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RESEARCH INTEREST SUMMARY

Elucidating physiology-based structure-function relationships in healthy and diseased tissues, tissue regeneration and repair, and biomimetic materials design by bridging materials science and engineering mechanics with the life-sciences.

EDUCATION

2001 **University of Colorado, Boulder, CO**
Ph.D. Mechanical Engineering, University of Colorado at Boulder
Dissertation: "Age related bone loss and treatment with cytokines in mice."
Advisor: Steven J. Simske, Ph.D. (Aerospace Engineering Sciences)

1998 **University of Colorado, Boulder, CO**
M.S. Mechanical Engineering, University of Colorado at Boulder
Thesis: "The effects of age and dietary restriction without nutritional supplementation on whole bone structural properties in C57BL/6J mice."
Advisor: Steven J. Simske, Ph.D. (Aerospace Engineering Sciences)

1993 **University of Colorado, Boulder, CO**
B.S. Mechanical Engineering, University of Colorado at Boulder

EXPERIENCE

9/2014 – Present *Associate Professor*
Mechanical Engineering, University of Colorado, Boulder, CO

1/2009 – Present *Associate*
BioFrontiers Institute, University of Colorado, Boulder, CO

10/2013 – Present *Associate*
Materials Science and Engineering Program, University of Colorado, Boulder, CO

3/2012 – Present *Assistant Clinical Professor*, Dean's Faculty Appointment
Department of Orthopaedics, University of Colorado School of Medicine, Denver, CO

10/2009 – Present *Assistant Clinical Professor*, Dean's Faculty Appointment
Department of Obstetrics and Gynecology, University of Colorado School of Medicine, Denver, CO

7/2016 – 7/2018 *Associate Chair of Undergraduate Studies*
Mechanical Engineering, University of Colorado, Boulder, CO

1/2006 – 8/2014 *Assistant Professor*
Mechanical Engineering, University of Colorado, Boulder, CO

1/2003 – 12/2005 *Visiting Research Associate*
Materials Science, Queen Mary, University of London, UK

2/2003 – 12/2005 *Research Associate*

	BioServe Space Technologies / Aerospace Engineering Sciences University of Colorado, Boulder, CO
8/2003 – 12/2004	*Adjunct Professor* Mechanical Engineering, University of Colorado, Boulder, CO
6/2001 – 12/2002	*Postdoctoral Research Associate* Materials Science, Queen Mary, University of London, UK
6/2001 – 12/2002	*Honorary Research Fellow* Anatomy and Developmental Biology, University College London, UK
5/1996 – 5/2001	*Graduate Research Assistant* BioServe Space Technologies & Mechanical Engineering University of Colorado, Boulder, CO
6/1995 – 1/1996	*Biomedical Engineering Intern* Division of Urology in the Department of Surgery University of Colorado Health Sciences Center, Denver, CO
11/1993 – 1/1995	*Environmental Remediation Project Engineer* EG&G, Rocky Flats Environmental Technology Site, Golden, CO
5/1992 – 10/1993	*Systems Engineering Intern* EG&G, Rocky Flats Environmental Technology Site, Golden, CO

AWARDS AND HONORS

2018-	Hudson Moore Endowed Professor, College of Engineering and Applied Science, University of Colorado
2018-2019	BOLD Center Faculty Fellow, College of Engineering and Applied Science, University of Colorado
2016-2017	Faculty Leadership Institute, University of Colorado
2016-2017	College of Engineering and Applied Science Dean's Faculty Leadership Advancement Group (FLAG), University of Colorado
2015	Dean's Faculty Fellowship – Sabbatical Research Supplement
2015	Orthopaedic Research Society Collaborative Exchange Award
2013	University of Colorado Innovative Seed Grant Award for Thermal Fusion in Arteries
2013	Dean's Faculty Fellowship Award, College of Engineering and Applied Science, University of Colorado
2012	Implementation of Multicultural Perspectives and Approaches in Research and Teaching (IMPART) Faculty Fellowship Award Program for *"Assessing the role of trust in mentored engineering research experiences"*, Office of Diversity and Equity, University of Colorado
2011	NSF Faculty Early Career Development (CAREER) Award
2010	Chancellor's Faculty Award for Excellence in STEM Education for *"Assessing YOU'RE@CU: A New Program to Promote Diversity in Engineering"*, University of Colorado
2007	Junior Faculty Development Award (JFDA), Council on Research and Creative Work; University of Colorado.
2006	CU Leadership, Excellence, Achievement, and Diversity Alliance (LEAD) Faculty Appreciation Award.
2006	Council on Research and Creative Work (CRCW) Seed Grant Recipient; University of Colorado.
2001-present	Sigma Xi Scientific Honor Society
2001-2002	Postdoctoral Fellowship, UK Medical Research Council, Discipline Hoppers Scheme

PUBLICATIONS

1. Preprint: Friedman MA, Abood A, Senwar B, Zhang Y, Maroni CR, **Ferguson VL**, Farber CR, Donahue HJ. Genetic Variability affects the Skeletal Response to Unloading. *bioRxiv* (2020).
2. Preprint: Barthold JE, St. Martin BM, Sridhar SL, Vernerey F, Schneider SE, Wacquez A, Ferguson VL, Calve S, Neu CP. Percolation of Microparticle Matrix Promotes Cell Migration and Integration while Supporting Native Tissue Architecture. *bioRxiv*. (2020)
3. Lindley E, Wuthrich Z, Ortega A, **Ferguson VL**, Patel VV. rhBMP-2 Improves Spine Fusion in a Vitamin D Deficient Rat Model. *Int J Spine Surgery*. Accepted, In Press. (2020).
4. Fischenich KM, Wahlquist JA, Wilmoth RL, Cai L, Neu CP, **Ferguson VL**. Human articular cartilage is orthotropic where microstructure, micromechanics, and chemistry vary with depth and split-line orientation. *Osteoarthritis Cartilage*. S1063-4584(20)31058-X (2020).
5. Sinha J, Podgórski M, Tomaschke A, Ferguson VL, Bowman CN. Phototriggered Base Amplification for Thiol-Michael Addition Reactions in Cross-linked Photopolymerizations with Efficient Dark Cure. *Macromolecules*. 53, 15, 6331–6340 (2020).
6. Aziz A, Wilmoth R, **Ferguson V**, Bryant S. IDG-SW3 osteocyte differentiation and bone extracellular matrix deposition are enhanced in a 3D MMP-sensitive hydrogel. *ACS Applied BioMaterials*. 3(3): 1666-1680. (2020).
7. Smith RC, Cramer MS, Mitchell PJ, Lucchesi J, Ortega Am, Livingston EW, Ballard D, Zhang L, Hanson J, Barton K, Berens S, Credille K, Bateman TA, **Ferguson VL**, Ma L, Stodieck, LS. Inhibition of myostatin prevents microgravity-induced loss of skeletal muscle mass and strength. *PLoS ONE* 15(4): e0230818. (2020).
8. Abad B, Knobloch JL, Frazer TD, Hernández-Charpak JN, Cheng HY, Grede AJ, Giebink NC, Mallouk TE, Mahale P, Nova NN, Tomaschke AA, **Ferguson VL**, Crespi VH, Gopalan V, Kapteyn HC, Badding JV, Murnane MM. Nondestructive Measurements of the Mechanical and Structural Properties of Nanostructured Metalattices. *Nano Lett.* (2020)
9. Coulombe JC, Senwar B, **Ferguson VL**. Spaceflight-Induced Bone Tissue Changes that Affect Bone Quality and Increase Fracture Risk. *Curr Osteoporos Rep.* Review. 18(1):1-12. (2020).
10. Kegelman CD, Coulombe JC, Jordan KM, Horan DJ, Qin L, Robling AG, **Ferguson VL**, Bellido TM, Boerckel JD. YAP and TAZ Mediate Osteocyte Perilacunar/Canalicular Remodeling. *J Bone Miner Res.* 35(1):196-210. (2020).
11. Heveran CM, Schurman CA, Acevedo C, Livingston EW, Howe D, Schaible EG, Hunt HB, Rauff A, Donnelly E, Carpenter RD, Levi M, Lau AG, Bateman TA, Alliston T, King KB, **Ferguson VL**. Chronic kidney disease and aging differentially diminish bone material and microarchitecture in C57Bl/6 mice. *Bone.* 127:91-103 (2019).
12. Aisenbrey EA, Tomaschke AA, Schoonraad SA, Fischenich KM, Wahlquist JA, Randolph MA, **Ferguson VL**, Bryant SJ. Assessment and prevention of cartilage degeneration surrounding a focal chondral defect in the porcine model. *Biochem Biophys Res Commun.* 514(3):940-945 (2019).
13. Yu Y, Rodriguez-Fontan F, Eckstein K, Muralidharan A, Uzcategui AC, Fuchs JR, Weatherford S, Erickson CB, Bryant SJ, **Ferguson VL**, Hadley Miller N, Li G, Payne KA. Rabbit Model of Physeal Injury for the Evaluation of Regenerative Medicine Approaches. *Tissue Eng Part C Methods*. 25(12):701-710 (2019).
14. Mao XW, Sandberg LB, Gridley DS, Herrmann EC, Zhang G, Raghavan R, Zubarev RA, Zhang B, Stodieck LS, **Ferguson VL**, Bateman T, Pecaut MJ. Proteomic analysis of mouse brain subjected to spaceflight. International Journal of Molecular Sciences, 20(1):7 (2019).
15. Shaw N, Erickson C, Bryant SJ, **Ferguson VL**, Krebs MD, Hadley-Miller N, Payne KA. Regenerative Medicine Approaches for the Treatment of Pediatric Physeal Injuries. *Tissue Engineering Part B: Reviews* 24(2): 85-87 (2018).
16. Shah VN, Carpenter RD, **Ferguson VL**, Schwartz AV. Bone health in type 1 diabetes. Curr Opin Endocrinol Diabetes Obes. 25(4):231-236 (2018).

17. Uzcategui AC, Muralidharan A, **Ferguson VL**, Bryant SJ, McLeod RR. Understanding and Improving Mechanical Properties in 3D printed Parts Using a Dual-Cure Acrylate-Based Resin for Stereolithography. *Advanced Engineering Materials* 1800876 (2018).

18. Heveran CM, Rauff A, King KB, Carpenter RD, **Ferguson VL**. A new open-source tool for measuring 3D osteocyte lacunar geometries from confocal laser scanning microscopy reveals age-related changes to lacunar size and shape in cortical mouse bone. Bone, 110, 115-127 (2018).

19. Aisenbrey EA, Tomaschke A, Kleinjan E, Muralidharan A, Pascual-Garrido C, McLeod RR, **Ferguson VL**, Bryant SJ. A Stereolithography-Based 3D Printed Hybrid Scaffold for In Situ Cartilage Defect Repair. Macromolecular Bioscience 18(2) (2018).

20. Fankell D, **Ferguson VL**, Kramer E, Reguiero R, Rentschler M. A small deformation thermo-poromechanics finite element model and its application to arterial tissue fusion. ASME Journal of Biomechanical Engineering. 140(3) (2018). **JBME Editors' Choice paper for 2018.**

21. Wahlquist JA, DelRio FW, Randolph MA, Aziz AH, Heveran CM, Bryant SJ, Neu CP, **Ferguson VL***. Indentation mapping revealed poroelastic, but not viscoelastic, properties spanning native zonal articular cartilage. *Acta biomaterialia*, *64*, 41-49 (2017).

22. MacDonald GA, Heveran CM, Yang M, Moore D, Zhu K, **Ferguson VL**, Killgore JP, DelRio FW. Determination of the True Lateral Grain Size in Organic–Inorganic Halide Perovskite Thin Films. *ACS applied materials & interfaces* 9(39): 33565-33570 (2017).

23. Pecaut ML, Mao XW, Bellinger DL, Jonscher KR, Stodieck LS, **Ferguson VL**, Bateman TA, Mohney RP, Gridley DS. Is Spaceflight-Induced Immune Dysfunction Linked to Systemic Changes in Metabolism? PLoS One, 12(5): e0174174 (2017).

24. Stender ME, Reguiero RA, **Ferguson VL***. A poroelastic finite element model of the bone—cartilage unit to determine the effects of changes in permeability with osteoarthritis. Comput Methods Biomech Biomed Engin, 20(3):1-13, (2017)

25. Aziz AH, Wahlquist J, Sollner A, **Ferguson V**, DelRio FW, Bryant SJ*. Mechanical characterization of sequentially layered photo-clickable thiol-ene hydrogels. J Mech Behav Biomed Mater, 65:454-465, (2017)

26. Stender ME, Carpenter RD, Reguiero RA, **Ferguson VL***. An evolutionary model of osteoarthritis including articular cartilage damage, and bone remodeling in a computational study. J Biomech, 49(14):3502-3508. (2016)

27. Baranowski LL, Heveran CM, **Ferguson VL**, Stoldt CR. Multi-scale mechanical behavior of Li3PS4 Solid-Phase Electrolyte. ACS Applied Materials and Interfaces, 8(43):29573-29579. (2016)

28. Heveran CM, Ortega AM, Cureton A, Clark R, Livingston EW, Bateman TA, Levi M, King KB, **Ferguson VL**. Moderate chronic kidney disease impairs bone quality in C57Bl/6J mice. Bone, 86:1-9, (2016).

29. Kramer EA, Cezo JD, Fankell DP, Taylor KD, Rentschler ME, **Ferguson VL**. Strength and Persistence of Energy-Based Vessel Seals Rely on Tissue Water and Glycosaminoglycan Content. Annals of Biomed Eng, 1-11 (2016).

30. Jonscher KR, Alfonso-Garcia A, Suhalim JL, Orlicky DJ, Potma EO, **Ferguson VL**, Bouxsein ML, Bateman TA, Stodieck LS, Levi M, Friedman JE. Spaceflight Activates Lipotoxic Pathways in Mouse Liver. PloS one, 11(4):26, (2016).

31. Fankell DP, Kramer E, Cezo J, Taylor KD, **Ferguson VL**, Rentschler ME. A Novel Parameter for Predicting Arterial Fusion and Cutting in Finite Element Models. Annals of Biomedical Engineering, 16:1-2, (2016).

32. Fielder C, Aisenbrey E, Wahlquist J, **Ferguson V**, Bryant S, McLeod R. Enhanced mechanical properties of photo-clickable thiol-ene PEG hydrogels through repeated photopolymerization of in-swollen monomer. Soft Matter, 12(44): 9095-9104. (2016)

33. Kim W, **Ferguson VL**, Borden M, Neu CP. Application of Elastography for the Noninvasive Assessment of Biomechanics in Engineered Biomaterials and Tissues. Annals of biomedical engineering, 44(3):705-24, (2016).

34. Lloyd SA, Morony SE, **Ferguson VL**, Simske SJ, Stodieck LS, Warmington KS, Livingston EW, Lacey DL, Kostenuik PJ, Bateman TA. Osteoprotegerin is an effective countermeasure for spaceflight-induced bone loss in mice. BONE 81:562-572, (2015).

35. Kinneberg KRC, Nelson A, Stender ME, Aziz AH, Mozdzen LC, Harley BAC, Bryant SJ, **Ferguson VL**. Reinforcement of Mono- and Bi-layer Poly(Ethylene Glycol) Hydrogels with a Fibrous Collagen Scaffold. Annals of Biomedical Engineering 43(11):2618-2629, (2015).

36. Stender ME, Regueiro RA, Klisch SM, **Ferguson VL.** An Equilibrium Constitutive Model of Anisotropic Cartilage Damage to Elucidate Mechanisms of Damage Initiation and Progression. Journal of Biomedical Engineering – Transactions of the ASME 137(8): 081010, (2015).

37. Cezo JD, Kramer EA, Schoen JA, **Ferguson VL**, Taylor KD, Rentschler ME. Tissue storage ex vivo significantly increases vascular fusion bursting pressure. SURG ENDOSC 29(7):1999-2005, (2015).

38. Briggs BN, Stender ME, Muljadi PM, Donnelly MA, Winn VD, **Ferguson VL**. A Hertzian contact mechanics based formulation to improve ultrasound elastography assessment of uterine cervical tissue stiffness. Journal of Biomechanics 48(9):1524-1532, (2015).

39. Gridley DS, Mao XW, Tian J, Cao JD, Perez C, Stodieck LS, **Ferguson VL**, Bateman TA, Pecaut MJ. Genetic and Apoptotic Changes in Lungs of Mice Flown on the STS-135 Mission in Space. In Vivo 29(4):423-433, (2015).

40. Anderson NS, Kramer EA, Cezo JD, **Ferguson VL,** Rentschler ME. Bond Strength of Thermally Fused Vascular Tissue Varies With Apposition Force. Journal of biomechanical engineering, 137(12), 121010, (2015).

41. Mao XW, Pecaut MJ, Stodieck LS, **Ferguson VL**, Bateman TA, Bouxsein ML, Gridley DS. Biological and metabolic response in STS-135 space-flown mouse skin. Free Rad Res 48(8): 890-897 (2014).

42. Latchney SE, Rivera PD, Mao XW, **Ferguson VL**, Bateman TA, Stodieck LS, Nelson GA, Eisch AJ. The effect of spacefligth on olfactory bulb volume, neurogenesis, and cell death indicates the protective effect of novel environment. J Appl Phys 116(12): 1593-1604 (2014).

43. Dodson RB, Rozance PJ, Mecham RP, Fleenor BS, Petrash CC, Shoemaker LG, Hunter KS, **Ferguson VL**. Thoracic and abdominal aortic increased hyperelastic stiffness and extracellular matrix changes in intrauterine growth restricted (IUGR) fetal sheep. Am J Physiology – Heart C. 306(3):H429-37 (2014).

44. Cezo JD, Passernig A, **Ferguson V**, Taylor K, Rentschler ME. Evaluating Temperature and Duration in Arterial Tissue Fusion to Maximize Bond Strength. J Mech Behav Biomed Mater. 30:41-9 (2014).

45. Sung M, Li J, Spieker AJ, Spatz J, Ellman R, **Ferguson VL**, Bateman TA, Rosen GD, Bouxsein M, Rutkove SB. Spaceflight and hind limb unloading induce similar changes in electrical impedance characteristics of mouse gastrocnemius muscle. J Musculoskelet Neuronal Interact. 13(4):405-11. (2013).

46. Paietta RC, Burger-Van Der walt E, **Ferguson VL**. Mineralization and collagen orientation throughout aging at the vertebral endplate in the human lumbar spine. J Struct Biol. 184(2):310-20. (2013).

47. Mao XW, Pecaut MJ, Stodieck LS, **Ferguson VL**, Bateman TA, Bouxsein M, Jones TA, Moldovan M, Cunningham CE, Chieu J, Gridley DS. Space flight environment induces mitochondrial oxidative damage in ocular tissue. Radiat Res. 180(4):340-50. (2013).

48. Gridley DS, Mao XW, Stodieck LS, **Ferguson VL**, Bateman TA, Moldovan M, Cunningham CE, Jones TA, Slater JM, Pecaut MP. Changes in mouse thymus and spleen after return from the STS-135 mission in space. PLoS One, 19;8(9):e75097 (2013).

49. Hanson AM, Harrison BC, Young MH, Stodieck LS, **Ferguson VL**. Longitudinal Characterization of Functional, Morphologic, and Biochemical Adaptations in Mouse Skeletal Muscle with Hindlimb Suspension. Muscle and Nerve. 48(3):393-402 (2013).

50. Dodson RB, Martin JT, Hunter KS, **Ferguson VL**. Determination of hyperelastic properties for umbilical artery in preeclampsia from uniaxial extension tests. Eur J Obstet Gynecol Reprod Biol. 169:207-212 (2013).

51. Dodson RB, Rozance PJ, Reina-Romo E, **Ferguson VL**, Hunter KS. Hyperelastic remodeling in the intrauterine growth restricted (IUGR) carotid artery in the near-term fetus. J Biomech. 46 (5):956-963 (2013).

52. Dodson RB, Rozance PJ, Fleenor BS, Petrash CC, Shoemaker LG, Hunter KS, **Ferguson VL**. Increased arterial stiffness and extracellular matrix reorganization in intrauterine growth-restricted fetal sheep. Pediatr Res 73 (2):147-154 (2013).

53. Cezo J, Kramer E, Taylor K, **Ferguson V**, Rentschler M. Temperature measurement methods during direct heat arterial tissue fusion. IEEE Trans Biomed Eng 60 (9):2552-2558 (2013).

54. Campbell SE, **Ferguson VL**, Hurley DC. Nanomechanical mapping of the osteochondral interface with contact resonance force microscopy and nanoindentation. Acta Biomat. 8 (12):4389-4396 (2012).

55. Campbell SE, Geiss RH, Feller SA, **Ferguson VL***. Tunable glass reference materials for quantitative backscattered electron imaging of mineralized tissues. J Mater Res. 27 (19):2568-2577 (2012).

56. Campbell SE, Cuozzo FP, Sauther ML, Sponheimer M, **Ferguson VL***. Nanoindentation of lemur enamel: An ecological investigation of mechanical property variations within and between sympatric species. Am J Phys Anthropol. 148 (2):178-190 (2012).

57. Stodieck LS, Greybeck BJ, Cannon CMA, Hanson AM, Young MH, Simske SJ, **Ferguson VL***. *In vivo* measurement of hindlimb neuromuscular function in mice. Muscle Nerve. 45 (4):536-543 (2012).

58. Gridley DS, Pecaut MJ, Green LM, Clifford Herrmann E, Bianski B, Slater JM, Stodieck LS, **Ferguson VL**, Sandberg LB*. Effects of space flight on the expression of liver proteins in the mouse. J Proteomics Bioinform. 5 (10):256-261 (2012).

59. Lloyd SA, Simske SJ, Bogren LK, Olesiak SE, Bateman TA, **Ferguson VL***. Effects of Combined Insulin-like Growth Factor 1 and Macrophage Colony-stimulating Factor on the Skeletal Properties of Mice. In Vivo 25 (3):297-305 (2011).

60. Paietta RC, Campbell SE, **Ferguson VL**. Influences of spherical tip radius, contact depth, and contact area on nanoindentation properties of bone. J Biomech. 44 (2):285-290 (2011).

61. Roberts JJ, Earnshaw A, **Ferguson VL**, Bryant SJ. Comparative study of the viscoelastic mechanical behavior of agarose and poly(ethylene glycol) hydrogels. J Biomed Mater Res B Appl Biomater B. (1):158-169 (2011).

62. Hanson AM, Stodieck LS, Cannon CMA, Simske SJ, **Ferguson VL**. Seven days of muscle re-loading and voluntary wheel running following hindlimb suspension in mice restores running performance, muscle morphology and metrics of fatigue but not muscle strength. J Muscle Res Cell Motil. 31 (2):141-153 (2010).

63. Lebsack TW, Fa V, Woods CC, Gruener R, Manziello AM, Pecaut MJ, Gridley DS, Stodieck LS, **Ferguson VL**, DeLuca D. Microarray Analysis of Spaceflown Murine Thymus Tissue Reveals Changes in Gene Expression Regulating Stress and Glucocorticoid Receptors. J Cell Biochem. 110 (2):372-381 (2010).

64. Martino CF, Perea H, Hopfner U, **Ferguson VL**, Wintermantel E. Effects of Weak Static Magnetic Fields on Endothelial Cells. Bioelectromagnetics. 31 (4):296-301 (2010).

65. Olesiak SE, Oyen ML, **Ferguson VL**. Viscous-elastic-plastic behavior of bone using Berkovich nanoindentation. Mech Time-Depend Mater. 14 (2):111-124 (2010).

66. Olesiak SE, Sponheimer M, Eberle JJ, Oyen ML, **Ferguson VL**. Nanomechanical properties of modern and fossil bone. Palaeogeogr Palaeoclimatol Palaeoecol. 289 (1-4):25-32 (2010).

67. Baqai FP, Gridley DS, Slater JM, Luo-Owen X, Stodieck LS, **Ferguson V**, Chapes SK, Pecaut MJ. Effects of spaceflight on innate immune function and antioxidant gene expression. J Appl Physiol. 106 (6):1935-1942 (2009).

68. **Ferguson VL**. Deformation partitioning provides insight into elastic, plastic, and viscous contributions to bone material behavior. J Mech Behav Biomed Mater. 2 (4):364-374 (2009).

69. RB Dodson, **Ferguson VL**. Bioengineering aspects of the umbilical cord. Eur J Obstet Gynecol Reprod Biol. 144 Suppl 1:S108-113 (2009).

70. Gridley DS, Slater JM, Luo-Owen X, Rizvi A, Chapes SK, Stodieck LS, **Ferguson VL**, Pecaut MJ. Spaceflight effects on T lymphocyte distribution, function and gene expression. J Appl Physiol. 106 (1):194-202 (2009).

71. Lloyd SA, Yuan YY, Simske SJ, Riffle SE, **Ferguson VL**, Bateman TA. Administration of high-dose macrophage colony-stimulating factor increases bone turnover and trabecular volume fraction. J Bone Miner Metab. 27 (5):546-554 (2009).

72. Ortega MT, Pecaut MJ, Gridley DS, Stodieck LS, **Ferguson V**, Chapes SK. Shifts in bone marrow cell phenotypes caused by spaceflight. J Appl Physiol. 106 (2):548-555 (2009).

73. **Ferguson VL**, Bushby AJ, Firth EC, Howell PGT, Boyde A. Exercise does not affect stiffness and mineralisation of third metacarpal condylar subarticular calcified tissues in 2 year old thoroughbred racehorses. Eur Cell Mater. 16:40-46 (2008).

74. Oyen ML, **Ferguson VL**, Bembey AK, Bushby AJ, Boyde A. Composite bounds on the elastic modulus of bone. J Biomech. 41 (11):2585-2588 (2008).

75. Martino CF, Belchenko D, **Ferguson V**, Nielsen-Preiss S, Qi HJ. The effects of pulsed electromagnetic fields on the cellular activity of SaOS-2 cells. Bioelectromagnetics. 29 (2):125-132 (2008).

76. Bembey AK, Bushby AJ, Boyde A, **Ferguson VL**, Oyen ML. Hydration effects on the micro-mechanical properties of bone. J Mater Res. 21 (8):1962-1968 (2006).

77. Ayers R, Nielsen-Preiss S, **Ferguson V**, Gotolli G, Moore JJ, Kleebe H-J. Osteoblast-like cell mineralization induced by multiphasic calcium phosphate ceramic. Mat Sci Eng C – Biomim. 26 (8):1333-1337 (2006).

78. Bushby AJ, **Ferguson VL**, Boyde A. Nanoindentation of bone: Comparison of specimens tested in liquid and embedded in polymethylmethacrylate. J Mater Res. 19 (1):249-259 (2004).

79. **Ferguson VL**, Ayers RA, Bateman TA, Simske SJ. Bone development and age-related bone loss in male C57BL/6J mice. BONE 33 (3):387-398 (2003).

80. **Ferguson VL**, Bushby AJ, Boyde A. Nanomechanical properties and mineral concentration in articular calcified cartilage and subchondral bone. J Anat. 203 (2):191-202 (2003).

81. **Ferguson VL**, Simske SJ, Ayers RA, Bateman TA, Wang HT, Bendele A, Rich B, Collins D, Scherrer J, Sennello R, Colagiovanni DB. Effect of MPC-11 myeloma and MPC-11 + IL-1 receptor antagonist treatment on mouse bone properties. BONE 30 (1):109-116 (2002).

82. Halloran BP, **Ferguson VL**, Simske SJ, Burghardt A, Venton LL, Majumdar S. Changes in bone structure and mass with advancing age in the male C57BL/6J mouse. J Bone Miner Res. 17 (6):1044-1050 (2002).

83. Bateman TA, Dunstan CR, Lacey DL, **Ferguson VL**, Ayers RA, Simske SJ. Osteoprotegerin ameliorates sciatic nerve crush induced bone loss. J Orthop Res. 19 (4):518-523 (2001).

84. Ross AB, Bateman TA, Kostenuik PJ, **Ferguson VL**, Lacey DL, Dunstan CR, Simske SJ. The effects of osteoprotegerin on the mechanical properties of rat bone. J Mater Sci Mater Med. 12 (7):583-588 (2001).

85. Bateman TA, Dunstan CR, **Ferguson VL**, Lacey DL, Ayers RA, Simske SJ. Osteoprotegerin mitigates tail suspension-induced osteopenia. BONE 26 (5):443-449 (2000).

86. Ayers RA, Wolford LM, Bateman TA, **Ferguson VL**, Simske SJ. Quantification of bone ingrowth into porous block hydroxyapatite in humans. J Biomed Mater Res. 47 (1):54-59 (1999).

87. Bateman TA, Zimmerman RJ, Ayers RA, **Ferguson VL**, Chapes SK, Simske SJ. Histomorphometric, physical, and mechanical effects of spaceflight and insulin-like growth factor-I on rat long bones. BONE 23 (6):527-535 (1998).

I.B. Manuscripts, In Review

1. Sherk V, Heveran CM, Foright RM, Johnson GC, Presby D, **Ferguson VL**, MacLean PS. Diet, sedentary time, obesity, and sex: A perfect storm for bone fragility? In Review, Bone. (2020).
2. Wilmoth R, **Ferguson VL**, Bryant SJ. A 3D, Dynamically Loaded Hydrogel Model of the Osteochondral Unit to Study Osteocyte Mechanobiology. In Review, Adv. Healthcare Mater. (2020).
3. Friedman MA, Abood A, Senwar B, Zhang Y, Maroni CR, **Ferguson VL**, Farber CR, Donahue HJ. Genetic Variability affects the Skeletal Response to Unloading. In Review, Bone Research (2020).
4. Uzcategui AC, Higgins CI, Hergert JE, Tomaschke AE, Crespo-Cuevas V, **Ferguson VL**, Bryant SJ, McLeod RJ, Killgore JP. Microscale Photopatterning of Through-thickness Modulus in a Monolithic and Functionally Graded 3D Printed Part. I Review, In Review. Adv. Mater. (2020)

I.C. Book Chapters, Peer-Reviewed

1. Paietta RC and **Ferguson VL**. The bone—cartilage interface in *Structural Interfaces in Biology*. Springer. Editors: Thomopolous S, Genin G, Birman V. 2012. ISBN-13: 978-1-461-43316-3
2. Oyen ML and **Ferguson VL**. Bone as a composite material in *Biomechanics of Hard Tissues: Modelling - Testing - Materials*. Wiley - VCH. Editor: Öchsner, A., Ahmed, W. 2010. ISBN-13: 978-3-527-32431-6
3. **Ferguson VL** and Olesiak SE. Nanoindentation of Bone in *Handbook of Nanoindentation with Biological Applications*. World Scientific Press. Editor: Oyen ML. 2010. ISBN-13: 978-9-814-24189-2
4. Simske SJ, **Ferguson VL**, Bateman TA. Mice and osteoporosis research in *Recent Research Developments in Biotechnology and Bioengineering,* Editor: Pandalai, SG (ed.), vol. 5, pp. 97-127, Research Signpost, Kerala, India; 2003. ISBN: 81-271-0011-0.

I.C. Articles published in Peer-Reviewed Conference Proceedings

1. Kramer EA, Anderson NS, Taylor KD, Ferguson VL, Rentschler ME. The role of glycosaminoglycans in tissue adhesion during energy-based vessel sealing. In SPIE BiOS (pp. 93260B-93260B). International Society for Optics and Photonics. 2015.
2. Fankell, Douglas, Eric Kramer, Kenneth Taylor, Virginia Ferguson, and Mark E. Rentschler. "A novel parameter for predicting arterial fusion and ablation in finite element models." In SPIE BiOS, pp. 93260C-93260C. International Society for Optics and Photonics, 2015.
3. Anderson N, Kramer E, Cezo J, Ferguson V, Rentschler ME, Tissue Bond Strength as a Function of Applied Fusion Pressure, ASME Journal of Medical Devices. 8(3): 030925-6 (2014).
4. Cezo J, Kramer E, **Ferguson VL**, Taylor K, Rentschler M Tissue Fusion Bursting Pressure and the Role of Tissue Water Content. In: Ryan JP (ed) BiOS SPIE Photonics West, San Francisco, CA, February 2-7 2013. Energy-based Treatment of Tissue and Assessment VII. SPIE Digital Library, pp 1-9 (2013).
5. Berg A, Tsai JY, **Ferguson V**, Louie B. What's trust got to do with it? Assessing a research-based mentoring program for novice engineers. Paper published in the Proceedings of the 120th American Society for Engineering Education Annual Conference and Exposition, Atlanta, GA, June 23-26 (2013).

6. Tsai JY, Berg AN, Kotys-Schwartz D, Louie B, **Ferguson VL.** Am I a boss or coach? Graduate students mentoring undergraduates in research. Paper published in the Proceedings of the 120th American Society for Engineering Education Annual Conference and Exposition, Atlanta, GA, June 23 - 26 (2013).
7. Tsai JY, Berg A, Kotys-Schwartz DA, Louie B, **Ferguson VL**. Comparing Mentor and Mentee Perspectives in a Research-Based Undergraduate Mentoring Program. Paper published in the Proceedings of the ASME 2012 International Mechanical Engineering Congress & Exposition, Houston, TX, November 9-15 (2012).
8. Tsai JY, Berg AN, Kotys-Schwartz DA, Louie B, **Ferguson VL**. Graduate students mentoring undergraduates in research: Attitudes and reflections about these experiences. Paper published in the Proceedings of the 119th American Society for Engineering Education Annual Conference and Exposition, June 23 - 26 (2012).
9. Tsai JY, Kotys-Schwartz D, **Ferguson V**, Louie B. Assessing efficacy of a new research-oriented peer mentoring program: YOU'RE@CU. Paper published in the Proceedings of the ASME 2011 International Mechanical Engineering Congress and Exposition, 5:459-468 (2011).
10. Olesiak, SE, Oyen, ML, **Ferguson, VL**. Viscous Behavior in Berkovich Nanoindentation of Bone. In: Transactions of the Society for Experimental Mechanics Annual Conference. Albuquerque, NM June 1-4, pp 1803-1809 (2009).
11. Olesiak SE, Sponheimer M, Eberle JJ, **Ferguson VL**. The contribution of crystallinity to tissue-level properties in modern and fossilized bone. In: Materials Research Society Symposium Proceedings. Materials Research Society, 1135:129-136 (2008).
12. Ayers RA, **Ferguson VL**, Belk D, Moore, J. Self-propagating high-temperature synthesis of porous nickel-titanium. In: Materials Science Forum, 561-565:1643-1648 (2007).
13. Olesiak SE, Oyen M, Sponheimer M, Eberle JJ, **Ferguson VL**. Ultrastructural mechanical and material characterization of fossilized bone. In: Materials Research Society Symposium Proceedings. 975:45-50 (2006).
14. Bembey AK, Oyen ML, **Ferguson VL**, Bushby AJ, Boyde A. Effect of water on mechanical properties of mineralized tissue composites. In: Materials Research Society Symposium Proceedings 975:147-152 (2006).
15. Bembey AK, Koonjul V, Bushby AJ, **Ferguson VL**, Boyde A. Contribution of collagen, mineral and water phases to the nanomechanical properties of bone. In: Fundamentals of Nanoindentation and Nanotribology III. Symposium, Materials Research Society Symposium Proceedings 841:81-86 (2005)
16. **Ferguson VL**, Boyde A, Bushby AJ Elastic modulus of dental enamel: Effect of enamel prism orientation and mineral content. In: Mechanical Properties of Bioinspired and Biological Materials joint session with Fundamentals of Nanoindentation and Nanotribology III., Materials Research Society Symposium Proceedings. 844:3-8 (2005).
17. Ntim MM, Bembey AK, **Ferguson VL**, Bushby AJ. Hydration effects on the viscoelastic properties of collagen. In: Materials Research Society Symposium Proceedings. 898:39-43 (2005).
18. Hanson AM, **Ferguson VL**, Simske SJ, Cannon CMA, Stodieck LS. Comparison of tail-suspension and sciatic nerve crush on the musculoskeletal system in young-adult mice. Biomedical Sciences Instrumentation 41:92-96 (2005).
19. Roland M, Hanson AM, Cannon CMA, Stodieck LS, **Ferguson VL**. Exercise prevention of unloading-induced bone and muscle loss in adult mice. Biomedical Sciences Instrumentation 41:128-134 (2005).
20. Smith EE, **Ferguson VL**, Simske SJ, Gayles EC, Pagliassotti MJ. Effects of high fat or high sucrose diets on rat femora mechanical and compositional properties. Biomedical Sciences Instrumentation 36:385-390 (2000).
21. Yuan Y, **Ferguson VL**, Simske SJ, Bateman TA. Low dose administration of Macrophage Colony-Stimulating Factor in mice. Biomedical Sciences Instrumentation 40:93-98 (2004).
22. Simske SJ, Bateman TA, Smith EE, **Ferguson VL**, Chapes SK. Effects of major histocompatibility complex class II knockout on mouse bone mechanical properties during development. Biomedical Sciences Instrumentation 38:47-52 (2002).

23. **Ferguson VL**, Greenberg AR, Bateman TA, Ayers RA, Simske SJ. The effects of age and dietary restriction without nutritional supplementation on whole bone structural properties in C57BL/6J mice. Biomedical Sciences Instrumentation 35:85-91 (1999).

IV. Invention Disclosures & Patents

K. Payne, S. Bryant, V. Ferguson, N. Hadley-Miller, R. McLeod. PCT/US2018/059466, filed, November 6, 2018. Biodegradable Biomimetics of Growth Plate Cartilage for the Treatment of Physeal Injuries. US Patent App. 16/762,835 (2020)

S.J. Simske, V.L. Ferguson, R.A. Ayers. Self-reporting bone implants, University of Colorado Invention Disclosure. (2004)

S.J. Simske, V.L. Ferguson, R.A. Ayers. Quantitative Imaging of Self-Reporting Bone Implants, University of Colorado Invention Disclosure. (2004)

V. Spaceflight Experiments

Rodent Research 16 (August – September 2019), Lead for Data and Science Integration. Center for Advancement of Science in Space (CASIS), Reference mission to evaluate efficacy of microgravity in mice.

Rodent Research-8 (December 2018-January 2019), Lead for Data and Science Integration. , Lead for Data and Science Integration. Reference mission to evaluate efficacy of microgravity in mice.

STS-135, CBTM-03 (July 2011), Lead Science Principal Investigator. Microgravity and bone loss in mice; treatment with Amgen's bone anabolic therapy – Sclerostin Antibody.

STS-118, CBTM-02 (August 2007), Co-Principal Investigator. Microgravity and muscle-wasting in mice: treatment with Amgen's muscle anabolic therapy - myostatin inhibitor (primary science objective). Microgravity and bone loss in mice (secondary science objective).

STS-108, CBTM-01 payload (December 2001), Co-Investigator. Microgravity and bone loss in mice, treatment with OPG.