BIOGRAPHICAL SKETCH
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NAME: Ryckman, Kelli Kae

eRA COMMONS USER NAME (credential, e.g., agency login): KRYCKMAN

POSITION TITLE: Associate Professor of Pediatrics

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Iowa State University	BS	12/2003	Biochemistry
Vanderbilt University	MS	08/2008	Applied Statistics
Vanderbilt University	PhD	05/2009	Genetics
University of Iowa	NIH training grant	08/2010	Pediatrics

A. PERSONAL STATEMENT
My research is focused on the epidemiologic, genetic and metabolic pathways that contribute to preterm birth. Specifically, my laboratory has access to a large data and specimen repository for studying preterm birth and complications of preterm birth, including access to linked records of birth, hospital discharge and newborn screening measurements for over 3 million births in California. My research has applied a variety of statistical methodologies including the use of genetic risk scores and meta-analysis for analyzing metabolic conditions of pregnancy such as preeclampsia and gestational diabetes. I have established a successful research program that includes several national and international data sources, a large repository of biologic specimens and funding to support several students and staff. I now direct the Iowa Perinatal Health Research Collaborative (IPHRC) an initiative to leverage population and hospital-level data on Iowa births to identify epidemiological and biological risk factors for adverse maternal-child health outcomes. The IPHRC includes a 10-member patient advisory board, whom advise and inform on all aspects of our research.

B. POSITIONS AND HONORS

Positions and Employment
2003–2004	Research Technician, BioForce Nanosciences, Ames, IA
2009–2011	Postdoctoral Research Fellow, Department of Pediatrics, University of Iowa, Iowa City, IA
2011–2012	Associate Research Scientist, Department of Pediatrics, University of Iowa, Iowa City, IA
2011–2012	Assistant Research Scientist, Department of Pediatrics, University of Iowa, Iowa City, IA
2012–2016	Assistant Professor of Epidemiology, University of Iowa, Iowa City, IA
2014–2016	Assistant Professor of Pediatrics, University of Iowa, Iowa City, IA
2016-present	Associate Professor of Epidemiology and Pediatrics, University of Iowa, Iowa City, IA

Other Experience and Professional Memberships
2005–	Member, American Society of Human Genetics
2016–	Society of Epidemiologic Research
2016–	Society for Pediatric Research

Honors

C. Contribution to Science

1. My early publications during my graduate program focused on the genetics and epidemiology of reproductive disorders. Primarily, my research involved detecting genetic associations in inflammation-infection related genes with cervical cytokine concentrations. These publications led to a greater understanding of bacterial vaginosis, a serious and prevalent disorder of the lower genital tract associated with adverse pregnancy outcomes. Additionally, we demonstrated that immunological differences, driven by genetic factors, may partially explain the higher prevalence of bacterial vaginosis in African American women. I served as the primary data analyst and author on all of these studies under the supervision of my graduate student mentor Dr. Scott Williams.

    a. Ryckman KK, Williams SM, Krohn MA, Simhan HN. Racial differences in cervical cytokine concentrations between pregnant women with and without bacterial vaginosis. J Reprod Immunol. 2008 Jul;78(2):166-71. PubMed PMID: 18336917; PubMed Central PMCID: PMC2518392.

    b. Ryckman KK, Simhan HN, Krohn MA, Williams SM. Cervical cytokine network patterns during pregnancy: the role of bacterial vaginosis and geographic ancestry. J Reprod Immunol. 2009 Jan;79(2):174-82. PubMed PMID: 19250684; PubMed Central PMCID: PMC2688465.

    c. Ryckman KK, Simhan HN, Krohn MA, Williams SM. Predicting risk of bacterial vaginosis: the role of race, smoking and corticotropin-releasing hormone-related genes. Mol Hum Reprod. 2009 Feb;15(2):131-7. PubMed PMID: 19131402; PubMed Central PMCID: PMC2734163.

    d. Ryckman KK, Williams SM, Krohn MA, Simhan HN. Genetic association of Toll-like receptor 4 with cervical cytokine concentrations during pregnancy. Genes Immun. 2009 Oct;10(7):636-40. PubMed PMID: 19554026; PubMed Central PMCID: PMC3164507.

2. The primary focus of my postdoctoral work in Dr. Jeff Murray's laboratory was on the genetic and metabolic contributions to pregnancy complications including preterm birth, preeclampsia, gestational diabetes, and low birth weight. I have continued this area of focus as an independent researcher and expanded the focus to also examining the associations between being born preterm and/or low birth weight and the impact on chronic disease later in life. This research has led to several key publications, including two meta-analyses identifying lipid metabolism as a significant contributor to preeclampsia and gestational diabetes and several publications on the association between low birth weight and chronic disease. Additionally, these studies demonstrate that genetic factors play a strong role in preterm birth, preeclampsia and the risk of delivering an infant of low birth weight.

    a. Ryckman KK, Feenstra B, Shaffer JR, Bream EN, Geller F, Feingold E, Weeks DE, Gadow E, Cosentino V, Saleme C, Simhan HN, Merrill D, Fong CT, Busch T, Berends SK, Comas B, Camelo JL, Boyd H, Laurie CC, Crosslin D, Zhang Q, Doheny KF, Pugh E, Melbye M, Marazita ML, Dagle JM, Murray JC. Replication of a genome-wide association study of birth weight in preterm neonates. J Pediatr. 2012 Jan;160(1):19-24.e4. PubMed PMID: 21885063; PubMed Central PMCID: PMC3237813.

    b. Spracklen CN, Smith CJ, Saftlas AF, Robinson JG, Ryckman KK. Maternal hyperlipidemia and the risk of preeclampsia: a meta-analysis. Am J Epidemiol. 2014 Aug;180(4):346-58. PubMed PMID: 24989239; PubMed Central PMCID: PMC4565654.

    c. Ryckman KK, Rillamas-Sun E, Spracklen CN, Wallace RB, Garcia L, Tylavsky FA, Howard BV, Liu S, Song Y, LeBlanc ES, White MV, Parikh NI, Robinson JG. Ethnic differences in the relationship between birth weight and type 2 diabetes mellitus in postmenopausal women. Diabetes Metab. 2014 Nov;40(5):379-85. PubMed PMID: 24751988; PubMed Central PMCID: PMC4638122.

    d. Smith CJ, Saftlas AF, Spracklen CN, Triche EW, Bjonnes A, Keating B, Saxena R, Breheny PJ, Dewan AT, Robinson JG, Hoh J, Ryckman KK. Genetic risk score for essential hypertension and risk of preeclampsia. Am J Hypertens. 2016 Jan;29(1):17-24. PubMed PMID: 26002928; PubMed Central PMCID: PMC4692983.

3. One of my primary focuses as an independent investigator is on understanding newborn screening profiles and their relationship to neonatal and childhood disease. To explore this research area I have worked with multiple State Departments of Health, including the Iowa Neonatal Metabolic Screening Program. Specifically, this work has led to the understanding that newborn screening profiles in preterm neonates can aid in the prediction of gestational age at birth and common complications of prematurity. We have shown from our work that amino acid levels are elevated in preterm neonates and in particular in those who develop respiratory distress syndrome and patent ductus arteriosus. I have served as the principal investigator on these studies.
   a. Ryckman KK, Cook DE, Berberich SL, Shchelochkov OA, Berends SK, Busch T, Dagle JM, Murray JC. Replication of clinical associations with 17-hydroxyprogesterone in preterm newborns. J Pediatr Endocrinol Metab. 2012;25(3-4):301-5. PubMed PMID: 22768660; PubMed Central PMCID: PMC3552557.
   b. Ryckman KK, Berberich SL, Shchelochkov OA, Cook DE, Murray JC. Clinical and environmental influences on metabolic biomarkers collected for newborn screening. Clin Biochem. 2013 Jan;46(1-2):133-8. PubMed PMID: 23010448; PubMed Central PMCID: PMC3534803.
   c. Ryckman KK, Dagle JM, Shchelochkov OA, Ehinger N, Poole SD, Berberich SL, Reese J, Murray JC. Association of amino acids with common complications of prematurity. Pediatr Res. 2013 Jun;73(6):700-5. PubMed PMID: 23481552; PubMed Central PMCID: PMC3660469.
   d. Ryckman KK, Berberich SL, Dagle JM. Predicting gestational age using neonatal metabolic markers. Am J Obstet Gynecol. 2016 Sep;214(4):515.e1-515.e13. PubMed PMID: 26645954; PubMed Central PMCID: PMC4808601.

4. My other primary focus is on identifying and understanding the relationships between maternal exposures and risk for preterm birth within large population-based cohorts. Specifically, I am focused on metabolic or immune related conditions that increase a woman's risk for PTB. We have a collection of studies using hospital discharge and birth certificate data from California that show dyslipidemia, rheumatoid arthritis and others are associated with an increased risk for preterm birth. We also we have begun to examine potential mediating effects that could explain some of the risk for PTB in these populations.
   a. Jelliffe-Pawlowski LL, Baer RJ, Blumenfeld YJ, Ryckman KK, O'Brodovich HM, Gould JB, Druzin ML, El-Sayed YY, Lyell DJ, Stevenson DK, Shaw GM, Currier RJ. Prediction of preterm birth with and without preeclampsia using mid-pregnancy immune and growth-related molecular factors and maternal characteristics. J Perinatology. 2018 Aug; 38(8):963-72. PubMed PMID: 29795450; PubMed Central PMCID: PMC6089890.
   b. Smith CJ, Baer RJ, Oltman SP, Breheny PJ, Bao W, Robinson JG, Dagle JM, Liang L, Feuer SK, Chambers CD, Jelliffe-Pawlowski LL, Ryckman KK. Maternal dyslipidemia and risk for preterm birth. PLoS One. 2018 Dec;13(12):e0209579. PubMed PMID: 30576377; PubMed Central PMCID: PMC6303099.
   c. Bandoli G, Jelliffe-Pawlowski LL, Feuer SK, Liang L, Oltman SP, Paynter R, Ross KM, Schetter CD, Ryckman KK, Chambers CD. Second trimester serum cortisol and preterm birth: an analysis by timing and subtype. J Perinatology. 2018. Aug; 38(8):973-81. PubMed PMID: 29795321; PubMed Central PMCID: PMC6092235.
   d. Stouse JL, Donovan BM, Fatima M, Fernandez-Ruiz R, Baer RJ, Nidey N, Smith CJ, Bandoli G, Paynter R, Parikh N, Jelliffe-Pawlowski LL, Ryckman KK, Singh N. The impact of autoimmune rheumatic diseases on birth outcomes: A population-based study. RMD Open. 2019, in press.

Complete List of Published Work in My Bibliography:
http://www.ncbi.nlm.nih.gov/myncbi/kelli.ryckman.1/bibliography/40706110/public/?sort=date&direction=ascending

D. RESEARCH SUPPORT
Relevant Research Support
University of California, San Francisco (UCSF123218) Dr. Laura Jelliffe-Pawlowski (PI) 11/01/15-12/31/19
Title: Gestational Dating at Birth by Metabolic Profile: Testing and Adaptation in African Settings and Added Benefits of Test
The major goal of this study is to validate a metabolic gestational dating algorithm based on metabolite

measures at birth in two African settings (in Uganda and Malawi) and to build and test related mortality and morbidity metrics (co-funding with the Bill and Melina Gates Foundation). Role: Co-I (PI of subcontract)

University of California, San Francisco (UCSF7027075)   Dr. Larry Rand (PI)   06/01/2016-05/30/20
Donation to UCSF by Mark and Lynn Benioff
Title: UCSF Preterm Birth Initiative
The major goal of this initiative is to conduct transdisciplinary cell to society investigations of preterm birth and work to reduce incidence and disparities in target locations. This grant does not overlap with the current proposal.
Role: Co-I (PI of subcontract)

Bill and Melinda Gates Foundation (OPP1134783)   Dr. Kelli Ryckman (PI)   10/01/16-12/30/19
Title: Estimating gestational age using metabolic biomarkers measured on cord and newborn blood specimens.
The goal of this project is to develop algorithms for gestational age prediction at birth using a diverse set of samples from sites across the United States and in India.
Role: PI

NCI P30 CA086862-18S6   Dr. George Weiner (PI)   09/01/20-08/31/19
Title: Pregnancy outcomes in cancer survivors.
This project is a cancer center supported supplement that examines pregnancy outcomes in cancer survivors and the impact on neonatal metabolism.
Role: PI of the one-year supplement

Completed Research Support
K99/R00 HD065786   Dr. Kelli Ryckman (PI)   08/20/10-01/31/17
Title: Integrated Genomic and Metabolomic Profiles in Newborn Infants
This proposal investigates the genetic contribution to metabolic profiles in newborns. My role as PI is to oversee data collection and laboratory analysis, to supervise personnel and to participate in manuscript writing.
Role: PI

March of Dimes (#21-FY13-19)   Dr. John Dagle (PI)   03/01/07-02/28/18
Title: A Population, Genomic and Environmental Variable Approach to Prematurity
This proposal studies families and a large birth cohort (100,000 women and infants) in Denmark to investigate causes of prematurity. This project was started in 2007 under the directorship of Dr. Jeff Murray; in 2013 Dr. John Dagle assumed leadership as PI of the proposal. My role as co-I started in 2013 and is to oversee work on data analysis and to participate in manuscript writing.
Role: Co-I

March of Dimes (#22-FY14-543)   Dr. Louis Muglia (PI)   01/01/14-06/30/18
Subcontract with MOD Ohio Prematurity Research Center Collaborative Theme 2
This is a subcontract with Cincinnati's Children's Hospital Medical Center (CCHMC) to provide phenotype and genotype data for ongoing/future studies of preterm birth with the MOD center and provide input on data analysis and interpretation.
Role: Co-I (PI of subcontract)

R21 HD087864   Dr. Kelli Ryckman (co-PI)   04/01/16-03/31/19
Title: Newborn Metabolic Screening for Prediction of Childhood Respiratory Phenotypes
This project is centered on identifying early metabolic contributors to infant and childhood respiratory conditions including asthma. My role is to coordinate and conduct all aspects of the research with the co-PI at Vanderbilt University.
Role: co-PI with Dr. Tina Hartert at Vanderbilt University