

Anastacia M. Garcia, PhD

Curriculum Vitae 08/20/2021

Biographical Sketch

Assistant Professor

School of Medicine | Department of Pediatrics | Section of Cardiology

University of Colorado Anschutz Medical Campus, Children's Hospital Colorado

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Aurora, CO 80045

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I am a current KL2 scholar and Assistant Professor in the Department of Pediatrics, Section of Cardiology at the University of Colorado Anschutz Medical Campus, Children's Hospital Colorado. The focus of my translational science lab is to better understand the adaptations governing pathological myocardial remodeling and the progression to heart failure in pediatric patients with severe congenital heart disease, with the overall goal of identifying efficacious therapies and improving outcomes in this vulnerable group. We plan to accomplish this by: 1) better understanding the molecular and metabolic adaptations of pediatric heart failure, 2) identifying novel therapeutic targets, 3) developing appropriate animal and cell-based models of pathological remodeling, 4) developing diagnostic and prognostic biomarkers, and 5) integrating multi-omic and functional data into a biologically and clinically relevant context. Through our publications we have demonstrated that the failing single ventricle (SV) heart is typified by unique molecular, genetic, and functional changes when compared to the adult or pediatric biventricular failing heart. By using a combination of human cardiac and blood samples in combination with cell and animal models, we have evaluated both the basic biology of SV and interventions that have the potential to slow the decline in myocardial function. Currently, a major focus of the lab is to elucidate the molecular mechanisms involved in the modulation of cardiac energy metabolism in SV. This work will be important for the identification and development of drug therapies that improve cardiac function and enhance transplant-free survival in this population. Additionally, we are actively investigating the use of peripheral blood mononuclear cells (PBMCs) as non-invasive molecular biomarkers in several distinct but complimentary capacities: 1) as a surrogate of the myocardial metabolic environment and presence of HF, and 2) as a readout of inflammatory and immune remodeling, for risk stratification and prediction of clinical outcomes, and 3) as a platform to evaluate therapeutic efficacy of novel drug targets to treat SV pathology.

Education and Training

2005 – 2007	University of Texas at El Paso Bachelor of Science (started), Biology	El Paso, TX
2007 – 2009	University of Texas at Arlington Bachelor of Science (completed), Biology/Microbiology	Arlington, TX
2009 – 2015	University of North Texas Doctor of Philosophy, Biology/Genetics	Denton, TX
2015 – 2019	University of Colorado Denver, Children's Hospital Colorado Postdoctoral Fellowship, Pediatric Cardiology	Aurora, CO

Academic Appointments

2009 – 2014	Graduate Instructor/Lab Demonstrator, Genetics University of North Texas	Denton, TX
2019 – Present	Assistant Professor, Department of Pediatrics, Section of Cardiology University of Colorado Denver, Children's Hospital Colorado	Aurora, CO

Other Professional Positions

2008 - 2009 Intern/Scientist I, cell biology & biochemistry,
Healthpoint, LTD.

Honors and Awards

2010, 2011, 2013 Awardee, Student travel award,
Society for the Advancement of Chicanos, Hispanics, and Native Americans in Science

2010, 2011, 2013 Awardee, Graduate student support grant, College of Arts & Sciences,
University of North Texas

2011, 2013 Awardee, USC scholarship for continuing students,
University of North Texas

2012, 2013 Awardee, Poster/platform travel award,
Federation of American Societies for Experimental Biology Minority Access to Research
Careers

2014 Awardee, 1st place poster presentation, Biology Graduate Student Research Day,
University of North Texas

2014 Awardee, Graduate student travel grant, Toulouse Graduate School,
University of North Texas

2014 – 2015 Awardee, Toulouse dissertation fellowship, Toulouse Graduate School,
University of North Texas

2014 Nominee, Outstanding teaching assistant, Department of Biological Sciences,
University of North Texas

2015 Awardee, TACSM membership poster award,
Texas Chapter of American College of Sports Medicine

2015 Awardee, Outstanding graduate student platform presentation, 42nd Annual meeting,
Texas Genetics Society

2016 Awardee, BCVS Minority Travel Award,
American Heart Association

2017 Awardee, Early Career Investigator Travel Award,
International Society for Heart Research North American Section

2018 Awardee, ECI Travel Award,
International Society for Heart Research North American Section

2017 Postdoctoral Fellowship Award 17POST33661109, AHA – *Declined to accept NIH
Diversity Supplement

2017-2019 Loan Repayment Program Award, NIH-NHLBI

2018 Early Career Investigator Travel Award, ISHR-NAS

2019-2021 Loan Repayment Program Award Renewal, NIH-NHLBI

2021-2023 Loan Repayment Program Award Second Renewal, NIH-NHLBI

Membership in Professional Organizations

2009 – Current SACNAS, student/trainee member

2010 – 2016 Genetics Society of America, student member

2015 – Current American Heart Association, trainee member (BCVS, CVDY)

2017 – Current International Society for Heart Failure Research, early career investigator

Committee and Service Responsibilities

University of North Texas (Graduate School):

- 2010 – 2011 Vice President and Founding member, University of North Texas SACNAS Chapter
University of North Texas
- 2011 – 2013 President, University of North Texas SACNAS Chapter
University of North Texas
- 2013 – 2014 Vice President of Administration & Finance, Graduate Student Council,
University of North Texas

University of Colorado Denver:

- 2017 – 2019 Departmental Representative, Postdoctoral Association,
University of Colorado Denver

National:

- 2020 – 2021 Conference local organizer, Early Career Investigator Committee,
International Society for Heart Research North American Section

Review and Referee Work

- 2017 – 2020 Conference abstract reviewer, International Society of Heart Research
- 2020 – Present Junior Reviewer, Journal of Molecular and Cellular Cardiology
- 2020 – Present Pre-K study section grant reviewer,
University of Colorado Denver, Colorado Clinical and Translational Sciences Institute
- 2021 – Present Child and Maternal Health Pilot Award reviewer,
University of Colorado Denver, Colorado Clinical and Translational Sciences Institute
- 2020 – Present Career Development Award- Cardiology Reviewer Committee Member,
American Heart Association
- Ad hoc reviewer: Journal of Molecular Sciences
American Journal of Physiology-Heart and Circulatory Physiology
Cells
Genes
Frontiers in Genetics

Invited Extramural Lectures, Presentations and Visiting Professorships

- 2011 Invited speaker, Oral Abstract Presentation, “Dietary Carbohydrates Affect Oxygen-Deprivation Survival in *C. elegans*” SACNAS National Conference, San Diego, CA
- 2015 Invited speaker, Oral Abstract Presentation, “Glucose Induces Sensitivity to Oxygen Deprivation and Modulates Insulin/IGF-1 Signaling and Lipid Biosynthesis in *C. elegans*” 42nd Annual meeting, Texas Genetics Society, Dallas, TX
- 2016 Invited speaker, Oral Abstract Presentation, “Circulating Factors Contribute to PDE5-Mediated Pathological Myocardial Remodeling in Single Ventricle Congenital Heart Disease.” *Circulation*. 2016; 134:A19517 (Published abstract) American Heart Association Scientific Sessions, New Orleans, LA
- 2017 Invited speaker, Rapid Fire Oral Abstract Presentation, “Transcriptome Profiling and a Novel in vitro Model of Single Ventricle Congenital Heart Disease”. American Heart Association Scientific Sessions 2017, Anaheim, CA
- 2020 Invited speaker, Oral Abstract Presentation, “Multi-Omic and Functional Metabolic Analysis Identified Dysregulated Lipid and Mitochondrial Metabolism in the Pediatric Failing Single Ventricle Heart”, International Society of Heart Failure Research North American Section Meeting 2020, online

2020 Invited speaker, “Multi-Omic and Functional Analysis Identified Dysregulated Lipid and Mitochondrial Metabolism in the Pediatric Failing Single Ventricle Heart”, Additional Ventures, Single Ventricle Speaker Series Webinar, online

Teaching Record

Undergraduate Classroom Instruction:

2005-2007 Undergraduate Tutor (one-on-one instruction to high school students)
Department of Biological Sciences, University of Texas at El Paso

2013 BIOL 3451 Genetics (Class size, 132), Guest lecturer, “epigenetics”
Department of Biological Sciences, University of North Texas

Graduate Classroom Instruction:

2009-2014 BIOL 3451 Genetics Lab (Class size, 24), Graduate Teaching Assistant/Lab Demonstrator,
Department of Biological Sciences, University of North Texas

2021 IPHY 7800 Integrated Physiology (Class size, 8), Lecturer, “cellular metabolism and mitochondria”,
Integrated Physiology Graduate Program, University of Colorado Denver

Key Administrative Positions:

2020 – Present Course Co-director, Graduate Comprehensive Physiology (IPHY 7800), this is a new graduate-level 6-credit hour core physiology course. Together with co-director KC Woulfe, we designed the course curricula and syllabus, and recruited invited lecturers.
University of Colorado Denver, Graduate School, Integrative Physiology Program

Trainees and Mentees:

Trainee	Degree, Position	Program	[My] Role	Period	Project	Current Position
Phillip Zegelbone	MD, Cardiology Fellow	-	Primary Mentor	2020 - Current	Peripheral Mononuclear Cells as Biomarkers for Myocardial Mitochondrial Function in Single Ventricle Congenital Heart Disease Patients	Fellow, Pediatric Cardiology, Children’s Hospital Colorado, Aurora, CO
Hailey Chapman	Undergrad	Child Health Research Internship, Children’s Hospital Colorado	Laboratory Mentor	Summer 2019	Metabolic Remodeling in Single Ventricle Heart Disease	Undergraduate Student, University of British Columbia, Vancouver, BC
Joseph Wall	BS, Medical Student	Child Health Research Internship, Children’s	Laboratory Mentor	Summer 2018	Differential Gene Expression in Pediatric Heart Failure	Medical Student, New York Medical College, Valhalla, NY

		Hospital Colorado				
Emma Selner	Undergrad	Child Health Research Internship, Children's Hospital Colorado	Laboratory Mentor	Summer 2017	Single Ventricle Patient Sera Induces Cardiomyocyte Hypertrophy and Altered Gene Expression <i>in vitro</i>	Professional Research Assistant, St. Jude Children's Research Hospital, Memphis, TN
Jessica McPhaul	MD, Cardiology Fellow	-	Co-Mentor	2017-2020	Cardiolipin Remodeling in Single Ventricle Heart Disease	Fellow, Pediatric Cardiology, Children's Hospital Colorado, Aurora, CO
Iran Roman	Undergrad	HHMI Scholar	Laboratory Mentor	2013-2014	Glucose Induces Sensitivity to Oxygen Deprivation in <i>C.elegans</i>	PhD Student, Center for Computer Research in Music and Acoustics, Stanford University, Stanford, CA

Grant support

Current:

12/01/19 – 11/31/21	Principal Investigator (75% effort), KL2-TR002534. NIH/NCATS Colorado CTSI KL2 (K12) “Metabolic Remodeling in the Failing Pediatric Right Ventricle” Total Direct Costs: \$268,246
05/01/20 – 12/31/21	Principal Investigator (12.5% effort), UL1 TR002535. NIH/NCATS Colorado CTSI Child and Maternal Health Pilot Mentored Award “Peripheral Mononuclear Cells as Biomarkers for Myocardial Mitochondrial Function in Single Ventricle Congenital Heart Disease Patients” Total Direct Costs: \$30,000
08/01/20 – 07/31/22	Principal Investigator (12.5% effort), 25M9264. NIH/NIDDK NORC Pilot and Feasibility Program “Mechanistic Investigations of PDE5-Inhibitor Improved Myocardial Energetics in Congenital Heart Disease” Total Direct Costs: \$40,000
11/01/20 – 12/31/21	Principal Investigator (8.3% effort), NIH/NHLBI PRIDE CVD-CGE PRIDE Small Research Project (SRP) Award “Defining the Transcriptional Landscape in the Systemic Right Ventricle” Total Direct Costs: \$11,500
01/15/21 – 01/14/24	Principal Investigator (25% effort), Additional Ventures Single Ventricle Research Fund Award

“Peripheral Mononuclear Cells as Biomarkers for Myocardial Mitochondrial Function in Single Ventricle Congenital Heart Disease Patients”

Total Direct Costs: \$600,000

Completed:

10/15/19 – 12/14/19

Postdoctoral Fellow (100% effort), T32 HL007822-21, NIH/NHLBI

“Investigations in Pediatric Cardiovascular Disease”

Direct Costs: \$50,000

04/01/17 – 10/14/19

Supplement Recipient (100% effort), R01 HL126928-03S1 NIH/NHLBI

“Myocardial Effects of PDE5-inhibition in Single Ventricle Heart Disease”

Direct Costs: \$160,389

08/01/18 – 07/31/19

Principal Investigator (100 % effort), UL1TR001082. NIH/NCATS Colorado

CTSI Child and Maternal Health Mentored Pilot Award

“Myocardial Effects of Phosphodiesterase-5 in Single Ventricle Heart Disease”

Direct Costs: \$20,000

Bibliography

Papers in Peer-Reviewed Journals:

1. Shi L, Ermis R, **Garcia A**, Telgenhoff D, Aust D., “Degradation of Human Collagen Isoforms by Clostridium Collagenase and the Effects of Degradation Products on Cell Migration.” *International Wound Journal*, **2010** (PMID: 20529148)
2. **Garcia A.M.**, Ladage M.L., & Padilla, P.A., “Use of Time Lapse Microscopy to Visualize Anoxia-Induced Suspended Animation in *C. elegans* Embryos.” *Journal of Visual Experiments*, **2012** (PMID: 23242305)
3. Padilla P.A., **Garcia A.M.**, Ladage M.L., Toni, L.S., “*C. elegans*: An Old Genetic Model Can Learn New Epigenetic Tricks.” *Integrative and Comparative Biology*, **2014** (PMID: 24861810)
4. **Garcia A.M.**, Ladage M.L., Dumesnil D.R., Zaman K., Shulaev V., Azad R.K., Padilla P.A., “Glucose Induces Sensitivity to Oxygen Deprivation and Modulates Insulin/IGF-1 Signaling and Lipid Biosynthesis in *Caenorhabditis elegans*.” *Genetics*, **2015** (PMID: 25762526)
5. Ladage M.L., King S.D., Burks D.J., Quan D.L., **Garcia A.M.**, Azad R.K., Padilla P.A., “Glucose and Altered Ceramide Biosynthesis Mediate Oxygen Deprivation Sensitivity Through Novel Pathways Revealed by Transcriptome Analysis in *Caenorhabditis elegans*.” *G3 Genetics*, **2016** (PMID: 27507791)
6. Nakano S.J., Siomos A.K., **Garcia A.M.**, Nguyen H., SooHoo M., Galambos C., Nunley K., Stauffer B.L., Sucharov C.C., Miyamoto S.D., “Fibrosis-related Gene Expression in Single Ventricle Heart Disease.” *J. Pediatrics*, **2017** (PMID: 29050751)
7. Sucharov C.C., Miyamoto S.D., **Garcia A.M.**, “Circulating microRNAs as Biomarkers in Pediatric Heart Diseases”, *Progress in Pediatric Cardiology*, **2018** (<https://www.sciencedirect.com/science/article/pii/S1058981317300668>)
8. Toni LS*, **Garcia AM***, Jeffrey DA, Jiang X, Stauffer BL, Miyamoto SD, Sucharov CC., “Optimization of phenol-chloroform RNA extraction.” *MethodsX*, **2018** *Authors contributed equally (PMID: 29984193)
9. **Garcia A.M.**, Nakano S.J., Karimpour-Fard A., Nunley K., Blain-Nelson P., Stafford N.M., Stauffer B.L., Sucharov C.C., Miyamoto S.D., “Phosphodiesterase-5 is Elevated in Failing Single Ventricle Myocardium and Affects Cardiomyocyte Remodeling in vitro.” *Circulation Heart Failure*, **2018** (PMID: 30354365)

10. **Garcia AM***, Allawzi A*, Tatman P, Hernandez-Lagunas L, Swain K, Mouradian G, Bowler R, Karimpour-Fard A, Sucharov CC, Nozik-Grayck E., “R213G polymorphism in SOD3 protects against bleomycin-induced inflammation and attenuates induction of proinflammatory pathways.” *Physiological Genomics*, **2018** *Authors contributed equally (PMID: 30004839)
11. Nakano S.J., Walker J.S., Walker L.A., Li X., Du Y., Miyamoto S.D., Sucharov C.C., **Garcia A.M.**, Mitchell M.B., Ambardekar A.V., Stauffer B.L., “Increased Myocyte Calcium Sensitivity in End-Stage Pediatric Dilated Cardiomyopathy.”, *Am J Physiol Heart Circ Physiol.*, **2019** (PMID: 31625780)
12. **Garcia A.M.**, Beatty J.T., Nakano S.J., “Heart Failure in Single Ventricle Congenital Heart Disease: Physiologic and Molecular Considerations.” *Am J Physiol Heart Circ Physiol.*, **2020** (PMID: 32108525)
13. **Garcia A.M.***, McPhaul J.C.*, Sparagna G.S., Patel S., Sucharov C.C., Stauffer B.L., Miyamoto S.D., and Chatfield K.C., “Alteration of Cardiolipin Biosynthesis and Remodeling in Single Right Ventricle Congenital Heart Disease.” *Am J Physiol Heart Circ Physiol.*, **2020** *Authors contributed equally (PMID: 32056460)
14. Rubinstein J., Woo J.G., **Garcia A.M.**, Alsaied T., Li J., Lunde P.K., Moore R., Laasmaa M., Sammons A., Mays W.A., Miyamoto S.D., Louch W.E., Veldtman G., “Probenecid improves cardiac function in subjects with a Fontan circulation and augments cardiomyocyte calcium homeostasis.” *Pediatr. Cardiol.*, **2020** (PMID: 32770262)
15. Wall JB, **Garcia AM**, Jacobsen RM, Miyamoto SD, “Important Considerations in Pediatric Heart Failure.” *Current Cardiology Reports*, **2020** (PMID: 32910348)
16. Ohlstrom D., Hernandez-Lagunas L., **Garcia A.M.**, Allawzi A., Karimpour-Fard A., Carpenter T., Sucharov C.C., Nozik-Grayck E., “MicroRNA regulation post-bleomycin due to the R213G extracellular superoxide dismutase variant is predicted to suppress inflammatory and immune pathways.”, *Physiol Genomics*, **2020** (PMID: 32421439)
17. Jeffrey D.A., Pires Da Silva J., **Garcia A.M.**, Jiang X., Karimpour-Fard A., Toni L.S., Lanzicher T., Pena B., Miyano C.A., Nunley K., Sbaizero O., Taylor M.R., Miyamoto S.D., Stauffer B.L., and Sucharov C.C., “Serum Circulating Proteins From Pediatric Dilated Cardiomyopathy Patients Cause Pathologic Remodeling and Cardiomyocyte Stiffness.” *JCI Insight*, **2021** (PMID: 34383712)

Scientific Abstracts Published or Presented at Scientific Meetings:

1. Kiedaisch B., **Garcia T.**, Rolland E., Carson D., Aust D., “Development of an Epidermal Skin Equivalent in vitro Wound Model.” Combined Symposium on Advanced Wound Care and Wound Healing Society, Dallas, TX, 2009
2. Ermis R, **Garcia T.**, Telgenhoff D., Shi L., “Digestion Products Released from MMP Treated Small Intestine Submucosa Wound Matrix and Their Effect on Keratinocyte Migration.” Combined Symposium on Advanced Wound Care and Wound Healing Society, Dallas, TX, 2009
3. Hajeri V., Ladage M.L., **Garcia A.M.**, Padilla P.A., “Investigating the role CDK-1, nucleoporin NPP-16 and mitochondrial ETC proteins have in an anoxia-induced prophase checkpoint.” *Metabolism, Stress & Small RNA's in C. elegans*, Maddison, WI 2010
4. **Garcia A.M.**, Ladage M.L., Padilla P.A., “Genes that Affect Glucose-Fed C. elegans Exposed to Oxygen-Deprivation.” 19th International C. elegans Meeting, Los Angeles, CA 2013
5. **Garcia A.M.**, Stauffer B.L., Sucharov C.C., Miyamoto S.D., “Investigations of the Failing Single Ventricle: Role of Circulating Factors.” *Keystone Symposia: Exosomes/Microvesicles: Novel Mechanisms of Cell-Cell Communication*, Keystone, CO, 2016
6. **Garcia A.M.**, Nakano S.J., Karimpour-Fard A., Stauffer B.L., Sucharov C.C., and Miyamoto S.D., “Circulating Factors Contribute to PDE5-Mediated Pathological Myocardial Remodeling in Single Ventricle Congenital Heart Disease.” *International Society of Heart Failure Research – North American Section Meeting*, New Orleans, LA 2017

7. **Garcia A.M.**, Chatfield K.C., Sparagna G.C., Phillips E.K., Karimpour-Fard A., Stauffer B.L., Sucharov C.C., Miyamoto S.D., “Metabolic Gene Expression and Mitochondrial Function are Altered in the Failing Single Ventricle Myocardium.” American Heart Association Scientific Sessions, Chicago, IL 2018
8. **Garcia A.M.**, Chatfield K.C., Sparagna G.C., Phillips E.K., Karimpour-Fard A., Stauffer B.L., Sucharov C.C., Miyamoto S.D., “Metabolic Gene Expression and Mitochondrial Function are Altered in the Failing Single Ventricle Myocardium.” Keystone Symposia: Mitochondrial Biology in Heart and Skeletal Muscle, Keystone, CO 2019
9. **Garcia A.M.**, Sparagna G.C., Jeffrey D.A., Stauffer B.L., Sucharov C.C., Miyamoto S.D., “Alterations in Sphingolipid Composition in the Pediatric Failing Single Ventricle Contribute to Pathological Myocardial Remodeling and Mitochondrial Dysfunction.” Keystone Symposia: Lipidomics and Functional Metabolic Pathways in Disease, Steamboat Springs, CO 2019
10. **Garcia A.M.**, Sparagna G.C., Phillips E.K., Miyano C.A., Nunley K., Stauffer B.L., Sucharov C.C., Miyamoto S.D., “Reactive Oxygen Species Accumulation and Mitochondrial Dysfunction in Peripheral Blood Mononuclear Cells are Associated with Heart Failure in Patients with Single Ventricle Congenital Heart Disease.” American Heart Association Scientific Sessions, Philadelphia, PA 2019
11. **Garcia A.M.**, Miyano C.A., Joschner R., Stone M., Stauffer B.L., Sucharov C.C., Miyamoto S.D., “Sildenafil Improves Mitochondrial Function in Failing Single Ventricles”, American Heart Association Scientific Sessions, Dallas, TX (moved to online format) 2020
12. **Garcia A.M.**, Toni L.S., Sparagna G.C., Karimpour-Fard A., Miyano C.A., Jonscher R., Chapman H.L., Stauffer B.L., Sucharov C.C., and Miyamoto S.D., “Multi-Omic and Functional Metabolic Analysis Identified Dysregulated Lipid and Mitochondrial Metabolism in the Pediatric Failing Single Ventricle Heart”, International Society of Heart Failure Research – North American Section Meeting, Denver, CO (moved to online format) 2020