

Lomeli Carpio Shull, Ph.D.

Assistant Professor
Department of Biology
University of New Mexico
Caster Hall
219 Yale Blvd NE
Albuquerque, NM 87131
Phone: (505) 353-0568
Email: lshull1@unm.edu

EDUCATION

Mayo Clinic, Rochester, MN 55901, USA July 2011-July 2016
Ph.D.—Biochemistry and Molecular Biology

New Mexico Institute of Mining and Technology, Socorro, NM 87801, USA Aug 2007-May 2011
B.S.—Biology with highest honors

RESEARCH EXPERIENCE

May 2017-December 2023—Postdoctoral Fellow, Department of Craniofacial Biology, University of Colorado Denver | Anschutz Medical Center, Aurora, CO; Mentor: Kristin Bruk Artinger, Ph.D.; Research topic: Understanding roles of epigenetic regulators in cranial neural crest cells during craniofacial development

July 2016-March 2017—Postdoctoral Fellow, Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN; Mentor: Jennifer J. Westendorf, Ph.D.; Research topics: Characterizing a muscular dystrophy, arthrogryptic phenotype in a mouse model; Histone deacetylase 3 in articular cartilage homeostasis and osteoarthritis disease progression

July 2011-July 2016—Ph.D. Candidate, Department of Biochemistry and Molecular Biology, Mayo Clinic, Rochester, MN; Mentor: Jennifer J. Westendorf, Ph.D.; Thesis: The Role of Histone Deacetylase 3 during Chondrocyte Maturation

August 2009-May 2011—Undergraduate Research Assistant, Department of Biology and Department of Chemical Engineering, New Mexico Institute of Mining and Technology, Socorro, NM; Mentors: Snezna Rogelj, Ph.D. and Michaelann Tartis, PhD.; Research topics: Characterizing physical properties and biological toxicity of chemotherapeutic drug delivery systems (liposomes and microbubbles)

June 2010-August 2010—Summer Undergraduate Research Fellowship, Department of Cancer Biology and Department of Biochemistry and Molecular Biology, Mayo Clinic, Jacksonville, FL; Mentor: Panagiotis Anastasiadis, Ph.D.; Research Topics: Protein PLEKHA7 in cell-cell adhesion, epithelial cell polarity, cell migration and metastasis

June 2009-August 2009—Summer Research Student, Department of Cell Biology and Physiology, University of New Mexico, Albuquerque, NM 87131; Mentor: Helen Hathaway, Ph.D.; Research Topics: Evaluation of β -catenin activity in response to activation of the estrogen receptor GPR30 in murine uterine tissue samples

PUBLICATIONS—PUBMED IDs: CARPIO LR and SHULL LC

1. **Shull LC**, Artinger KB. Epigenic regulation of craniofacial development and disease. *Birth Defects Res.* 2024 Jan;116(1):e2271. Doi 10.1002/bdr.2271. Epub 2023 Nov 14. Review. PubMed PMID:

2. Truong BT, **Shull LC**, Lencer ES, Bend EG, Field M, University of Washington Center for Mendelian Genomics, Everman D, Schwartz CE, Flanagan-Steet H, Artinger KB. PRDM1 DNA-binding zinc finger domain is required for normal limb development and is disrupted in Split Hand/Foot Malformation. *medRxiv* 2022.11.16.22282191; doi: <https://doi.org/10.1101/2022.11.16.22282191>
3. **Shull LC**, Lencer ES, Kim HM, Goyama S, Kurokawa M, Costello JC, Jones K, Artinger KB. PRDM paralogs antagonistically balance Wnt/ β -catenin activity during craniofacial chondrocyte differentiation. *Development* 2022 Feb 8;dev.200082. doi: 10.1242/dev.200082. Online ahead of print. PMID: 35132438.
4. **Shull LC**, Sen R, Menzel J, Goyama S, Kurokawa M, Artinger KB. The conserved and divergent roles of Prdm3 and Prdm16 in zebrafish and mouse craniofacial development. *Dev Biol.* 2020 May 15;461(2):132-144. PMID: 32044379. DOI: 10.1016/j.ydbio.2020.02.006.
5. Sen R, Pezoa SA, **Shull LC**, Hernandez-Lagunas L, Niswander LA, Artinger KB. Kat2a and Kat2b acetyltransferase activity regulates craniofacial cartilage and bone differentiation in zebrafish and mice. *J Dev Biol.* 2018 Nov 12;6(4):27. PMID: 30424580. DOI: 10.3390/jdb6040027
6. Hwang SM, Feigenson M, Begun DL, **Shull LC**, Culley KL, Otero M, Goldring MB, Ta LE, Kakar S, Bradley EW, Westendorf JJ. Phlpp inhibitors block pain and cartilage degradation associated with osteoarthritis. *J Orthop Res.* 2018 May;36(5):1487-1497. PMID: 29068480. DOI: 10.1002/jor.23781.
7. Feigenson M, **Shull LC**, Taylor EL, Camilleri ET, Riester SM, van Wijnen AJ, Bradley EW, Westendorf JJ. Histone Deacetylase 3 Deletion in Mesenchymal Progenitor Cells Hinders Long Bone Development. *J Bone Miner Res.* 2017 Dec;32(12):2453-2465. PMID: 28782836. DOI: 10.1002/jbmr.3236
8. **Carpio LR**, Bradley EW, Westendorf JJ. Histone Deacetylase 3 Suppresses Erk Phosphorylation and Subsequent Matrix Metalloproteinase (Mmp)-13 Activity in Chondrocytes. *Connective Tissue Res.* 2016 Sept 23:1-10. PMID: 27662443. DOI:10.1080/03008207.2016.1236088
9. **Carpio LR**, Bradley EW, McGee-Lawrence ME, Weivoda MM, Poston DD, Dudakovic A, Xu M, Tchkonja T, Kirkland JL, van Wijnen AJ, Oursler MJ, Westendorf JJ. Histone Deacetylase 3 Supports Endochondral Bone Formation by Controlling Cytokine Signaling and Matrix Remodeling. *Sci. Signal.* 2016 Aug 09; 440(9): ra79. PMID: 27507649. DOI: 10.1126/scisignal.aaf3273.
10. **Carpio LR**, Westendorf JJ. Histone Deacetylases in Cartilage Homeostasis and Osteoarthritis. *Curr Rheumatol Rep.* 2016 Aug; 18(8): 52. PMID: 27402109; DOI: 10.1007/s11926-016-0602-z.
11. Bradley EW, **Carpio LR**, McGee-Lawrence ME, Castillejo Becerra C, Amanatullah DF, Ta LE, Otero M, Goldring MB, Kakar S, Westendorf JJ. Phlpp1 facilitates post-traumatic osteoarthritis and is induced by inflammation and promoter demethylation in human osteoarthritis. *Osteoarthritis and Cartilage.* 2015 Dec 31; pii: S1063-4584(15)01437-5. PMID: 26746148. DOI: 10.1016/j.joca.2015.12.014.
12. Bradley EW, **Carpio LR**, van Wijnen AJ, McGee-Lawrence ME, Westendorf JJ. Histone Deacetylases in Bone Development and Skeletal Disorders. *Physiological Rev.* 2015 Oct; 95(4):1359-81, PMID: 26378079. DOI: 10.1152/physrev.00004.2015
13. Kourtidis A, Ngok SP, Pulimeno P, Feathers RW, **Carpio LR**, Baker TR, Carr JM, Yan IK, Borges S, Perez EA, Storz P, Copland JA, Patel T, Thompson EA, Citi S, Anastasiadis PZ. Distinct E-cadherin-based complexes regulate cell behavior through miRNA processing or Src and p120 catenin activity. *Nat. Cell Biol.* 2015 Sep; 17(9): 1145-57. PMID: 26302406. DOI: 10.1038/ncb3227.
14. McGee-Lawrence ME, **Carpio LR**, Schulze RJ, Pierce JL, McNiven MA, Farr JN, Khosla S, Oursler MJ, Westendorf JJ. Hdac3 Deficiency Increases Marrow Adiposity and Induces Lipid Storage and Glucocorticoid Metabolism in Osteochondroprogenitor Cells. *J. Bone Miner. Res.* 2016 Jan; 31(1): 116-

28. PMID: 26211746. DOI: 10.1002/jbmr.2602
15. Bradley EW, **Carpio LR**, Newton AC, Westendorf JJ. Deletion of the PH-domain and leucine rich repeat protein phosphatase 1 (Phlpp1) increases fibroblast growth factor (Fgf) 18 expression and promotes chondrocyte proliferation. *J. Biol. Chem.* 2015 Jun 26; 290(26):16272-80, PMID: 25953896. PMCID: 4481226; DOI: 10.1074/jbc.M114.612937
16. Bradley EW, **Carpio LR**, Olson EN, Westendorf JJ. Histone Deacetylase 7 (Hdac7) Suppresses Chondrocyte Proliferation and β -Catenin Activity during Endochondral Ossification. *J. Biol. Chem.* 2015 Jan 2; 290(1):118-26. PMID: 25389289. PMCID: PMC4281714 DOI: 10.1074/jbc.M114.596247.
17. McGee-Lawrence ME, **Carpio LR**, Bradley EW, Dudakovic A, Lian JB, van Wijnen AJ, Kakar S, Hsu W, Westendorf JJ. Runx2 is required for early stages of endochondral ossification but delays final stages of bone repair in Axin2-deficient mice. *Bone.* 2014 Sep; 66:277-86. PMID: 24973690. PMCID: PMC4125446 DOI: 10.1016/j.bon.2014.06.022.
18. Ryan ZC, Craig TA, Salisbury JL, **Carpio LR**, McGee-Lawrence ME, Westendorf JJ, Kumar R. Enhanced prostacyclin formation and Wnt signaling in sclerostin deficient osteocytes and bone. *Biochem. Biophys. Res. Commun.* 2014 May 23; 448(1):83-8. PMID: 24780398 PMCID: PMC4052706. DOI: 10.1016/j.bbrc.2014.04.092.
19. McGee-Lawrence ME, Ryan ZC, **Carpio LR**, Kakar S, Westendorf JJ, Kumar R. Sclerostin deficient mice rapidly heal bone defects by activating beta-catenin and increasing intramembranous ossification. *Biochem. Biophys. Res. Commun.* 2013 Nov 29; 441(4):886-90. PMID:24211207. PMCID: PMC3876417. DOI:10.1016/j.bbrc.2013.10.155.
20. Bradley EW, **Carpio LR**, Westendorf JJ. Histone deacetylase 3 suppression increases PH domain and leucine-rich repeat phosphatase (Phlpp)1 expression in chondrocytes to suppress Akt signaling and matrix secretion. *J. Biol. Chem.* 2013 Apr 5; 288(14):9572-82. PMID:23408427. PMCID: PMC3617261. DOI:10.1074/jbc.M112.423723.

ABSTRACTS AND PRESENTATIONS

1. **Shull LC**, Artinger KB. PRDM paralogs are required during Meckel's cartilage and mandibular bone development. (Poster Presentation). Society for Developmental Biology 82nd Annual Meeting, Chicago, IL. July 20-23, 2023.
2. **Shull LC**, Artinger KB. PRDM paralogs genetically interact in the mammalian neural crest during craniofacial development. (Poster Presentation). Craniofacial Morphogenesis Tissue and Regeneration Gordon Research Conference, Ventura, CA. October 16-21, 2022.
3. **Shull LC**, Artinger KB. PRDM paralogs genetically interact in the mammalian neural crest during craniofacial development. (Poster Presentation). Craniofacial Morphogenesis Tissue and Regeneration Gordon Research Seminar, Ventura, CA. October 15-16, 2022.
4. **Shull LC**, Artinger KB. PRDM paralogs genetically interact in the mammalian neural crest during craniofacial development. (Poster Presentation). Joint Society for Developmental Biology 81st Annual Meeting and PASEDB 4th Biennial Meeting. July 17-20, 2022.
5. **Shull LC**, Artinger KB. Upstream regulation of Wnt/ β -catenin signaling by PRDM proteins balances gene expression during craniofacial chondrocyte development (Short Talk). Virtual Society for Developmental Biology 80th Annual Meeting. July 12-16, 2021.
6. **Shull LC**, Artinger KB. Upstream regulation of Wnt/ β -catenin signaling by PRDM proteins balances gene expression during craniofacial chondrocyte development (Short Talk). Virtual Southwest

Regional Society for Developmental Biology Meeting. May 12-14, 2021.

7. **Shull LC**, Artinger KB. PRDM histone methyltransferases regulate cranial neural crest development (Poster Presentation). Craniofacial Morphogenesis Tissue and Regeneration Gordon Research Conference, Lucca (Barga), IT. February 23-28, 2020.
8. **Shull LC**, Artinger KB. PRDM histone methyltransferases regulate cranial neural crest development (Podium Presentation). Craniofacial Morphogenesis Tissue and Regeneration Gordon Research Seminar, Lucca (Barga), IT. February 22-23, 2020.
9. **Shull LC**, Gerlach J, Sen R, Niswander LA, Artinger KB. PRDM histone methyltransferases regulate cranial neural crest development (Poster Presentation). Society of Craniofacial and Developmental Biology 41st Annual Meeting, La Jolla, CA. October 16, 2018.
10. **Shull LC**, Sen R, Menzel J, Niswander LA, Artinger KB. Histone 3 lysine 9 methyltransferases, Prdm3 and Prdm16, regulate cranial neural crest development (Poster Presentation). Craniofacial Morphogenesis and Tissue Regeneration Gordon Research Conference, Lucca (Barga), IT. February 11-16, 2018.
11. **Carpio LR**, Bradley EW, McGee-Lawrence ME, Weivoda MM, Poston DD, Dudakovic A, Xu M, Tchkonja T, Kirkland JL, van Wijnen AJ, Oursler MJ, Westendorf JJ. Histone Deacetylase 3 Supports Endochondral Bone Formation by Controlling Cytokine Signaling and Matrix Remodeling (Podium Presentation). American Society for Bone and Mineral Research Annual Meeting, Atlanta, GA. September 16-19, 2016.
12. **Carpio LR**, Bradley EW, Dudakovic A, van Wijnen AJ, McGee-Lawrence ME, Westendorf JJ. Histone Deacetylase 3 Controls Extracellular Matrix Remodeling and Proinflammatory Signals in Chondrocytes (Plenary Poster Presentation). American Society for Bone and Mineral Research Annual Meeting, Seattle, WA. October 9-12, 2015.
13. **Carpio LR**, Bradley EW, McGee-Lawrence ME, Westendorf JJ. Histone Deacetylase 3 (Hdac3) Controls Endochondral Bone Formation and Marrow Adiposity (Poster Presentation). Musculoskeletal Development and Regeneration Fusion Conference. Cancun, Mexico. February 6-9, 2015.
14. **Carpio LR**, Bradley EW, McGee-Lawrence ME, Westendorf JJ. Histone Deacetylase 3 Suppresses Erk Phosphorylation and Subsequent Matrix Metalloproteinase (MMP)-13 Activity in Chondrocytes during Endochondral Ossification (Podium Presentation). American Society for Bone and Mineral Research Annual Meeting, Houston, TX. September 12-15, 2014.
15. **Carpio LR**, Bradley EW, McGee-Lawrence ME, Westendorf JJ. Histone Deacetylase 3 Controls Extracellular Matrix Degradation, Vascularization, and Secondary Ossification Formation during Endochondral Ossification (Poster Presentation). American Society for Bone and Mineral Research Annual Meeting, Baltimore, MD. October 4-7, 2013.
16. Aguilar M, **Carpio LR**, Myers M, Mikahlin A, Tartis M, Rogelj S, Kornienko A. Characterization of microbubble drug delivery vehicles by flow cytometry, microscopy, and spectrophotometry (Poster Presentation). NM-INBRE Annual Symposium; Loretta Inn and Spa, Santa Fe, NM; March 27-29 2011.

RESEARCH SUPPORT AWARDED

Ongoing Support

Federal

Principal Investigator – Functions of PRDM histone methyltransferases during cartilage development in the craniofacial skeleton Funded by the National Institute of Dental and Craniofacial Research (**K99/R00 DE031349**)

05/01/2022 - present

Completed Grants

Federal

Principal Investigator — Functions of PRDM histone methyltransferases in cranial neural crest cell development Funded by the National Institute of Dental and Craniofacial Research (**F32 DE029099**)
09/01/2019 – 04/30/2022

Federal

Principal Investigator — The Role of Histone Deacetylase 3 in Chondrocyte Maturation Funded by the National Institute of Arthritis and Musculoskeletal and Skin Diseases (**F31 AR67646**)
09/2015-07/2016

Federal

Trainee — Musculoskeletal Research Training Program Funded by the National Institute of Arthritis and Musculoskeletal and Skin Diseases (**T32 AR 56950**, Westendorf, PI)
05/2013-05/2015

Federal

Trainee — The Mayo Clinic Initiative for Maximizing Student Development Program Funded by the National Institute of General Medical Sciences (**R25 GM 55252**, Maher, PI)
08/2011-05/2013

HONORS AND AWARDS

2020 Best Developmental Biology Best Paper Runner Up for “The conserved and divergent roles of Prdm3 and Prdm16 in zebrafish and mouse craniofacial development.” *Dev Biol.* 2020 May 15;461(2):132-144

2018 University of Colorado Anschutz Medical Campus, School of Dental Medicine Dean’s Postdoc Research Award--Dental Research Day, Denver, CO – February 23, 2018

American Society of Bone and Mineral Research (ASBMR) 2016 Annual Meeting Young Investigator Award, Atlanta, GA, Sept. 16-19, 2016

American Society of Bone and Mineral Research (ASBMR) Young Investigator Travel Award to attend the 2015 ASBMR Annual Meeting, Seattle, WA, Oct. 9-12, 2015

First place poster prize, Musculoskeletal Development and Regeneration, Cancun, Mexico, Feb. 6-9, 2015
American Society of Bone and Mineral Research (ASBMR) Young Investigator Travel Award to attend the 2014 ASBMR Annual Meeting, Houston, TX, Sept. 12-15, 2014

American Society of Bone and Mineral Research (ASBMR) Travel Award to attend Ph.D. Training Course at the University of Hamburg, Hamburg, Germany, Sept. 15-18, 2013

MENTORING EXPERIENCE

May 2015-August 2015—Mentored Mayo Clinic Summer Undergraduate Research Fellow, Mentee: Daniel Poston, Creighton University

January 2017-March 2017—Mentored Mayo Clinic PhD Rotation Student, Mentee: Paige Arneson, Mayo Clinic PhD student

May 2017-August 2017—Mentored Gates Center for Regenerative Medicine Summer Intern, Mentee: Oscar Yip, Occidental College

March 2018-May 2018—Mentored University of Colorado Anschutz PhD Rotation Student, Mentee: Brittany Truong, University of Colorado Anschutz PhD student in Human Medical Genetics and Genomics Program

May 2018-August 2018—Mentored Gates Center for Regenerative Medicine Summer Intern, Mentee: Joseph Gerlach, Cornell University

May 2021-August 2021—Mentored Gates Center for Regenerative Medicine Summer Intern, Mentee: Elizabeth Belcher, North Carolina State University

August 2021-November 2021—Mentored University of Colorado Anschutz PhD student, Mentee: Mikaela Follmer, University of Colorado Anschutz PhD student in Cell Biology, Stem Cells, and Development Program

June 2022-August 2022—Mentored Summer Research Training Program Student, Mentee: Jesutomisin (Praise) Olusoji, Colorado School of Mines

TEACHING EXPERIENCE

Teaching Assistant—Pilot IRACDA program between University of Colorado Anschutz Medical Campus and Denver’s Metropolitan State University, February 2021-May 2021. Working under the guidance of Dr. Vida Melvin, gained experience in undergraduate course development using the backward course design method for an upper-level Developmental Biology course. Observed all lectures throughout the semester and assisted in leading Journal Club discussions.

University of Colorado Anschutz Medical Campus, Aurora, CO

Guest Lecturer—Embryology and Craniofacial Biology (DSBS 5500) for Dental Students, gave the Early Embryology lecture and Neural and Neural Crest Development lecture. K. Fantauzzo and J. Nichols, course directors, Spring Semester 2023

Teaching Assistant—Embryology section of Core Topics Course: Introduction to Concepts and Model Systems in Developmental Biology (Core Topics in Biomedical Science BMSC 7810), L. Barlow and K. Artinger, course directors, Fall Semester 2017.

PROFESSIONAL MEMBERSHIPS

Society for Developmental Biology, Member – 2019-present

Society for Craniofacial Genetics and Developmental Biology, Member – 2018-present

American Society for Bone and Mineral Research, Member — 2013-2016