to a predicate: a 4, 8, 12 week study	K Sikes	$418,240

PATENTS

1. Puttlitz CM, Labus KM. "Loading Device for Measuring Stiffness of Structural Member Over Time, Monitoring System, and Method Thereof." United States Patent Number: 11717213B2; Publication Date: August 08, 2023.

2. Wolynski JG, Labus KM, Puttlitz CM, McGilvray KC. "Method and system for measuring deflections of structural member at multiple locations using multiple antennae." United States Patent Number: 11402193; Publication Date: August 2, 2022.

3. Puttlitz CM, Labus KM. "Loading Device for Measuring Stiffness of Structural Member Over Time, Monitoring System, and Method Thereof." United States Patent Number: 17039111; Publication Date: February 04, 2021.

4. Wolynski J, Labus KM, Puttlitz CM, McGilvray KC. "Method and system for measuring deflections of structural member at multiple locations and antenna thereof." United States Patent Number: 10892558; Publication Date: January 12, 2021.

5. Puttlitz CM, Demir HV, Labus KM, McGilvray KC, Unal E. "Displacement and deformation monitoring method and system without using any strain sensor, and components thereof." United States Patent Number: 10641664. Publication Date: May 5, 2020.

TEACHING EXPERIENCE

Guest Lecturer Fall 2018 – Fall 2019
Course: *MECH 578 – Musculoskeletal Biosolid Mechanics*
Department of Mechanical Engineering, Colorado State University

Graduate Teaching Assistant Fall 2013 - Spring 2016
Course: *MECH 231 - Engineering Experimentation*
Department of Mechanical Engineering, Colorado State University

MENTORSHIP

Advisor, Graduate Students

Hassan Mahmoud (M.S.)	2023-present
Anton Pavlov (Ph.D.)	2023-present

Graduate Thesis Committee

Whitney Paxson (M.S.)	2024

Mentor, Graduate Students

Jacqueline Linn (Ph.D.)	2023-present
Jason Kuiper (Ph.D.)	2019-2023
Wenqiang Liu (Ph.D.)	2018-2022
Jakob Wolynski (Ph.D.)	2017-2021
	2023-2024

Undergraduate Research

Mya Lewis	2024-present
Melissa Willis	2024-2024
Makayla Veglia	2024-2024
Jonathan Bannerot	2024-present
Hassan Mahmoud	2022-2023
Taylor Zagrocki	2021-2023
Garret Snyder	2021-2023
Shervin Kazemi	2020-2022
Tanara Morrell	2020-2021
Daniel Palmer	2018-2019
Amy Holcomb	2018
Lauren Berens	2017

AWARDS

- Journal of Biomechanical Engineering: Editor's Choice Paper, 2014: "A Computational Model to Describe the Regional Interlamellar Shear of the Annulus Fibrosus."

PROFESSIONAL TRAININGS

- Good Laboratory Practices (GLP) Study Director and Principal Investigator Training: Society of Quality Assurance. 2022.
- GLP Study Training
- Open-Beam X-Ray Instruments Training
- CSU Hazardous Waste Training

- CSU Blood-borne Pathogen Training
- CSU Biosafety BSL1 and BSL2 Training

PROFESSIONAL AFFILIATIONS

- American Society of Mechanical Engineers (ASME)
- Orthopaedic Research Society (ORS)
- Tissue Engineering and Regenerative Medicine International Society (TERMIS)

SERVICE

- *Ad hoc* manuscript reviewer:
    - Nature: Scientific Reports
    - Journal of Biomechanical Engineering
    - Journal of the Mechanical Behavior of Biomedical Materials
    - Journal of Biomechanics
    - Cartilage
    - Frontiers in Bioengineering
    - Computers in Biology and Medicine

- Abstract Reviewer: 2024 Summer Bioengineering, Biomechanics and Biotransport Conference

- Judge, Student Paper Competition: 2024 Summer Bioengineering, Biomechanics and Biotransport Conference

- Committees:
    - Biomaterials TTF Search, Dept. Mech. Eng., CSU 2024

NCAA ATHLETICS

NCAA Track & Field, Cross Country August, 2007 - May, 2011
University of Notre Dame
Notre Dame, Indiana, USA