Name: Adriana Rodriguez

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Major Professor: Karen Downs

Degree Objective: Ph.D. Endocrinology and Reproductive Physiology (ERP)

Background: BS Biology (Mathematics Minor), University of Houston, TX

Current Research Project:
The chorio-allantoic placenta forms a vital vascular bridge between the mother and fetus, providing a means for fetal-maternal exchange of nutrients, gasses and wastes and ensuring fetal survival and development. This bridge is initiated by the precursor of the umbilical cord, called the allantois, which emerges from the posterior end of the fetus, and grows toward the chorion, where maternal blood infiltrates. As the allantois elongates, it vascularizes. At its distal end, the allantoic vasculature spreads over and fuses with the chorion, while at its proximal end, it fuses with the fetal and yolk sac vasculatures at a fixed point within the base of the allantois, provisionally named the "Vessel of Confluence" (VOC), creating a vascular continuum throughout the conceptus.

As disruptions in blood flow throughout the conceptus can have severe consequences to fetal heath and survival, loss or impairment of the VOC during development could be an underlying cause of a variety of umbilical-associated fetal birth defects and early pregnancy losses. However, while the distal end of the allantois has been fairly well studied, i.e. the mechanism by which the allantois elongates and connects to the chorionic component of the placenta, little is known about the VOC and how the fetal-umbilical connection is established at the allantois's proximal end.

The goal of my graduate thesis is to uncover the cellular and molecular mechanisms that govern the biology of the VOC. Specifically, I will test the hypothesis that the three major, evolutionarily conserved, signaling pathways (Hedgehog, Fibroblast Growth Factors "FGFs" and heparan sulfate proteoglycans "HSPGs") that are found at the presumptive site of VOC formation cooperate to establish and build the fetal-umbilical connection by regulating the origin, size, placement, and/or proliferation and differentiation of the VOC. Results from this research proposal will provide a depth of insight into molecular mechanisms involved in the regulation of vasculogenesis as a whole and the fetal-umbilical connection, in particular.

Honors:
Winner of the 2012 Science & Medicine Graduate Research Scholars (SciMed GRS) Annual Poster Session Competition
Advancing Hispanic Excellence in Technology, Engineering, Math, and Science (AHETEMS) Travel Grant Award 2009

Grants Received:

T32 ERP Program Trainee Award 2015-2016

R25 Training, Education, And Mentoring in Science (TEAM-Science) Award 2013-2015
Advanced Opportunities Fellowship (AOF) Award 2010-2011

Publications:

- Lalit, P. A., **Rodriguez, A. M.**, Downs, K. M., and Kamp, T. J. (2017). Generation of expandable, multipotent induced cardiac progenitor cells from mouse fibroblasts and potency testing in *ex vivo* embryos. Nature Protocols, in press.

- Wolfe, A. D., **Rodriguez, A. M.** and Downs, K. M. (2017) Distinct STELLA cell populations at the fetal-placental interface support roles in mesendodermal differentiation in the mouse gastrula. Dev. Biol., in revision.

- **Rodriguez, A. M.**, Jin, D. X., Mikedis, M. M., Wolfe, A. D., Hashmi, M., Wierenga, Viebahn, C., and Downs, K. M. (2017) Brachyury drives formation of a distinct vascular branchpoint critical for fetal-placental arterial union and patterning in the mouse. Submitted.

National Presentations:

- Poster Presentation: **Rodriguez A**, Dexter X, Mikedis M, Downs K (2014) The role of FGF and HSPG signaling in the establishment of the fetal-umbilical vascular connection. Fibroblast Growth Factors in Development and Disease Gordon Research Seminar (GRS). Ventura, CA.

- Poster Presentation: **Rodriguez A**, Dexter X, Mikedis M, Downs K (2014) The role of FGF and HSPG signaling in the establishment of the fetal-umbilical vascular connection. Fibroblast Growth Factors in Development and Disease Gordon Research Conference (GRC). Ventura, CA.

- Poster Presentation: **Rodriguez A**, Palecek S, Das A (2010) Improvement of a Mathematical Model for the Canonical Wnt Pathway. *Committee on Institutional Cooperation (CIC) Summer Research Opportunities Program Conference*. (Ohio State University).

Other Presentations:

- Oral Presentation: **Rodriguez A** (2015) Cellular and molecular mechanisms that build the fetal-umbilical vascular connection. *Spring 2015 ERP Seminar*. (University of Wisconsin-Madison).

- Oral Presentation: **Rodriguez A**, Dexter X, Mikedis M, Wierenga L, Downs K (2015) The role of FGFR1 in establishing the vascular confluence between an amniote and its environment. *EMBO Workshop: Embryonic-Extraembryonic Interfaces*. Göttingen, Germany.

- Poster Presentation: **Rodriguez A**, Dexter X, Mikedis M, Wierenga L, Downs K (2015) The role of FGFR1 in establishing the vascular confluence between an amniote and its environment. *EMBO Workshop: Embryonic-Extraembryonic Interfaces*. Göttingen, Germany.

- Poster Presentation: **Rodriguez A**, Dexter X, Downs K (2014) The role of Hedgehog signaling in the establishment of the fetal-maternal vasculature. *SciMed GRS 2014 Annual Poster Session*. (University of Wisconsin-Madison).

- Guest Oral Presentation: **Rodriguez A** (2014) Establishing the fetal-umbilical vascular connection. *Neonatology Seminar Club.* (University of Wisconsin-Madison).

- Oral Presentation: **Rodriguez A** (2014) Establishing the fetal-umbilical vascular connection. *Fall 2014 ERP Seminar*. (University of Wisconsin-Madison).

- Selected Abstract for Oral Presentation: **Rodriguez A** (2013) The role of FGF signaling in the establishment of the fetal-maternal vasculature. *ERP 2013 Annual Symposium*. (University of Wisconsin-Madison).

- Oral Presentation: **Rodriguez A** (2013) Establishing the fetal-umbilical vascular connection. *Spring 2013 ERP Seminar*. (University of Wisconsin-Madison).

- Poster Presentation: **Rodriguez A**, Dexter X, Downs K (2013) The role of FGF signaling in the establishment of the fetal-maternal vasculature. *SciMed GRS 2013 Annual Poster Session*. (University of Wisconsin-Madison).

- Poster Presentation: **Rodriguez A**, Dexter X, Downs K (2013) The role of FGF signaling in the establishment of the fetal-maternal vasculature. Discovery Challenge Poster Session 2013. (University of Wisconsin-Madison).

- Poster Presentation: **Rodriguez A**, Dexter X, Downs K (2012) The role of FGF signaling in the establishment of the fetal-maternal vasculature. *SciMed GRS 2012 Annual Poster Session*. (University of Wisconsin-Madison).

- Oral Presentation: **Rodriguez A**, Palecek S, Das A (2010) Improvement of a Mathematical Model for the Canonical Wnt Pathway*. IBS-SRP 2010 Final Symposium*. (University of Wisconsin-Madison).

ERP Service:

ERP Recruitment Advisory Committee	2012-2013
ERP Focus Group Committee	2011-2012
ERP Symposium Committee	2011-2016