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EDUCATION AND TRAINING

Johns Hopkins University School of Medicine, Baltimore MD August 2019 - Present
Postdoctoral training in PNS protein homeostasis under the direction of Dr. Seth Margolis.

University of Missouri, Columbia MO May 2016 - June 2019
Postdoctoral training in SMA and SMARD1 therapeutics under the direction of Dr. Christian Lorson.

University of Missouri, Columbia MO August 2012 - May 2016
Doctor of Philosophy (PhD) in Biological Sciences
Major: Cellular, Molecular and Behavioral Neuroscience

University of Missouri, Columbia MO August 2010 - July 2012
MU Post-Baccalaureate Research Education Program (MU-PREP)
Major: Neuroscience

University of California Davis, Davis CA August 2007 - June 2010
Bachelor of Science (B.S.)
Major: Neurobiology, Physiology and Behavior

PUBLICATIONS

In-revision* manuscripts:*

1. **Villalón-Landeros E**, Turker F, Kho SC, Church T, Delannoy M, Caterina MJ, Margolis SS. The Nociceptive Activity of Peripheral Sensory Neurons is Regulated by the Neuronal Membrane Proteasome. ***In-revision***

Complete bibliography: https://www.ncbi.nlm.nih.gov/myncbi/1JeF6PXI64TkS/bibliography/public/

1. Arpke R, Moritz T, Hahn K, **Villalón E**, Lorson C, Cornelison DDW. Normal muscle fiber type distribution is recapitulated in aged ephrin-A3-/- mice that previously lacked most slow myofibers. American Journal of Physiology. Jan. 2023. *In-press*
2. Comley LH, Kline RA, Thomson AK, Woschitz V, **Villalón-Landeros** E, Osman EY, Lorson CL, Murray LM. Motor Unit Recovery Following Smn Restoration in Mouse Models of Spinal Muscular Atrophy. Hum Mol Genet. 2022, Sep 10;31(18):3107-3119. doi: 10.1093/hmg/ddac097. PMID: 35551393
3. Dumas SA, **Villalón E**, Bergman EM, Wilson KJ, Marugan JJ, Lorson CL, Burnett BG. A Combinatorial Approach Increases SMN Level in SMA Model Mice. Hum Mol Genet. 2022 Aug 25;31(17):2989-3000. doi: 10.1093/hmg/ddac068. PMID: 35419606
4. Smith CE, Lorson MA, Ricardez Hernandez SM, Al Rawi Z, Mao J, Marquez J, **Villalón E**, Keilholz AN, Smith CL, Garro-Kacher MO, Morcos T, Davis DJ, Bryda EC, Nichols NL, Lorson CL. The Ighmbp2D564N Mouse Model is the First SMARD1 Model to Demonstrate Respiratory Defects. Hum Mol Genet. 2022 Apr 22;31(8):1293-1307. doi: 10.1093/hmg/ddab317. PMID: 34726235
5. Shababi M* Smith CE*, Ricardez-Hernandez S, Marquez J, Al Rawi ZY, **Villalón E**, Farris DK, Kacher M, Lorson CL. Defining the Optimal Dose and Therapeutic Window in the FVB Model of SMARD1 (FVB-*nmd*). Molecular Therapy Methods and Clinical Development. 2021. Dec 10;23:23-32. doi.org/10.1016/j.omtm.2021.07.008. PMID: 34553000

6. McCormack NM, **Villalón E**, Viollet C, Dalgard CL, Lorson CL, Burnett BG. Survival Motor Neuron Deficiency Slows Myoblast Fusion Through Reduced Myomaker and Myomerger Expression. J Cachexia Sarcopenia Muscle. 2021. Aug. doi: 10.1002/jcsm.12740.
7. Kaifer KA, **Villalón E**, Smith CE, Simon ME, Marquez J, Hopkins AE, Morcos TI, Lorson CL. AAV9-DOK7 gene therapy reduces disease severity in $Smn^{2b/-}$ SMA model mice. Biochem Biophys Res Commun. 2020. Sep. doi: 10.1016/j.bbrc.2020.07.031.
8. Toedebusch CM, Garcia VB, Snyder JC, Jones MR, Schulz DJ, Johnson GC, **Villalón E**, Coates JR, Garcia ML. Lumbar Spinal Cord Microglia Exhibited Increased Activation in Aging Dogs Compared with Young Adult Dogs. Geroscience. 2020. Feb. doi: 10.1007/s11357-019-00133-8. PMID: 31828496
9. Shababi M, Smith CE, Kacher M, Alrawi Z, **Villalón E**, Davis D, Bryda EC, Lorson CL. Development of a Novel Severe Mouse Model of Spinal Muscular Atrophy with Respiratory Distress Type-1: FVB-nmd. Biochem Biophys Res Commun. 2019. doi: 10.1016/j.bbrc.2019.10.032.
10. **Villalón E**, Kline RA, Smith CE, Lorson ZC, Osman EY, O'Day S, Murray LM, Lorson CL. AAV9-Stathmin1 Gene Delivery Improves Disease Phenotype in an Intermediate Mouse Model of Spinal Muscular Atrophy. Hum Mol Genet. 2019 Nov 15; doi: 10.1093/hmg/ddz188. PMID: 31363739
11. **Villalón E**, Lee NN, Marques J, Lorson CL. Muscle Fiber-Type Selective Propensity to Pathology in the nmd Mouse Model of SMARD1. Biochem Biophys Res Commun. 2019. Aug 13; 516(1):313-319. doi: 10.1016/j.bbrc.2019.06.117. PMID: 31256932.
12. Kaifer KA, **Villalón E**, O'Brien BS, Sison SL, Smith CE, Simon M, Marquez J, O'Day S, Hopkins AE, Neff R, Rindt H, Ebert AD, Lorson CL. AAV9-Mediated Delivery of miR-23a Reduces Disease Severity in Smn2B/- SMA Model Mice. Hum Mol Genet. 2019 Oct 1; doi.org/10.1093/hmg/ddz142. PMID: 31211843.
13. Osman EY, Bolding MR, **Villalón E**, Kaifer KA, Lorson ZC, Tisdale S, Hao Y, Conant GC, Pires JC, Pellizzoni L, Lorson CL. Functional Characterization of SMN Evolution in Mouse Model of SMA. Sci. Rep. 2019 Jul 1; 9(1):9472; doi: 10.1038/s41598-019-45822-8. PMID: 31263170
14. Shababi M, **Villalón E**, Kaifer KA, DeMarco V, Lorson CL. A Direct Comparison of IV and ICV Delivery Methods for Gene Replacement Therapy in a Mouse Model of SMARD1. Mol Ther Methods Clin Dev. 2018 Aug 17; 10:348-360. doi: 10.1016/j.omtm.2018.08.005. PMID: 30202772.
15. **Villalón E**, Barry DM, Byers N, Frizzi K, Jones MR, Landayan DS, Dale JM, Downer NL, Calcutt NA, Garcia ML. Internode Length is Reduced During Myelination and Remyelination by Neurofilament Medium Phosphorylation in Motor Axons. Exp Neurol. 2018 Aug; 306:158-168. doi: 10.1016/j.expneurol.2018.05.009. Epub 2018 May 14. PMID: 29772247.
16. Toedebusch CM, Snyder JC, Jones MR, Garcia VB, Johnson GC, **Villalón E**, Coates JR, Garcia ML. Arginase-1 Expressing Microglia in Close Proximity to Motor Neurons were Increased Early in Disease Progression in Canine Degenerative Myelopathy, a Model of Amyotrophic Lateral Sclerosis. Mol Cell Neurosci. 2018 Apr; 88:148-157. doi: 10.1016/j.mcn.2018.01.009. Epub 2018 Feb 20. PMID: 29408267.
17. **Villalón E**, Shababi M, Kline R, Lorson ZC, Florea KM, Lorson CL. Selective Vulnerability in Neuronal Populations in nmd/SMARD1 Mice. Hum Mol Genet. 2018 Feb 15; 27(4):679-690. doi: 10.1093/hmg/ddx434. PMID: 29272405.
18. Sison SL, Patitucci TN, Seminary ER, **Villalón E**, Lorson CL, Ebert AD. Astrocyte-produced miR-146a as a Mediator of Motor Neuron Loss in Spinal Muscular Atrophy. Hum Mol Genet. 2017 Sep 1; 26(17):3409-3420. doi: 10.1093/hmg/ddx230. PMID: 28637335.

19. Jones MR, **Villalón E**, Northcutt AJ, Calcutt NA, Garcia ML. Differential Effects of Myostatin Deficiency on Motor and Sensory Axons. Muscle Nerve. 2017 Dec; 56(6):E100-E107. doi: 10.1002/mus.25570. Epub 2017 Apr 11. PMID: 28073155.
20. Kaifer KA, **Villalón E**, Osman EY, Glascock JJ, Arnold LL, Cornelison DD, Lorson CL. Plastin-3 Extends Survival and Reduces Severity in Mouse Models of Spinal Muscular Atrophy. JCI Insight. 2017 Mar 9; 2(5):e89970. doi: 10.1172/jci.insight.89970. PMID: 28289706.
21. **Villalón E**, Jones MR, Sibigtroth C, Zino SJ, Dale JM, Landayan DS, Shen H, Cornelison DD, Garcia ML. Muscle Spindle Alterations Precede Onset of Sensorimotor Deficits in Charcot-Marie-Tooth type 2E. Genes Brain Behav. 2017 Feb; 16(2):260-270. doi: 10.1111/gbb.12341. PMID: 27643807.
22. Shababi M, Feng Z, **Villalón E**, Sibigtroth CM, Osman EY, Miller MR, Williams-Simon PA, Lombardi A, Sass TH, Atkinson AK, Garcia ML, Ko CP, Lorson CL. Rescue of a Mouse Model of Spinal Muscular Atrophy with Respiratory Distress Type 1 by AAV9-IGHMBP2 Is Dose Dependent. Mol Ther. 2016 May 5; 24(5):855-66. doi: 10.1038/mt.2016.33. PMID: 26860981.
23. **Villalón E**, Dale JM, Jones M, Shen H, Garcia ML. Exacerbation of Charcot-Marie-Tooth type 2E Neuropathy Following Traumatic Nerve Injury. Brain Res. 2015 Nov 19; 1627:143-53. doi: 10.1016/j.brainres.2015.09.024. PMID: 26423936.
24. Dale JM, **Villalon E**, Shannon SG, Barry DM, Markey RM, Garcia VB, Garcia ML. Expressing hNF-LE397K Results in Abnormal Gaiting in a Transgenic Model of CMT2E. Genes Brain Behav. 2012 Apr; 11(3):360-5. doi: 10.1111/j.1601-183X.2012.00771.x. PubMed PMID: 22288874.

BOOK CHAPTERS

1. Jones MR, **Villalón E**, Garcia ML. Genetic Manipulation of Neurofilament Protein Phosphorylation. Methods Enzymol. 2016; 568:461-76. doi: 10.1016/bs.mie.2015.07.027. Epub 2015 Oct 24. PMID: 26795480.
2. **Villalón E**, Schulz DJ, Waters ST. Real-time PCR quantification of Gene Expression in Embryonic Mouse Tissue. Methods Mol Biol. 2014; 1092:81-94. doi: 10.1007/978-1-60327-292-6_6. Epub 2013 Oct 17; PMID: 24318815.

JOURNAL FRONT COVER

1. Villalón E. Strategy for identifying potential disease gene modifiers. Human Molecular Genetics. 2019 Nov. Vol 28:22. Cover image
2. Villalón E. Axonal regulation of internode length by NF-M phosphorylation. Experimental Neurology. 2018 Aug; Vol. 306. Cover image.
3. Villalón E. Inverted Pseudo-colored Nerve Branch and NMJ. Human Molecular Genetics. 2018 Feb. Vol. 27:4. Cover image.
4. Villalón E. Innervated Neuromuscular Junctions in Mice with Spinal Muscular Atrophy. Molecular Therapy. 2016 Sep. Vol 24:9. Cover image.

FUNDING SUPPORT

Postdoctoral: *Johns Hopkins University School of Medicine, Baltimore MD***:**

- JHU Merkin PNNR Center Fellow ($50,000/yr) November 2021 - present
- NIH NINDS F32 NRSA ($59,525/yr) September 2020 - July 2022

Graduate School: *University of Missouri, Columbia MO:*

- T-32 Training Grant ($27,000/yr) August 2014 - July 2016

- Initiative for Maximizing Student Diversity (IMSD) Fellowship ($27,000/yr) — August 2012 - July 2014
- University of Missouri-Columbia Chancellor's Gus T. Ridgel Fellowship ($18,000/yr) — August 2012 - July 2014
- Carl Storm Underrepresented Minority Fellowship, NIH ($600) — June 2012

Post-baccalaureate: *University of Missouri, Columbia MO:*

- NIH Post-Baccalaureate Research Education Program MU-PREP $24,000/yr) — August 2010 - July 2012

MENTORSHIP AND TEACHING

Damani Sama-Borbon (Graduate student in Dr. Seth Margolis Laboratory)
Current Position: Ph.D. student in Neuroscience at JHU SOM.
Research Topic: The PNS neuronal membrane proteasome associated signaling peptides.

Samuel Kho, Woodrow Wilson Fellow (Undergraduate student in Dr. Seth Margolis Laboratory)
Current position: Sophomore undergraduate at JHU.
Research topic: Cellular, Molecular, Biochemical mechanisms of neuroimmune communication in the PNS.

Dean Zhang (Undergraduate student in Dr. Seth Margolis Laboratory)
Current position: Senior student pre-med student at JHU.
Research topic: Immuno-electron microscopy investigation of the NMP in the PNS.

Yiyan Lin (Graduate student in Dr. Seth Margolis Laboratory)
Current position: Ph.D. student in Biological Chemistry program at JHU SOM.
Research topic: Neuronal membrane proteasome role in peripheral nervous system function.

Caley E. Smith (Graduate student in Dr. Christian Lorson Laboratory)
Current position: Ph.D. candidate in Molecular Pathogenesis and Therapeutics program at the University of Missouri.
Research topic: Pathogenesis and gene therapy in mouse models of Spinal Muscular Atrophy with Respiratory Distress type 1 (SMARD1).

Jose Marquez (Postbacc student in Dr. Christian Lorson Laboratory)
Current position: Ph.D. candidate in Neuroscience at the University of California, Davis.
Research topic: Pathogenesis and gene therapy in mouse models of Spinal Muscular Atrophy.

Reginald Edwards (Undergraduate student in Dr. Michael Garcia Laboratory)
Current position: PREP scholar at the University of North Carolina Chapel Hill.
Research topic: Molecular mechanisms of Schwann cell elongation during myelination.

Victoria Hassebroek (Undergraduate student in Dr. Michael Garcia Laboratory)
Current position: Postdoc Researcher at Stowers Institute for Medical Research, Kansas.
Research topic: Pathology development in a mouse model of CMT2E.

Amanda Leung (Undergraduate student in Dr. Michael Garcia Laboratory)
Current position: Ph.D. candidate in Cell and Developmental Biology at Vanderbilt University.
Research Topic: Molecular and behavioral mechanisms of CMT2E disease development.

ACADEMIC HONORS AND AWARDS

- Biomedical Scholar Association 2022 Milestones Award. Johns Hopkins University, School of Medicine. May 2022

- Biomedical Scholar Association 2021 Milestones Award. Johns Hopkins University, School of Medicine. May 2021
- Biomedical Scholar Association 2020 Milestones Award. Johns Hopkins University, School of Medicine. May 2020
- Kansas City Area Life Sciences Institute (KCALSI) Science to Art image contestant selected for Auction. Image sold for $250. Funds used to promote STEAM (STEM +Art) education in local community. Summer 2018.
- Life Sciences Week, Experts Choice award for Best Scientific image, University of Missouri, Summer 2018.
- Kansas City Area Life Sciences Institute (KCALSI) Science to Art image contestant selected for Auction. Image sold for $300. Funds used to promote STEAM (STEM +Art) education in local community. Summer 2018.
- Best Poster Presentation Award, Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) Annual Conference, October 2009.
- INSET internship, NSF, Summer 2006
- EPSEM internship, NSF, Summer 2004

MEMBERSHIPS

- The Peripheral Nerve Society 2022 - present
- Johns Hopkins Diversity Postdoctoral Alliance Committee 2019 - present
- Johns Hopkins Postdoctoral Association 2019 - present
- University of Missouri Postdoctoral Association (MUPA)-member 2016 - 2019
- Alternative Career Exploration in the Sciences (ACES)- member 2014 - 2019
- Society for the Advancement of Chicanos and Native Americans in Science (SACNAS). 2004 – present

SERVICE

- JHU Biological Chemistry Diversity Equity and Inclusion committee, **Member** 2020- present
- JHU Diversity Postdoctoral Alliance Committee HBCU Mentoring Program, **Mentor** 2021 - 2022
- Johns Hopkins Postdoctoral Association, **Co-President** 2021 - 2022
- Johns Hopkins Postdoctoral Association, **Secretary** 2020 - 2021
- Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) Chapter at the University of Missouri. **Founder and President** 2010 - 2012
- Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) Chapter at the University of California, Davis. **Founder and President** 2008 – 2010

SCIENTIFIC PRESENTATIONS

1. **Invited Speaker:** The Nociceptive Activity of Peripheral Sensory Neurons is Modulated by the Neuronal Membrane Proteasome. Peripheral Nerve Society 2023 Annual Meeting. Copenhagen DK. June 2023
2. **Invited Speaker:** The Nociceptive Activity of Peripheral Sensory Neurons is Modulated by the Neuronal Membrane Proteasome. Neurotrophic Factors in Health and Disease Gordon Research Seminar 2023. Newport RI. May 2023
3. **Invited Speaker:** The Nociceptive Activity of Peripheral Sensory Neurons is Modulated by the Neuronal Membrane Proteasome. Pharmacology and Neuroscience Department Seminar. Loyola University Stritch School of Medicine. Chicago Il. April 2023

4. **Invited Speaker:** DRG Neuroproteasome Signaling Peptides. Merkin Peripheral Nerve Neuropathy Regeneration Center Symposium 2023. Baltimore, MD. March 2023
5. **Invited Speaker:** The Neuronal Membrane Proteasome Modulates Sensory Neuron Activity in the Peripheral Nervous System. JHU Merkin Peripheral Nerve Neuropathy Regeneration Center, Baltimore MD. January 2022.
6. **Invited Speaker:** The Neuronal Membrane Proteasome Modulates Sensory Neuron Activity in the Peripheral Nervous System. The Broad Institute of MIT and Harvard. Cambridge, MA. November 2021.
7. **Invited Speaker:** The Neuronal Membrane Proteasome Modulates Sensory Neuron Activity in the Peripheral Nervous System. Kennedy Krieger Institute. Baltimore MD. October 2021.
8. **Invited Speaker:** The Neuronal Membrane Proteasome in the Peripheral Nervous System. JHU Basic Science Institute Summer Internship Program. Baltimore, MD. June 2021.
9. **Invited Speaker:** The Neuronal Membrane Proteasome in the Peripheral Nervous System. JHU SOM Biological Chemistry Department. Baltimore, MD. September 2020.
10. **Invited Speaker:** Development of Therapeutics in Motor Neuron Diseases. JHU SOM Biological Chemistry Department. Baltimore, MD. February 2019
11. **Invited Speaker:** STMN1 Overexpression Ameliorates Phenotype in an Intermediate Mouse Model of Spinal Muscular Atrophy. 2018 SMA Research Meeting. Dallas, TX. June 2018.
12. **Invited Speaker:** Charcot-Marie-Tooth type 2E: New Insights into Disease Pathogenesis. Missouri Life Sciences Seminar. Columbia, MO, March 2016.
13. **Invited Speaker:** Neurofilament Medium Phosphorylation Regulates Schwann Cell Elongation During Myelination. Neuroscience Seminar. Columbia MO, Dec 2015
14. **Invited Speaker:** Neurofilament Medium Phosphorylation Regulates Schwann Cell Elongation During Myelination. Neuroscience Seminar. Columbia MO, Feb 2015
15. **Invited Speaker:** Anatomical Differences in the Developmental Stages of Populus trichocarpa. Chancellor's Colloquium with Dr. Arden L. Bement head director of the National Science Foundation and the UC Davis campus Senior Administration. Davis, CA. March 2010
16. **Poster Presentation:** The Nociceptive Activity of Peripheral Sensory Neurons is Modulated by the Neuronal Membrane Proteasome. Neurotrophic Factors in Health and Disease Gordon Research Conference 2023. Newport RI. May 2023
17. **Poster presentation:** STMN1 Overexpression Ameliorates Phenotype in an Intermediate Mouse Model of Spinal Muscular Atrophy. 2018 Midwest Motorneuron Consortium. Indianapolis, IN. September 2018.
18. **Poster presentation:** Selective Vulnerability to Pathology in Motor Unit Populations in Spinal Muscular Atrophy with Respiratory Distress Type 1. 2018 SMA Research Meeting. Dallas, TX. June 2018.
19. **Poster presentation:** Selective vulnerability to Neuromuscular Junction Defects in Different Muscles of SMARD1 Mice. College of Vet. Medicine Research Day. Columbia, MO. April 2017.
20. **Poster presentation:** Selective Vulnerability to Neuromuscular Junction Defects in Different Muscles of SMARD1 Mice. 2017 MDA Scientific Conference. Arlington, VA. March 2017.
21. **Poster presentation:** Mimicking Constitutive Phosphorylation of the Neurofilament Medium KSP Repeats Results in Decreased Motor Nerve Conduction Velocity without Alterations in Nerve Structure. Intermediate Filaments Gordon Research Conference. Lewiston, Maine. June 2012.
22. **Poster presentation:** Anatomical Differences in the Developmental Stages of *Populus trichocarpa.* Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference. Dallas, TX. October 2009.

23. **Poster presentation:** Organic-Inorganic Framework Compounds. Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference. Tampa, FL. October 2006

REFEREES

Dr. Seth S. Margolis, PhD, Associate Professor (Postdoctoral Mentor)
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Dr. Michael Caterina, MD, PhD, Professor (Co-mentor/Collaborator)
Solomon H. Snyder Professor of Neurosurgery
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Dr. Christian L. Lorson, PhD, Professor (Former Postdoctoral Mentor)
Department of Veterinary Pathobiology
Associate Vice Chancellor for Research, College of Veterinary Medicine,
Associate Dean for Research and Graduate Studies, College of Veterinary Medicine
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Dr. Ahmet Hoke, MD, PhD, FRCPC, Professor (Collaborator)
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