Joshua N. Farr, Ph.D.
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Chronology of Education

08/2000 – 05/2005 University of Arizona, Tucson AZ
Degree: B.S.
Date Awarded: 05/2005
Major Field: Physiology

06/2005 – 05/2007 University of Arizona, Tucson AZ
Degree: M.S.
Title: Physical activity levels in the early knee osteoarthritis population
Master's Thesis Advisor: Dr. Scott B. Going, Ph.D.
Date Awarded: 05/2007
Major Field: Physiology

06/2007 – 05/2011 University of Arizona, Tucson AZ
Degree: Ph.D.
Title: Influences of soft tissue composition and physical activity on bone volumetric density, bone geometry, and fracture prevalence in young girls
Dissertation Director: Dr. Scott B. Going, Ph.D.
Date Awarded: 05/2011
Major Field: Physiology

Chronology of Employment

06/2011 – 06/2014 Mayo Clinic
Postdoctoral Research Fellow
Rochester, MN

06/2014 – 12/2015 Mayo Clinic
Research Associate (RA)

	Rochester, MN
12/2015 – 12/2020	Mayo Clinic Associate Consultant Scientist I (ACI) Rochester, MN
12/2020 – 8/2024	Mayo Clinic Associate Consultant Scientist II (ACII) Rochester, MN
08/2024 – Current	University of Arizona Associate Professor Tucson, AZ

University of Arizona Appointments & Memberships

Arthritis Center Member, Member: 2024 – present

Arizona Center on Aging (ACOA) Member, Member: 2025 - present

BIO5 Institute, Member: 2024 – present

Cancer Center, Clinical & Translational Oncology Program, Member: 2024 – present

Cellular & Molecular Medicine (CMM), Joint-Appointment: 2026 – present

Clinical Translational Sciences (CTS) Program, Member: 2024 – present

Physiological Sciences Graduate Interdisciplinary Program (GIDP), Member: 2024 – present

School of Nutritional Sciences and Wellness (SNSW), Joint-Appointment: 2024 – present

Honors and Awards

2007 – 2011	NIH Physiological Sciences Systems Training Grant Doctoral Candidate, NIH NIGMS T32 GM-08400
2010	Certificate in Collegiate Teaching – University of Arizona, Tucson, AZ
2010	ACSM Herbert E. Carter Travel Award (Baltimore, MD)
2010	ASBMR Young Investigator Travel Award (Toronto, Ontario, Canada)
2011 – 2014	NIH Endocrinology, Diabetes, and Metabolism Endocrine and Diabetes Training Grant Postdoctoral Fellow, NIH NIGMS T32 GM-08400
2011	ASBMR Selection for President's Poster Competition (San Diego, CA)
2012	ASBMR Young Investigator Travel Award (Minneapolis, MN)
2012	ASBMR Young Investigator Award (Minneapolis, MN)
2013	ASBMR Young Investigator Travel Grant Award (Baltimore, MD)
2013	ASBMR Moderator for Oral Session – Cortical Porosity (Baltimore, MD)
2014	ASBMR Young Investigator Travel Award (Houston, TX)
2014 – 2016	Career Development Award in Aging Research (Robert & Arlene Kogod Center

	on Aging, Mayo Clinic, Rochester, MN)
2015	Endocrine Society Young Investigator Travel Award (San Diego, CA)
2015	Endocrine Society Outstanding Abstract Award (San Diego, CA)
2015	6th Annual Alliance on Healthy Aging Conference Travel Award (Newcastle, UK)
2016	ASBMR Young Investigator Travel Grant Award (Atlanta, GA)
2017	Richard Emslander Career Development Award in Endocrinology (Mayo Clinic, Rochester, MN)
2017	ASBMR Most Outstanding Translational Abstract Award (Denver, CO)
2017	ASBMR Moderator for Late Breaking Abstract Presentations – Clinical (Denver, CO)
2018	ASBMR Co-Chair at Symposium: Senescence and Aging Bone (Montréal, Québec, Canada)
2018	ASBMR Mid-Career Faculty Travel Grant (Montréal, Québec, Canada)
2021	ASBMR Moderator for Oral Session – Mechanisms of Skeletal Disease (San Diego, CA)
2024	University of Arizona, Ethel McChesney Chair for Osteoporosis Research Endowed Chair, Arizona Arthritis Center
2025	University of Arizona, Department of Medicine, Outstanding Scientific Publication Award (Tucson, AZ)
2025	ASBMR Moderator & Co-Chair at Symposium: Bone Aging, Senescence, and Systemic Signals (Seattle, WA)

Service / Outreach

Local / State Outreach

2008	University of Arizona Arthritis Center, Living Healthy with Arthritis Lecture Series; Title: “The Role of Physical Activity in Weight Management”, Tucson, AZ
2010	University of Arizona, Nutrition Educator In-Service Series; Title: “Influences of Physical Activity on Human Body Composition”, Tucson, AZ
2014	Mayo Clinic, CCaTS Grand Rounds; Title: “Changes in Bone Quality with Growth, Aging, and Diabetes”, Rochester, MN
2024	University of Arizona Arthritis Center, Living Healthy with Arthritis Lecture Series; Title: “Decoding Osteoporosis: The Latest Research on Promoting and Bone Health”, Tucson, AZ
2024	Hacienda at the Canyon Retirement Community; Title: “Decoding Osteoporosis: The Latest Research on Promoting and Bone Health”, Catalina Foothills, AZ
2025	Member of Board of Directors for the Global Health and Body Composition Institute (GHBCI), Tucson, AZ
2025	University of Arizona Arthritis Center, Joint Space Podcast; Title: “The ABC’s of Osteopenia and Osteoporosis”, Tucson, AZ

Departmental Committees

2006 – 2007 Service on Activities Committee, Student Representative
University of Arizona, Department of Physiology, Tucson, AZ

2008 – 2009 Service on Teaching Committee, Student Representative
University of Arizona, Department of Physiology, Tucson, AZ

2009 – 2010 Service on Recruitment Committee, Student Representative
University of Arizona, Department of Physiology, Tucson, AZ

2006 – 2011 Service on Preceptor Committee for M.S. and Ph.D. students
University of Arizona, Department of Physiology, Tucson, AZ

2019 – 2024 Service on Geriatric Medicine & Gerontology Research Committee
Mayo Clinic Division of Geriatric Medicine & Gerontology, Mayo Clinic, Rochester, MN

2020 – 2024 Service on Examination Committees for Degree Candidates
Mayo Clinic Graduate School of Biomedical Sciences, Mayo Clinic, Rochester, MN

2021 – 2024 Service on Mayo Clinic Robert & Arlene Kogod Center on Aging Career Development Award (CDA) Review Committee, Mayo Clinic, Rochester, MN

Other Committees

2015 Grant Reviewer for Swiss National Science Foundation

2016 – 2019 American Society for Bone and Mineral Research (ASBMR)
Early State Investigator Committee Member

2017 Grant Reviewer for UCSF Pilot & Feasibility Application for NIH Diabetes Research Center

2017 – 2021 *Journal of Bone & Mineral Research*, Editorial Board Member

2019 Grant Reviewer for Mayo Clinic Geriatric Medicine and Gerontology Research Committee

2019 – *Journal of Clinical Endocrinology & Metabolism*, Associate Editor

2020 – 2023 American Society for Bone and Mineral Research (ASBMR)
Education Advisory Committee (EAC) Member

2021 Grant Reviewer for Mayo Clinic Robert & Arlene Kogod Center on Aging Career Development Award

2021 Grant Reviewer for Mayo Clinic Robert & Arlene Kogod Center on Aging Early-Stage Clinical Trials Award

2022 Grant Reviewer for National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) Special Grant Study Section AMS Council

2023 Grant Reviewer for National Institute of Aging (NIA), Division of Aging Biology, Special Emphasis Panel, “Cellular Mechanism of Hallmarks of Aging” (ZRG1 BN Z52)

2025 Grant Reviewer for University of Arizona Cancer Center (UACC) Basic Clinical Partnership (BCP) to Promote Translational Bench to Bedside Research Award FY26.

2025 Grant Reviewer for National Institutes of Health (NIH) Skeletal Biology Structure & Regeneration (SBSR) Study Section; Musculoskeletal, Skin and Oral Sciences [MSOS].

Publications / Creative Activity

ORCID #: 0000-0002-3179-6414

h-index = 35 (Source: Web of Science)

Chapters in Scholarly Books

1. Going SB, Hingle M, and **Farr JN**. Body Composition. In: Ross CA, Caballero B, Cousins RJ, Tucker KL, Ziegler TR, eds. Modern Nutrition in Health and Disease. 11th edition, Chapter 48. Baltimore, Maryland: Lippincott, Williams & Wilkins; 2014, pg. 635-48.
2. **Farr JN**, Khosla S. Bone Quality in Type 2 Diabetes Mellitus. In: Lecka-Czernik B, Fowlkes JL., eds. Diabetic Bone Disease: Basic and Translational Research and Clinical Applications. 1st edition, Chapter 14. Cham, Switzerland: Springer International Publishing; 2016, pg. 211-24.
3. Going SB, **Farr JN**, Bea J. Body Composition: Changes in Body Composition with Exercise in Overweight and Obese Children. In: Health and Performance in Exercise and Sport. 1st Edition, Chapter 8; CRC Press/Taylor & Francis Group; 2017, pg. 129-46.
4. Diez-Perez A and **Farr JN**. Reference Point Indentation. In: Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism, 2018, 9th Edition, Chapter 36, pg. 287-92.
5. Khosla S, Monroe DG, and **Farr JN**. Osteoporosis and Bone Loss. In: Serrano M, ed. Cellular Senescence in Disease. Elsevier Inc; 2021,1st Edition, Chapter 13, pg. 335-61.
6. Kaur J, and **Farr JN**. Cellular senescence and other aging mechanisms in bone and muscle. In: Duque G, and Troen BR, eds. Osteosarcopenia, Elsevier Inc; 2022 1st Edition, Chapter 2, pg. 19-37.
7. **Farr JN** and Chandra A. Age-related disease: Bones. In: Aging: How Aging Works, How We Reverse Aging, and Prospects for Curing Aging Diseases. Elsevier Inc; 2024,1st Edition, Chapter 4, pg. 53-72.
8. Nogues X, **Farr JN**, and Diez-Perez A. Reference Point Indentation. In: Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism, 2024, 9th Edition, Chapter 38. (Book Chapter).

Refereed Journal Articles

1. **Farr JN**, Going SB, Lohman TG, Rankin L, Kasle S, Cornett M, and Cussler E. *Physical activity levels in patients with early knee osteoarthritis measured by accelerometry. *Arthritis Care Res*. 2008 59(9):1229-36. PMID: 18759320. PMCID: PMC2595140
2. McKnight PE, Kasle S, Going SB, Villanueva I, Cornett M, **Farr JN**, Wright J, Streeter C, And Zautra A. *A comparison of strength training, self-management, and the combination for early osteoarthritis of the knee. *Arthritis Care Res*. 2010 62(1):45-53. PMID: 20191490. PMCID: PMC2831227.
3. **Farr JN**, Going SB, McKnight P, Kasle S, Cussler E, and Cornett M. *Progressive resistance training improves overall physical activity levels in patients with early osteoarthritis of the knee: a randomized controlled trial. *Phys Ther.* 2010 Mar; 90(3):356-66. PMID: 20056719. PMCID: PMC2836140.

4. **Farr JN**, Chen Z, Lisse JR, Lohman TG, and Going SB. *Relationship of total body fat mass to weight-bearing bone geometry and volumetric density in young girls. *Bone.* 2010 46(4):977-84. PMID: 20060079. PMCID: PMC2842480.
5. Going SB and **Farr JN**. *Exercise and bone macro-architecture: Is childhood a window of opportunity for osteoporosis prevention? *Int J Body Comp Res.* 2010 8(Suppl):1-9. PMID: 24478595. PMCID: PMC3903297.
6. **Farr JN**, Tomás R, Chen Z, Lisse JR, Lohman TG, and Going SB. *Lower trabecular volumetric BMD at metaphyseal regions of weight-bearing bones is associated with prior fracture in young girls. *J Bone Miner Res.* 2011 26(2):380-7. PMID: 20721933. PMCID: PMC3179352.
7. **Farr JN**, Lee VR, Blew RM, Lohman TG, and Going SB. *Quantifying bone-relevant activity and its relation to bone strength in girls. *Med Sci Sports Exer.* 2011 43(3):476-83. PMID: 20631644. PMCID: PMC3152309.
8. **Farr JN**, Blew RM, Lee VR, Lohman TG, and Going SB. *Associations of physical activity duration, frequency, and load with volumetric bone mineral density, geometry, and bone strength in young girls. *Osteoporos Int.* 2011 22(5):1419-30. PMID: 20694457. PMCID: PMC3152197.
9. **Farr JN**, Funk JL, Chen Z, Lisse JR, Blew RM, Lee VR, Laudermilk M, Lohman TG, and Going SB. *Skeletal muscle fat content is inversely associated with bone strength in young girls. *J Bone Miner Res.* 2011 26(9):2217-25. PMID: 21544865. PMCID: PMC3162199.
10. **Farr JN**, Van Loan MD, Lohman TG, and Going SB. *Lower physical activity is associated with skeletal muscle fat content in young girls. *Med Sci Sports Exer.* 2012 44(7):1375-81. PMID: 22217562. PMCID: PMC3819115.
11. **Farr JN**, Charkoudian N, Barnes JN, Monroe DG, McCready LK, Atkinson EJ, Amin S, Melton LJ III, Joyner MJ, and Khosla S. Relationship of sympathetic activity to bone microstructure, turnover, and plasma osteopontin levels in women. *J Clin Endocrinol Metab.* 2012 97(11):4219–27. PMID: 22948767. PMCID: PMC3485606.
12. Laudermilk MJ, Manore MM, Thomson CA, Houtkooper LB, **Farr JN**, and Going SB. Vitamin C and zinc intakes are related to bone macro-architectural structure and strength in prepubescent girls. *Calcif Tissue Int.* 2012 91(6):430-9. PMID: 23076447. PMCID: PMC3496253.
13. Laddu DR, **Farr JN**, Laudermilk MJ, Lee VR, Blew RM, Stump C, Houtkooper L, Lohman TG, and Going SB. Longitudinal relationships between whole body and central adiposity on weight-bearing bone geometry, density, and bone strength: a pQCT study in young girls. *Arch Osteoporos.* 2013 8(1-2)156. PMID: 24113839. PMCID: PMC4416207.
14. Lee VR, Blew RM, **Farr JN**, Tomas R, Lohman TG, and Going SB. Estimation of whole-body fat from appendicular soft tissue from peripheral quantitative computed tomography in adolescent girls. *Int J Body Comp Res.* 2013 11(1):1-8. PMID: 2514782. PMCID: PMC4137877.
15. **Farr JN**, Khosla S, Miyabara Y, Miller VM, and Kearns AE. Effects of four years of oral or transdermal estrogen with micronized progesterone therapy on cortical versus trabecular changes in bone mass and microstructure in early postmenopausal women. *J Clin Endocrinol Metab.* 2013 98(2):E249-57. PMID: 23322818. PMCID: PMC3565106.
16. Randall C, Bridges D, Guerri R, Nogues X, Puig L, Torres E, Mellibovsky L, Hoffseth K, Stalbaum T, Srikanth A, Weaver J, Rosen S, Barnard H, Brimer D, Proctor A, Candy J, Saldana C, Chandrasekar S, Lescun T, Nielson C, Orwoll E, Herthel D, Kopeikin H, Yang HT, **Farr JN**, McCready LK, Khosla S, Diez-Perez A, and Hansma PK.

Applications of a new hand-held reference point indentation instrument for measuring bone material strength. *J Med Devices.* 2013 7(4):410051-56. PMID: 24115973. PMCID: PMC3792445.

17. **Farr JN**, Laddu DR, Blew RM, Lee VR, and Going SB. Effects of physical activity and muscle quality on bone development in girls. *Med Sci Sports Exer.* 2013 45(12):2332-40. PMID: 23698240. PMCID: PMC3833884.
18. Laddu DR, **Farr JN**, Lee VR, Blew RM, Stump C, Houtkooper L, Lohman TG, and Going SB. Muscle density predicts changes in bone density and strength: a prospective study in girls. *J Musculoskelet Neuronal Interact*. 2014 14(2):195-204. PMID: 24879023. PMCID: PMC4414028.
19. **Farr JN**, Zhang W, Kumar SK, Jacques RM, Ng AC, McCready LK, Rajkumar SV, and Drake MT. Altered cortical microarchitecture in patients with monoclonal gammopathy of undetermined significance. *Blood*. 2014 123(5):647-9. PMID: 24227822. PMCID: PMC3907752.
20. Blew RM, Lee VR, **Farr JN**, Schiferl DJ, and Going SB. Standardizing evaluation of pQCT image quality in the presence of subject movement: qualitative vs. quantitative assessment. *Calcif Tissue Int.* 2014 94(2):202-11. PMID: 24077875. PMCID: PMC3949118.
21. **Farr JN**, Amin S, Melton LJ III, Kirmani S, McCready LK, Atkinson EJ, Mueller R, and Khosla S. Bone strength and structural deficits in children and adolescents with a distal forearm fracture resulting from mild trauma. *J Bone Miner Res.* 2014 29(3):590-9. PMID: 2395563. PMCID: PMC4074503.
22. Fujita K, Roforth MM, Atkinson EJ, Peterson JM, Drake MT, McCready LK, **Farr JN**, Monroe DG, and Khosla S. Isolation and characterization of human osteoblasts from needle biopsies without *in vitro* culture. *Osteoporos Int.* 2014 25(3):887-95. PMID: 24114401. PMCID: PMC4216562.
23. **Farr JN**, Drake MT, Amin S, Melton LJ III, McCready LK, and Khosla S. *In vivo* assessment of bone quality in postmenopausal women with type 2 diabetes. *J Bone Miner Res.* 2014 29(4):787-95. PMID: 24123088. PMCID: PMC3961509.
24. Bishop N, Arundel P, Clark E, Dimitri P, **Farr JN**, Jones G, Makitie O, Munns CF, and Shaw N. Fracture prediction and the definition of osteoporosis in children and adolescents: The ISCD 2013 Pediatric Official Positions. *J Clin Densitom*. 2014 17(2):275-80. PMID: 24631254.
25. Drake MT and **Farr JN**. Inhibitors of sclerostin: emerging concepts. *Curr Opin Rheumatol*. 2014 26(4):447-52. PMID: 24807403. PMCID: PMC4138969.
26. **Farr JN**, Khosla S, Achenbach SJ, Atkinson EJ, Kirmani S, McCready LK, Melton LJ III, and Amin S. Diminished bone strength is observed in adult women and men who sustained a mild trauma distal forearm fracture during childhood. *J Bone Miner Res.* 2014 29(10):2193-202. PMID: 24753047. PMCID: PMC4352579.
27. **Farr JN**, Laddu DR, and Going SB. Exercise, hormones, and skeletal adaptations during childhood and adolescence. *Pediatr Exerc Sci.* 2014 26(4):384-91. PMID: 25372373. PMCID: PMC4356169.
28. **Farr JN**, Amin S, LeBrasseur NK, Atkinson EJ, Achenbach SJ, McCready LK, Melton LJ III, and Khosla S. Body composition during childhood and adolescence: relations to biomechanical bone strength. *J Clin Endocrinol Metab*. 2014 99(12):4641-8. PMID: 25243571. PMCID: PMC4356169.
29. Elraiyah T, Ahmed AH, Wang Z, **Farr JN**, Murad MH, and Drake MT. Predictors of

teriparatide treatment failure in patients with low bone mass. *Bone Rep.* 2015 17(4):17-22. PMID: 28326338. PMCID: PMC4926837.

30. **Farr JN** and Khosla S. Skeletal changes through the lifespan: from growth to senescence. *Nat Rev Endocrinol.* 2015 11(9):513-21. PMID: 26032105. PMCID: PMC4822419.
31. **Farr JN**, Bergen RH III, Vanderboom PM, White TA, Atkinson EJ, Singh RJ, Khosla S, and LeBrasseur NK. Myostatin as a mediator of sarcopenia versus homeostatic regulator of muscle mass: insights using a new mass spectrometry-based assay. *Skelet Muscle.* 2015 15:5-21. PMID: 26180626. PMCID: PMC4502935.
32. Roforth MM, **Farr JN**, Fujita K, McCready LK, Atkinson EJ, Cunningham JM, Drake MT, Monroe DG, and Khosla S. Global transcriptional profiling using RNA sequencing and DNA methylation patterns in highly enriched mesenchymal cells from young versus elderly women. *Bone.* 2015 76:49-57. PMID: 25827254. PMCID: PMC4447531.
33. McGee-Lawrence ME, Carpio LR, Schulze RJ, McNiven M, **Farr JN**, Khosla S, Oursler MJ, and Westendorf JJ. Hdac3-deficiency increases marrow adiposity by inducing lipid storage and glucocorticoid metabolism in pre-osteoblasts. *J Bone Miner Res.* 2016 31(1):116-28. PMID: 26211746. PMCID: PMC4758691.
34. Zhu Y, Tchkonia T, Pirtskhalava T, Gower A, Ding H, Giorgadze N, Palmer AK, Ikeno Y, Borden G, Lenburg M, O'Hara SP, LaRusso LF, Miller JD, Roos CM, Verzosa GC, LeBrasseur NK, Wren JD, **Farr JN**, Khosla S, Stout MB, McGowan SJ, Fuhrmann-Stroissnigg H, Gurkar AU, Zhao J, Colangelo D, Dorronsoro A, Ling Y, Barghouthy AS, Navarro DC, Sano T, Robbins PD, Niedernhofer LJ, and Kirkland JL. The Achilles' heel of senescent cells: from transcriptome to senolytic drugs. *Aging Cell.* 2015 14(4):644-58. PMID: 25754370. PMCID: PMC25754370.
35. **Farr JN** and Khosla S. Determinants of bone strength and quality in diabetes mellitus. *Bone*. 2016 82:28-34. PMID: 26211989. PMCID: PMC4679576.
36. **Farr JN**, Roforth MM, Fujita K, Nicks KM, Cunningham JM, Atkinson EJ, Therneau TM, McCready LK, Peterson JM, Drake MT, Monroe DG, and Khosla S. Effects of age and estrogen on skeletal gene expression in humans as assessed by RNA sequencing. *PLoS One.* 2015 24(9):e0138347. PMID: 26402159. PMCID: PMC4581624.
37. **Farr JN†**, Fraser DG, Wang H, Jaehn K, Ogrodnik M, Weivoda M, Drake MT, Tchkonia T, LeBrasseur NK, Kirkland JL, Bonewald LF, Pignolo RJ, Monroe DG, and Khosla S†. Identification of senescent cells in the bone microenvironment. *J Bone Miner Res.* 2016 31(11):1920-29. PMID: 27341653. PMCID: PMC5289710. †Co-Corresponding Authors.
38. **Farr JN** and Dimitri P. The impact of fat and obesity on bone microarchitecture and strength in children. *Calcif Tissue Int.* 2017 100(5):500-13. PMID: 28013362. PMCID: PMC5395331.
39. **Farr JN**, Atkinson EJ, Achenbach SJ, Melton LJ III, Khosla S, and Amin S. Fracture incidence and characteristics in young adults aged 18 to 49 years: a population-based study. *J Bone Miner Res.* 2017 32(12):2347-54. PMID: 28972667. PMCID: PMC5732068.
40. **Farr JN**, Xu M, Weivoda MM, Monroe DG, Fraser DG, Onken JL, Negley BA, Sfeir JG, Ogrodnik M, Hachfeld CM, LeBrasseur NK, Drake MT, Pignolo RJ, Pirtskhalava T, Tchkonia T, Oursler MJ, Kirkland JL, and Khosla S. Targeting cellular senescence prevents age-related bone loss in mice. *Nat Med.* 2017 23(9):1072-9. PMID: 28825716. PMCID: PMC5657592.
41. **Farr JN**, Weivoda MM, Nicks KM, Fraser DG, Negley BA, Onken JL, Thicke BS, Ruan M, Liu H, Forrest D, Hawse JR, Khosla S, and Monroe DG. Osteoprotection through the

deletion of the transcription factor Rorβ in mice. *J Bone Miner Res*. 2018 33(4):720-31. PMID: 29206307. PMCID: PMC5925424.

42. Khosla S, **Farr JN**, and Kirkland JL. Inhibiting cellular senescence: A new therapeutic paradigm for age-related osteoporosis. *J Clin Endocrinol Metab*. 2018 103(4):1282-90. PMID: 29425296. PMCID: PMC6276719.
43. Xu M, Pirtskhalava T, **Farr JN**, Weigand BM, Palmer AK, Weivoda MM, Inman CL, Ogrodnik MB, Hachfeld CM, Fraser DG, Onken JL, Johnson KO, Verzosa GC, Langhi LGP, Weigl M, Giorgadze N, LeBrasseur NK, Miller JD, Jurk D, Singh RJ, Allison DB, Ejima K, Hubbard GB, Ikeno Y, Cubro H, Garovic VD, Hou X, Weroha SJ, Robbins PD, Niedernhofer LJ, Khosla S, Tchkonia T, and Kirkland JL. Senolytics improve physical function and increase lifespan in old age. *Nat Med.* 2018 24:1246-56. PMID: 29988130. PMCID: PMC6082705.
44. **Farr JN‡** and Almeida M. The spectrum of fundamental basic science discoveries contributing to organismal aging. *J Bone Miner Res*. 2018 33:1568-84. PMID: 30075061. PMCID: PMC6327947. ‡Corresponding Author.
45. Khosla S, Drake MT, Volkman TL, Thicke BS, Achenbach SJ, Atkinson EJ, Joyner MJ, Rosen CJ, Monroe DG, and **Farr JN**. Sympathetic β1-adrenergic signaling contributes to regulation of human bone metabolism. *J Clin Invest.* 2018 128:4832-42. PMID: 30153111. PMCID: PMC6205387.
46. ◦Aquino Martinez RF, **Farr JN**, Weivoda M, ◦Negley BA, Onken JL, Thicke BS, ◦Fulcer MM, Fraser DF, van Wijnen AJ, Khosla S, and Monroe DG. miR-219a-5p regulates Rorβ during osteoblast differentiation and in age-related bone loss. *J Bone Miner Res*. 2019 34:135-44. PMID: 30321475. PMCID: PMC6450079.
47. **Farr JN†** and Khosla S†. Cellular senescence in bone. *Bone.* 2019 121:121-33. PMID: 30659978. PMCID: PMC6485943. †Co-Corresponding Authors.
48. **Farr JN†**, Rowsey JL, ◦Eckhardt BA, Thicke BS, Fraser DG, Tchkonia T, Kirkland JL, Monroe DG, and Khosla S†. Independent roles of estrogen deficiency and cellular senescence in the pathogenesis of osteoporosis: evidence in young adult mice and older humans. *J Bone Miner Res.* 2019 34:1407-18. PMID: 30913313. PMCID: PMC6697189. †Co-Corresponding Authors.
49. Weivoda MM, Chew CK, Monroe DG, **Farr JN**, Atkinson EJ, Geske JR, ◦Eckhardt B, Thicke B, Ruan M, Tweed A, Rizza RA, McCready LK, Vella A, Matveyenko A, Kassem M, Anderson TL, Drake MT, Clarke BL, Oursler MJ, and Khosla S. Identification of osteoclast-osteoblast coupling factors in humans reveals links between bone and energy metabolism. *Nat Commun.* 2020 11(1):87. PMID: 31911667. PMCID: PMC6946812.
50. ◦Aquino Martinez RF, Onken JL, ◦Negley BA, Fraser DF, Khosla S, **Farr JN†**, and Monroe DG†. LPS-induced premature osteocyte senescence: implications in inflammatory alveolar bone loss and periodontal disease pathogenesis. *Bone*. 2020 132:115220. PMID: 31904537. PMCID: PMC6990876. †Co-Corresponding Authors.
51. Chandra A, Lagnado A, Monroe DG, **Farr JN**, Park S, Hachfeld C, Khosla S, Kirkland JL, Passos J, and Pignolo RJ. Targeted reduction of senescent cell burden alleviates focal radiotherapy-related bone loss. *J Bone Miner Res.* 2020 35:1119-31. PMID: 32023351. PMCID: PMC7357625.
52. Khosla S, **Farr JN**, Tchkonia T, and Kirkland JL. The role of cellular senescence in ageing and endocrine disease. *Nat Rev Endocrinol.* 2020 16(5):263-75 PMID: 32161396. PMCID: PMC7227781.

53. **Farr JN‡**. Very infrequent zoledronate therapy – Somehow still promisingly effective. *J Clin Endocrinol Metab.* 2020 105:e2289-90. PMID: 32232405. PMCID: PMC7179998. ‡Corresponding Author.

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Other Scholarships

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Regional Poster Presentations

2007 **Farr JN**, Going SB, Lohman TG, Rankin L, Kasle S, Cornett M, and Cussler E. Physical activity levels in patients with early knee osteoarthritis measured by accelerometry. Research Frontiers in Nutritional Sciences Conference, Tucson, AZ; 05/2007.

2009 **Farr JN**, Going SB, Chen Z, Lisse JR, Cussler E, Laudermilk M, and Lohman TG. Relationship of total body fat mass to weight-bearing bone geometry and volumetric density in young girls. Research Frontiers in Nutritional Sciences Conference, Tucson, AZ; 05/2009.

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2007 **Farr JN**, Going SB, Lohman TG, Rankin L, Kasle S, Cornett M, and Cussler E. Physical activity levels in the early knee osteoarthritis population measured by accelerometry. American College of Sports Medicine Annual Meeting, New Orleans, LA; 06/2007.

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2016 **Farr JN**, Weivoda MM, Atkinson EJ, Khosla S, and Monroe DG. Lin-/Lepr+ cells are an important source of osteoprogenitors in adult life. American Society for Bone and Mineral Research Annual Meeting, Atlanta, GA; 09/2016.

2019 Eckhardt BA, Rowsey JL, Thicke BS, Fraser DG, Monroe DG, and **Farr JN**. Modeling key metabolic and skeletal phenotypes of human type 2 diabetes in the mouse. American Society for Bone and Mineral Research Annual Meeting, Orlando, FL; 09/2019.

2020 Samakkarnthai P, Sfeir JG, Wennberg PW, Dyck PJ, Atkinson EJ, Achenbach SJ, Tweed AJ, Volkman TL, Drake MT, **Farr JN**, and Khosla S. Cortical porosity is associated with peripheral small vessel disease in adult patients with type 2 diabetes. Endocrine Society Annual Meeting, Online Format; 10/2020.

2021 Chandra A, Lagnado AB, **Farr JN**, Monroe DG, Passos JF, Pignolo RJ, and Khosla S. Targeted clearance of p21-positive senescent cells ameliorates radiation-associated bone deterioration and marrow adiposity. American Society for Bone and Mineral Research Annual Meeting, San Diego, CA; 09/2021.

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2022 Saul D, Samakkarnthai P, Doolittle ML, Monroe DG, **Farr JN**, and Khosla S. Single-cell proteomic analysis reveals senotherapeutic effects of zoledronic acid on bone marrow pre-osteoclastic cells. American Society for Bone and Mineral Research Annual Meeting, Austin, TX; 09/2022.

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2023 Hoong C, **Farr JN**, White T, Atkinson EJ, Tweed A, Vos S, Drake MT, LeBrasseur NK, Khosla S, and Sfeir J. Relationship of biomarkers of cellular senescence with skeletal

parameters in type 2 diabetes. American Society for Bone and Mineral Research Annual Meeting, Vancouver, British Columbia, Canada; 10/2023.

2023 Froemming MN, Pařízek V, Doolittle ML, Saul D, Rowsey JL, Vos SJ, Monroe DG, Khosla S, and **Farr JN**. Cellular senescence is a modifiable mediator of skeletal fragility in mice with type 2 diabetes. American Society for Bone and Mineral Research Annual Meeting, Vancouver, British Columbia, Canada; 10/2023.

International Poster Presentations

2015 **Farr JN**, Monroe DG, Drake MT, Fraser DG, Tchkonia T, LeBrasseur NK, Kirkland JL, and Khosla S. Identification of senescent cells in the bone microenvironment: a key role for osteocytes in skeletal aging. 6th Annual Alliance on Healthy Aging, Newcastle, United Kingdom; 11/2015.

2018 **Farr JN**, Monroe DG, Fraser DG, Negley BA, Thicke BS, Onken JL, Pignolo RJ, Tchkonia T, Kirkland JL, and Khosla S. Estrogen deficiency and cellular senescence represent independent mechanisms in the pathogenesis of osteoporosis: Evidence from studies in mice and humans. 9th Annual Alliance on Healthy Aging, Groningen, Netherlands; 11/2018.

Work in Progress

Publications (Submitted / In Preparation)

1. Benitez-Rosendo A, Feua MB, Chini CCS, Warner GM, Thompson KL, Mazdeh DZ, Lopez SA, Miller LB, Zwerdling AE, Wandersee MK, Peclat TR, Bueser KR, Kashyap S, Kanamori KS, Pereira FC, Cordeiro HS, Colman L, Strange JL, Lucredi NC, Serrano LP, Rowsey JL, **Farr JN**, Kaundal R, Khosla S, Meyer RG, Meyer-Ficca ML, Chini EN. NAD deficiency induces an accelerated aging phenotype *in vivo*. 2024 *Nat Metab.* (Under Review).

3. Lagnado AB, Chibuzo NC, Li Y, Franco AC, Han Y, Jurk D, Martini H, Victorelli S, Lee G, Costa D, Saul D, Hruby A, Gomez LS, **Farr JN**, Wyles S, Khalfaoui L, Khosla S, Neretti N, Prakash YS, Camp J, Holmes III, D, and Passos JF. SenoQuant: a versatile software for unbiased spatial analysis of senescence markers across diverse tissues. *EMBO Journal.* (Under Review).

4. ◦Froemming MN, ◦Brooks HW, ◦Pařízek V, ◦Cusick NC, Doolittle ML, Saul D, Cusick N, Chandra A, Funk JL, Matveyenko A, Monroe DG, Khosla S, and **Farr JN‡**. Type 2 Diabetes in mice accelerates senescence and drives skeletal dysfunction (In Preparation). ‡Corresponding Author.

5. Chandra, A, Aversa Z, Zhang X, **Farr JN**, David A, Sharma R, Tchkonia T, Kirkland JL, Robbins PD, Niedernhofer LJ, Passos JF, Monroe DG, Miller J, LeBrasseur NK, Ikeno Y, Khosla S, and Pignolo RJ. Comprehensive healthspan assessments and influence of sex as a biological variable in aging rats (In Preparation).

Media

Webinars (Invited)

2018 **Farr JN**. Invited Webinar Presentation: “Aging, cellular senescence, and bone.” American Society for Bone and Mineral Research, Online Format; 06/2018.

Conferences / Scholarly Presentations

Oral Presentations

Regional (Invited)

2024 **Farr JN.** Senescent cells: Emerging therapeutic targets for multiple chronic diseases. University of Arizona Department of Medicine (DOM) Grand Rounds, Tucson, AZ; 09/2024.

2024 **Farr JN.** Skeletal cellular senescence with aging and type 2 diabetes. University of Arizona Nutritional Sciences & Wellness Research Seminar, Tucson, AZ; 10/2024.

2024 **Farr JN.** Decoding osteoporosis: The latest research on promoting and protecting bone. University of Arizona Arthritis Center Living Healthy with Arthritis Lecture Series, Tucson, AZ; 11/2024.

2025 **Farr JN.** Skeletal cellular senescence with aging and type 2 diabetes. University of Arizona Cellular & Molecular Medicine (CMM) Research Seminar, Tucson, AZ; 1/2025.

2025 **Farr JN.** Targeting cellular senescence to prevent age-related bone loss: From mice to humans. University of Arizona Rheumatology Grand Rounds, Tucson, AZ; 2/2025.

2025 **Farr JN.** Skeletal cellular senescence with aging and breast cancer. University of Arizona Cancer Center Faculty Lunch Series, Tucson, AZ; 5/2025.

2025 **Farr JN.** Targeting cellular senescence to prevent age-related bone loss: From mice to humans. University of Arizona Translational Medicine Workshop Plenary Lecture, Tucson, AZ; 5/2025.

2025 **Farr JN.** Osteoporosis pathophysiology, prevention, and treatment. University of Arizona Rheumatology Grand Rounds, Tucson, AZ; 9/2025.

2025 **Farr JN.** Future directions in osteoporosis therapy: Integrating osteoanabolic agents and senescence-targeted strategies. University of Arizona Rheumatology Grand Rounds, Tucson, AZ; 3/2026.

National (Invited)

2009 **Farr JN**, Going SB, Cussler EC, Lee VR, and Blew RM. Quantifying bone-loading exposure and its relation to bone density, geometry, and strength in girls. American College of Sports Medicine 2009 Annual Meeting, Seattle, WA; 06/2009.

2010 **Farr JN**, Tomás R, Shutt-Wood DD, and Going SB. Utility of peripheral quantitative computed tomography for assessment of regional and total body fat in girls. American College of Sports Medicine Annual Meeting, Baltimore, MD; 06/2010.

2012 **Farr JN**, Khosla S, Miller VM, and Kearns AE. Effects of four years of estrogen therapy in early postmenopausal women on cortical versus trabecular changes in bone mass and microstructure. American Society for Bone and Mineral Research Annual Meeting, Minneapolis, MN; 10/2012.

2012 **Farr JN**, Amin S, Melton LJ III, Kirmani S, McCready LK, Achenbach SJ, and Khosla S. HRpQCT reveals cortical thinning and deficits in bone microstructure in children and adolescents with a distal forearm fracture due to mild but not moderate trauma. American Society for Bone and Mineral Research Annual Meeting, Minneapolis, MN; 10/2012.

2012 **Farr JN**, Charkoudian N, Barnes JN, Monroe DG, McCready LK, Atkinson EJ, Amin S, Melton LJ III, Joyner MJ, and Khosla S. Relationship of sympathetic activity to bone microstructure, turnover, and plasma osteopontin levels in women. American Society for Bone and Mineral Research Annual Meeting, Minneapolis, MN; 10/2012.

2013 **Farr JN**, Amin S, Melton LJ III, Kirmani S, McCready LK, Atkinson EJ, and Khosla S. Body composition and physical activity during childhood and adolescence: Relations to biomechanical bone strength. Bone Strength Working Group Meeting, American Society for Bone and Mineral Research Annual Meeting, Baltimore, MD; 10/2013.

2013 **Farr JN**, Amin S, Melton LJ III, McCready LK, and Khosla S. Bone material strength measured by *in vivo* microindentation is compromised in postmenopausal women with type 2 diabetes. American Society for Bone and Mineral Research Annual Meeting, Baltimore, MD; 10/2013.

2014 **Farr JN**, Vanderboom PM, Bergen RH III, Atkinson EJ, Khosla S, and LeBrasseur NK. Novel mass spectrometry measurements of circulating myostatin levels in relation to sarcopenia, lean mass and bone parameters in women and men. American Society for Bone and Mineral Research Annual Meeting, Houston, TX; 09/2014.

2015 **Farr JN**, Roforth MM, Fujita K, Atkinson EJ, McCready LK, Peterson JM, Drake MT, Monroe DG, and Khosla S. Skeletal biomarkers associated with aging and estrogen deficiency revealed by RNA sequencing. 97th Annual Meeting of the Endocrine Society, San Diego, CA; 03/2015.

2015 **Farr JN**. Invited Symposium Presentation: Bone quality in type 2 diabetes. 97th Annual Meeting of the Endocrine Society, San Diego, CA; 03/2015.

2016 **Farr JN**, Nicks KM, Xing Q, Weivoda MM, Khosla S, and Monroe DG. Rorβ deletion stimulates bone formation and inhibits bone resorption in aged mice by activating Wnt signaling and increasing Opg expression. American Society for Bone and Mineral Research Annual Meeting, Atlanta, GA; 09/2016.

2017 **Farr JN**, Xu M, Weivoda MM, Monroe DG, Fraser DG, Onken JL, Negley BA, Sfeir JG, Ogrodnik M, Hachfeld CM, LeBrasseur NK, Drake MT, Pignolo RJ, Pirtskhalava T, Tchkonia T, Oursler MJ, Kirkland JL, and Khosla S. Causal role of senescent cells in mediating age-related bone loss. American Society for Bone and Mineral Research Annual Meeting, Denver, CO; 10/2017.

2018 **Farr JN**, Monroe DG, Fraser DG, Negley BA, Thicke BS, Onken JL, Pignolo RJ, Tchkonia T, Kirkland JL, and Khosla S. Estrogen deficiency and cellular senescence represent independent mechanisms in the pathogenesis of osteoporosis: Evidence from studies in mice and humans. American Society for Bone and Mineral Research Annual Meeting, Montréal, Québec, Canada; 10/2018.

2018 **Farr JN**. Meet the Professor (MTP) Session. “The spectrum of fundamental basic discoveries contributing to organismal aging.” American Society for Bone and Mineral Research Annual Meeting, Montréal, Québec, Canada; 10/2018.

2019 **Farr JN**. Invited Symposium Presentation: Targeting senescent cells to prevent age-related bone loss. Advances In Mineral Metabolism (AIMM) Annual Meeting, Snowmass, CO; 04/2019.

2019 **Farr JN**. Meet the Professor (MTP) Session. “Senescent cells and bone formation.” American Society for Bone and Mineral Research Annual Meeting, Orlando, FL; 09/2019.

2021 **Farr JN**. Invited Seminar Presentation: Skeletal cellular senescence in aging and type 2 diabetes. Virginia Commonwealth University (VCU) Biomedical Engineering Research Seminar, Richmond, VA; 10/2021.

2022 **Farr JN**. Invited Seminar Presentation: Skeletal cellular senescence in aging and type 2 diabetes. Vanderbilt University Medical Center, Clinical Pharmacology Grand Rounds, Nashville, TN; 11/2022.

2023 **Farr JN**. Invited Seminar Presentation: Skeletal cellular senescence in aging and type 2 diabetes. Indiana University Orthopedic Surgery Grand Rounds, Indianapolis, IN; 05/2023.

2023 **Farr JN**. Invited Symposium Presentation: Cellular senescence in osteoporosis. In Session: The new and the old: stem cells, senescence, and bone biology. Endocrine Society Annual Meeting, Chicago, IL; 06/2023.

2024 **Farr JN**. Invited Symposium Presentation: The role of cellular senescence in aging and endocrine disease. In Session: Metabolism and aging-related diseases. American Diabetes Association Annual Meeting, Orlando, FL; 06/2024.

International (Invited)

2018 **Farr JN**. Invited Symposium Presentation: Targeting senescent cells to prevent age-related bone loss. In "Basic Science Update: Senolytics, a cure for (bone) ageing." European Calcified Tissue Society (ECTS) Annual Meeting, Valencia, Spain; 05/2018.

2018 **Farr JN**. Invited Symposium Presentation: Identification of senescent cells in the bone microenvironment. In "Fellows Day Symposium." Italian Society of Osteoporosis, Mineral Metabolism and Skeletal Diseases (SIOMMSD) Annual Meeting, Naples, Italy; 10/2018.

2018 **Farr JN**. Invited Symposium Presentation: Targeting senescent cells to prevent age-related bone loss. In "Symposium on Cell Senescence, Aging, and Bone." Italian Society of Osteoporosis, Mineral Metabolism and Skeletal Diseases (SIOMMSD) Annual Meeting, Naples, Italy; 10/2018.

2019 **Farr JN**. Invited Symposium Presentation: Aurelio Rapado-FEIOMM-IFMRS Lecture – Mechanisms of cellular senescence in bone tissue. 24th Congress of the Spanish Society of Bone Research and Mineral Metabolism (SEIOMM) Annual Meeting, Girona, Spain; 05/2019.

2020 **Farr JN**. Invited Symposium Presentation: Mechanisms of bone aging: Opportunities for treatment. In "Mayo Clinic Endocrine Update," San Juan, Puerto Rico; 02/2020.

2022 **Farr JN**. Invited Keynote Lecture: The role of cellular senescence in mediating age-related bone loss. In "Bone Site Meeting and Expert Forum on Osteoporosis." Madrid, Spain; 11/2022.

2024 **Farr JN**. Invited Symposium Presentation: Skeletal cellular senescence in aging and type 2 diabetes. In "Navigating Musculoskeletal Health through Aging and Metabolic Derangement." 12th Seoul International Congress of Endocrinology and Metabolism (SICEM), Seoul, Korea; 04/2024.

2025 **Farr JN**. Invited Plenary Symposium Presentation: Sympathetic nervous system regulation of bone metabolism. In "Plenary Symposium 2: Skeletal Neurobiology." European Calcified Tissue Society (ECTS) Annual Meeting, Innsbruck, Austria; 05/2025.

2025 **Farr JN**. Invited Symposium Presentation: Targeting cellular senescence to prevent age-related bone loss: From mice to humans. In "Role of Ageing in Health and Disease with a Focus on Endocrinology." Danish Diabetes and Endocrine Academy (DDEA) Annual Meeting, Odense, Denmark; 09/2025.

Awarded Grants and Contracts

Internal – University of Arizona

University of Arizona Cancer Center (UACC) Internal Pilot Award (IPA) FY25 01/2025 – 12/2025
UACC $50,000 Awarded 01/2025
Title: Characterizing Treatment-induced Senescence in Bone-disseminated ER+ Breast Cancer for Therapeutic Targeting
The goal of this project is to establish the roles of standard-of-care therapy and senescent cells/SASP in mice with ER+ breast cancer bone metastases and whether senolytics improve survival.
Role: PI (Farr)

University of Arizona RII Core Facilities Pilot Program
UACC $7,200 Awarded 03/2025
Title: Creating a Syngenetic C57BL/6 Model of ER+ Breast Cancer Bone Metastasis for Drug Discovery Using Transgenic Mice
The goal of this project is to create a syngenetic C57BL/6 mouse model of ER+ breast cancer bone metastasis that can be utilized for drug discovery and development and permit in vivo transgenic manipulations.
Role: PI (Farr)

Federal – Active

R01AG082681 07/2023 – 07/2028
NIA $403,500 / yr 5% effort
The goal of this project is to define the role of p21-positive senescence cells in radiation-associated bone deterioration.
Role: Co-Investigator (Farr, Joshua)
PI: Chandra, Abishek

R01DK128552 05/2021 – 05/2026
NIDDK $381,600 / yr 35% effort
The goal of this project is to define the role of cellular senescence in mediating skeletal deficits in a mouse model of type 2 diabetes mellitus.
Role: PI (Farr, Joshua)

Pending Grants and Contracts

Federal – Pending

R21CA307874 12/2025 – 11/2027
NCI $275,000 15% effort
Title: Targeting Therapy-induced Senescence in Bone-disseminated ER+ Breast Cancer
The goal of this project is to establish the roles of standard-of-care therapy and senescent cells/SASP in mice with ER+ breast cancer bone metastases and whether senolytics improve survival.
Role: PI (Farr)

R01AG099904 04/2026 – 03/2031
NIA $2,500,000 20% effort

Title: Targeting DNA Repair Defects to Prevent Heart Aging and Disease
The goal of this project is to delineate the molecular mechanisms by which WRN regulates cardiomyocyte senescence through DNA repair pathways and define the optimal therapeutic window for senescent cardiomyocyte clearance to preserve cardiac function with aging.
Role: MPI (Farr)

Not Awarded Grants and Contracts

Foundation – Not Awarded

Twisted Pink Metastatic Breast Cancer Impact Award 01/2026 – 12/2026
ASCO EveryGrant $200,000 10% effort
Title: Targeting Senescence in Treatment-resistant ER+ Breast Cancer Bone Metastases
The goal of this project is to determine the role of senescent cells/SASP in mice with ER+ breast cancer bone metastases treated with anti-estrogen therapy and CDK4/6 inhibitors.
Role: PI (Farr)

Foundation – Not Awarded

METAvivor 2025 Translational Research Award 01/2026 – 12/2028
METAVIVOR $450,000 15% effort
Title: Targeting Radiation-induced Senescence in Bone-disseminated ER+ Breast Cancer Metastasis to Improve Survival
The goal of this project is to establish the roles of radiation therapy and senescent cells/SASP in mice with ER+ breast cancer bone metastases and whether senolytics improve survival.
Role: PI (Farr)

Federal – Not Awarded

R01AG097438 12/2025 – 11/2030
NIA $2,500,000 20% effort
The goal of this project is to establish the efficacy of SenoTACs in preventing age-related bone loss in old mice.
Role: MPI (Farr)

BC250956 - Breast Cancer Research Program Breakthrough Award 1/2026 – 12/2028
Department of Defense (DoD) $1,249,940 25% effort
Title: Targeting therapy-induced senescence in ER+ metastatic breast cancer
The goal of this project is to determine whether standard-of-care anticancer therapies promote senescence in mice with estrogen receptor-positive breast cancer bone metastases, and whether treating with senolytics improves therapeutic outcomes.

24-24SB_2-0058 – NASA NNH24ZDA001N-SBR 12/2026 – 11/2028
National Aeronautics and Space Administration (NASA) $995,789 20% effort
Title: Mechanisms of Bone Loss and Senolytic Countermeasures for Space Radiation-Induced Osteoporosis. The goal of this project is prevent space flight-induced bone loss by clearing senescent cells with senolytics.

Awarded Grants and Contracts – Non-Active

Federal – Non-Active

R01AG063707 04/2020 – 04/2025
NIA $397,500 / yr 25% effort
The goal of this project is to advance our understanding of the mechanisms by which a specific microRNA, miR-219a-5p, functions as a novel bone forming agent in bone metabolism.
Role: Co-Investigator (Farr)

P01AG062413 01/2019 – 01/2024
NIA $2,897,046 50% effort
The major goal of this multi-disciplinary, multi-site application was to build a firm foundation of discovery science in cellular senescence that will lead to a pipeline of therapeutic strategies that slow or prevent age-associated diseases.
Co-PI and Co-Project Leader – Project 2 (Farr)

R21AG065868 02/2020 – 02/2022
NIA $229,395 15% effort
The major goal of this phase 2, randomized controlled trial was to test the efficacy of interventions that target senescent cells to alleviate skeletal aging in humans.
Role: Co-PI and Lead Contact PI (Farr)

K01AR070241 07/2016 – 07/2021
NIAMS $128,034 100% effort
The major goals of this project were to identify senescent cells in the bone microenvironment and utilize genetic and pharmacological approaches for eliminating senescent cells to prevent age-related bone loss in old mice.
Role: PI (Farr)