


# KRISTEN E. BOYLE, PHD

## CURRICULUM VITAE

Associate Professor  
University of Colorado School of Medicine  
Department of Pediatrics, Section of Nutrition

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## RESEARCH INTERESTS

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*Cellular metabolism, epigenetics, and molecular biology:*

- Mechanisms for maternal obesity influence on offspring metabolic disease risk using a human umbilical cord-derived mesenchymal stem cell model
- Role of oxidative stress in metabolism
- Epigenetic regulation of cellular metabolism and development of metabolic disease

## EDUCATION

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- 1996-2001      *University of Massachusetts, Amherst, MA*  
**Bachelor of Science in Exercise Science and Nutrition, *cum laude***  
Minor: English  
Interdisciplinary Honors Program
- 2002-2005      *Ohio University, Athens, OH*  
**Master of Science in Exercise Physiology**  
*Thesis:* Ghrelin reflects changes in body size, not energy availability
- 2005-2009      *East Carolina University, Greenville, NC*  
**Doctor of Philosophy in Bioenergetics**  
*Dissertation:* Metabolic inflexibility in skeletal muscle with obesity
- 2009-2012      *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Postdoctoral Fellowship**  
*Project:* Skeletal muscle mitochondrial capacity in obese and diabetic pregnant women

## ACADEMIC APPOINTMENTS

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- 2013-2019      *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Assistant Professor**  
School of Medicine, Department of Pediatrics, Section of Nutrition
- 2018-Present    *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Graduate Faculty Appointment**  
School of Medicine: Cell Biology, Stem Cells, and Development Program
- 2019-Present    *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Associate Professor**  
School of Medicine, Department of Pediatrics, Section of Nutrition

## HONORS AND AWARDS

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- 1996-1998      State of Connecticut Academic Scholarship
- 1996-2001      Commonwealth of Massachusetts Academic Scholarship
- 2001            Commonwealth Scholar, University of Massachusetts, Amherst
- 2003-2004      Department of Biological Sciences Travel Grant, Ohio University
- 2011-2013      National Institutes of Health Loan Repayment Program Recipient
- 2012            Seahorse Bioscience Travel Award Recipient
- 2013, 2016      University of Colorado Women's Health Research Day Poster Award  
*\*\*Awarded to top 5 abstract presentations of ~30*
- 2014-2016      National Institutes of Health Loan Repayment Program Recipient
- 2015            Young Investigator Travel Grant Award Recipient, American Diabetes Association  
*\*\*Awarded to junior scientist presenters of top abstracts*
- 2015            President's Oral Session Abstract Selection, American Diabetes Association  
*\*\*Top 8 abstracts of over 4,000*
- 2017            Nominated and accepted to the Perinatal Research Society, Full Member

## PROFESSIONAL MEMBERSHIP

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- 2003-2005      American College of Sports Medicine (ACSM)
- 2009-Present    American Society for Nutrition (ASN)
- 2013-Present    The Obesity Society (TOS)
- 2013-Present    American Diabetes Association (ADA)

- 2014-2015 The American Heart Association (AHA)  
2017-Present Perinatal Research Society (PRS)

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## SERVICE

- 2006-2007 *Graduate Student Organization, East Carolina University*  
**Vice President**  
Assisted in organizing graduate students for self-advocacy programs, fund raisers.
- 2013-2015 *Pediatric Nutrition Seminar Series*  
**Co-Chair/Chair**  
Assisted in coordinating speakers and speaking locations for lecture series sponsored by the Section of Nutrition in the Department of Pediatrics at the University of Colorado.
- 2013-Present *Center for Women's Health Research (CWHR)*  
**Junior Faculty Affiliate**  
I participate in fund-raising and community awareness events, representing the center. I present my research at the Annual Board Meeting and to affiliated lay audiences as opportunities arise. I have attended and participated in meetings with local members of the United States Congress to advocate for and advance the mission of the center.
- 2014-2019 *UCSOM Department of Pediatrics Junior Faculty Interest Group*  
**President: 2017-2019**  
**Member: 2014-2017**  
We plan and participate in quarterly events geared toward junior faculty training and development (e.g., promotions, grant management, wellness). We advocate for policy change at the department level for issues important to junior faculty (e.g., faculty recognition, paid family leave, faculty equity). We share responsibility for representation at Academic Affairs meetings and revision of Department of Pediatrics Faculty Handbook.
- 2015-Present *Gates Center for Regenerative Medicine*  
**Member**
- 2019-Present *Women's Reproductive Health Research K12 Career Development Award*  
**Member, Internal Advisory Committee**

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## ACADEMIC CERTIFICATIONS & CAREER DEVELOPMENT

- 2009-Present University of Colorado HIPPA Certification (online training/certification)

- 2011-2012 *Co-Mentor Training*, Colorado Clinical and Translational Sciences Institute (4 x 5 hr sessions). Participated as mentee with post-doctoral mentor.
- 2012-2014 *Responsible Conduct of Research Training*, University of Colorado School of Medicine (9 x 1 hr sessions)
- 2013-Present *Health Information Privacy and Security Training*, Collaborative Institution Training Initiative (CITI) Program (online training/certification)
- 2013-Present Junior Faculty Training Modules, University of Colorado Center for Women's Health Research (1-3 x 1 hr sessions per year)
- 2014-2015 *Women's Leadership Training*, Women in Medicine and Science, University of Colorado School of Medicine (4 x 5-8 hr sessions, 50 women selected/year)
- 2015 *Examining a Developmental Approach to Childhood Obesity: The Fetal and Early Childhood Years Workshop*, Institute of Medicine and National Research Council of the National Academies, Washington DC (2 x 8 hr sessions)
- 2016 *Nutrigenetics, Nutrigenomics, and Precision Medicine Short Course*, University of Carolina Nutrition and Obesity Research Center, Kannapolis, NC (4 x 8 hr sessions)

## **REVIEW & REFEREE**

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### *Grant Proposal Review*

- 2015-Present *Reviewer*, Colorado Clinical & Translational Sciences Institute Pre-K Review Program: Internal review and study section of NIH K award or similar grant mechanisms (3 cycles per year)
- 2017-Present *Ad Hoc Reviewer*, Colorado Clinical & Translational Sciences Institute K to R Transition Program: Internal review and study section of NIH R01 or similar grant mechanisms
- 2017-2018 *Reviewer*, American Association for the Advancement of Sciences (AAAS) Research Competitiveness Program: Supports and coordinates peer-review of proposals to U.S. and International grant organizations (1-2 cycles per year)
- 2018-Present *Reviewer*, Dr. Lorna Moore Launch Award, University of Colorado Anschutz Medical Campus
- 2018 *Reviewer*, Colorado Clinical & Translational Sciences Institute Child Maternal Health Pilot Award Program

- 2019-Present     *Reviewer*, Center for Women’s Health Research Junior Faculty Seed Grant Program, University of Colorado Anschutz Medical Campus
- 2019                *Reviewer*, University of Colorado Graduate School NRSA Mock Review Program, Internal review and study section of NIH F award or similar grant mechanisms
- 2020                *Member*, NIH NIDDK Special Emphasis Panel Review Committee
- 2020                *Reviewer*, University of Colorado Cancer Center – Nutrition Obesity Research Center Seed Grants, University of Colorado Anschutz Medical Campus

*Internship Application Review*

- 2017-Present     *Reviewer*, Children’s Hospital Colorado Child Health Research Internship: Review of >30 applications for 8-week summer research internship (1 cycle per year)

*Abstract Review*

- 2019-Present     *Reviewer*, American Society for Nutrition Annual Conference (Nutrition 2019)

*Manuscript Review*

Verified Peer Review Record at *Publons*: [publons.com/a/1337364/](https://publons.com/a/1337364/)

Ad-hoc Reviewer for:

Adipocyte  
American Journal of Obstetrics & Gynecology  
American Journal of Physiology  
Applied Physiology, Nutrition, and Metabolism  
Cell Reports  
Childhood Obesity  
Diabetes  
Epigenetics  
European Journal of Nutrition  
Experimental Physiology  
International Journal of Obesity  
International Journal of Sports Medicine  
Journal of Applied Physiology  
Journal of Clinical Investigation  
Molecular Endocrinology  
Pediatric Research  
Reproduction  
Scientific Reports  
Stem Cells  
Obesity

## INVITED LECTURES

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### *International*

1. Maternal Obesity and Offspring Adiposity: Clues from Umbilical Cord Mesenchymal Stem Cells. Obesity and Adipose Tissue Biology, Keystone Symposia, Banff, Alberta, Canada, February 2019.
2. Epigenetic Mechanisms for Altered Infant Metabolism with Maternal Obesity: Insights from Umbilical Cord Stem Cells. Perinatal Society of Australia & New Zealand Congress 2020. Sydney, Australia, April 2020. *\*\*Cancelled due to COVID-19*

### *National*

1. Maternal obesity and the fetal programming of disordered metabolism. The National Conference on Women's Health Research: Sex Differences Across the Lifespan, Colorado Springs, CO, September 2016.
2. Programming of Adiposity and Metabolism. Pediatric Academic Societies Meeting. San Francisco, CA, May 2017.
3. Umbilical Cord Mesenchymal Stem Cells: Programmed Risk? Aspen/Snowmass Perinatal Biology Meeting, Aspen, CO, August 2019.

### *Regional*

1. Skeletal Muscle Lipid Oxidation: Substrate Selection and Obesity, Metabolism Interest Group, University of Colorado Anschutz Medical Campus, March 2009.
2. Pediatric Obesity: From the Womb. Denver Dietetic Association, Denver, CO. February 2010.
3. Maternal Programming of Fetal Stem Cells: How Obesity in Pregnancy Imparts Disease Risk in the Next Generation. University of Missouri Nutrition and Exercise Physiology Seminar Series, Columbia, MO. March 2015.
4. Maternal Obesity Alters Fat Metabolism and DNA Methylation in Stem Cells from Human Infants. Building Better Babies Symposium. Aurora, CO, May 2017.
5. Maternal Obesity and the Epigenetic Regulation of Offspring Adiposity. Animal Reproduction & Biotechnology Laboratory Seminar Series. Colorado State University, Fort Collins, CO, November 2018.

6. Umbilical Cord Derived Mesenchymal Stem Cells Characterize Phenotypes of Infants Born to Mothers with Obesity. SCORE Seminar Series, University of Colorado Boulder, Boulder, CO. December 2019.
7. Maternal Obesity and Offspring Adiposity: Identifying Mechanisms for Obesity Risk Using Umbilical Cord-Derived Mesenchymal Stem Cells. Center for Children's Healthy Lifestyles & Nutrition Seminar Series, University of Kansas Medical Center. Virtual Seminar March 2020.

*Local*

1. Lipid Oxidation in Obesity: A Case for Metabolic Inflexibility. Diabetes and Obesity Research Seminar, East Carolina University, Greenville, NC. November 2007.
2. Measurement of Mitochondrial Function. Metabolism Interest Group Seminar, University of Colorado Anschutz Medical Campus, April 2010.
3. Metabolic Substrate Switching: Stories from Obese, Insulin Resistant, Skeletal Muscle Mitochondria. Metabolism and Diabetes Interest Group Seminar, University of Colorado Anschutz Medical Campus, September 2011.
4. Lipid Metabolism in Human Skeletal Muscle: Measuring Mitochondrial Function Using the Seahorse Metabolic Analyzer. Mucosal Inflammation Program, University of Colorado Anschutz Medical Campus, October 2012.
5. Maternal Programming of Fetal Stem Cells. Perinatal Research Conference, University of Colorado Anschutz Medical Campus, January 2013.
6. Maternal Programming of Fetal Stem Cells: How Obesity in Pregnancy Imparts Disease Risk in the Next Generation. Center for Women's Health Research Advisory Board Meeting, University of Colorado Anschutz Medical Campus, May 2013.
7. Maternal Obesity and Fetal Mesenchymal Stem Cell Differentiation. Pediatric Heart Lung Center, University of Colorado Anschutz Medical Campus, November 2014.
8. Maternal Programming of Fetal Stem Cells: How Obesity in Pregnancy Imparts Disease Risk in the Next Generation. Endocrine Research Conference, University of Colorado Anschutz Medical Campus, February 2015.
9. Maternal Programming of Fetal Stem Cells: How Obesity in Pregnancy Imparts Disease Risk in the Next Generation. LEAD Seminar Series, University of Colorado Anschutz Medical Campus, May 2015.
10. Mesenchymal Stem Cells: Clues for Understanding How Obesity in Pregnancy Impacts Offspring Adiposity. Pediatric Nutrition Seminar, University of Colorado Anschutz Medical Campus, June 2015.

11. Are Infants of Obese Mothers Programmed for Excess Adiposity and Metabolic Dysfunction?: A Mechanistic Approach. Endocrine Research Conference, University of Colorado Anschutz Medical Campus, September 2015.
12. Maternal Obesity and the Fetal Programming of Disordered Metabolism. Reproductive Sciences Seminar, University of Colorado Anschutz Medical Campus, October 2016.
13. Maternal Obesity Programs Deficits in Offspring Fatty Acid Oxidation. Perinatal-Neonatal Research Conference, University of Colorado Anschutz Medical Campus, November 2016.
14. Maternal Obesity and the Epigenetic Programming of Offspring Adiposity. Mucosal Inflammation Program, University of Colorado Anschutz Medical Campus, April 2017.
15. Maternal Obesity and Offspring Adipogenesis: Umbilical cord Mesenchymal Stem Cells. Maternal Fetal Medicine Research Series, University of Colorado Anschutz Medical Campus, November 2017.
16. Maternal Obesity and Offspring Adiposity. Basic & Translational Pediatric Research Seminar Series, University of Colorado Anschutz Medical Campus, January 2018.
17. Maternal Obesity and Offspring Fat Metabolism: Epigenetic Clues to Increased Obesity Risk. The Gates Center for Regenerative Medicine Seminar Series, University of Colorado Anschutz Medical Campus, March 2018.
18. Unravelling the Developmental Origins of Excess Adiposity: Umbilical Cord Mesenchymal Stem Cells. Cell Biology, Stem Cells, and Development Membership Seminar, University of Colorado Anschutz Medical Campus, May 2018.
19. Maternal Obesity and the Epigenetic Regulation of Offspring Adiposity. Perinatal-Neonatal Research Conference. University of Colorado Anschutz Medical Campus, November 2018.
20. Maternal Obesity and the Epigenetic Regulation of Offspring Adiposity. Integrated Physiology Seminar Series. University of Colorado Anschutz Medical Campus, December 2018.
21. MSC Metabolomics: Data Analysis for Deep Phenotyping. Exercise and Metabolism Meeting. University of Colorado Anschutz Medical Campus, January 2019.
22. Maternal Obesity: Pathways Leading to Offspring Obesity Risk. Barbara Davis Center Diabetes Day. University of Colorado Anschutz Medical Campus, March 2019.
23. What Makes a Phenotype: Maternal Obesity Induces Phenotypic Differences in Offspring MSCs. Department of Pediatrics Basic & Translational Research Seminar. University of Colorado Anschutz Medical Campus, March 2019.
24. Maternal Obesity and the Epigenetic Regulation of Offspring Obesity/Diabetes Risk. University of Colorado AMC Cells, Stem Cells, & Development Graduate Program Retreat. Breckenridge, CO. October 2019.



*Conference Abstracts – Oral Presentations*

1. **Boyle KE**, Thuma JR, and Loucks AB. Short-term effects of low energy availability on ghrelin reflect effects on body size, not leptin or insulin. 2003 American College of Sports Medicine 50<sup>th</sup> Annual Meeting, San Francisco, CA.
2. **Boyle KE**, Zheng D, Anderson EJ, Neuffer PD, and Houmard JA. Mitochondrial function is impaired in cultured myotubes from obese humans. International Biochemistry of Exercise Conference, University of Guelph, Ontario, Canada, June 2009.
3. **Boyle KE**, Hwang H, DeVente JM, Barbour L, Hernandez T, Bowen B, Zhengping Y, Mandarino LJ, and Friedman JE. Quantitative Proteomic Profile in Skeletal Muscle from Women with Gestational Diabetes Reveals Potential for Reduced Mitochondrial Function, 2010 American Diabetes Association 70<sup>th</sup> Scientific Sessions, Orlando, FL.
4. **Boyle KE**, Heerwagen MJ, and Friedman JE. Transgenic mice enriched for omega-3 fatty acids show improved skeletal muscle mitochondrial fuel switching in response to high-fat diet. August 2011, FASEB Summer Research Conference: Nutrient Control of Metabolism and Cell Signaling, Steamboat Springs, CO.
5. **Boyle KE**, Patinkin Z, Shapiro ALB, Dabelea D, Friedman JE. Human mesenchymal stem cells from offspring of obese mothers have increased adipogenesis and evidence for insulin resistance: The Healthy Start Study. *2015 American Diabetes Association 75<sup>th</sup> Scientific Sessions, Boston, MA. President's Oral Sessions.*
6. **Boyle KE**, Patinkin ZW, Shapiro ALB, Baker PR II, Dabelea D, Friedman JE. Disrupted GSK-3 $\beta$ / $\beta$ -catenin signaling induces greater adipogenesis in mesenchymal stem cells derived from babies of obese women: The Healthy Start BabyBUMP Project. *2015 The Obesity Society ObesityWeek 2015, Los Angeles, CA.*
7. **Boyle KE**, Patinkin ZW, Shapiro ALB, Vanderlinden L, Kechris K, Dabelea D, & Friedman JE. DNA hypermethylation of metabolic genes corresponds to lower fatty acid oxidation in mesenchymal stem cells from infants of obese mothers: The Healthy Start BabyBUMP Project. *2016 Obesity and Adipose Tissue Biology, Keystone Symposia, Banff, Alberta, Canada.*
8. **Boyle KE**, Patinkin ZW, Shapiro ALB, Yang I, Davidson B, Vanderlinden L, Kechris K, Dabelea D, & Friedman JE. DNA Hypermethylation Corresponds to Differences in Metabolism and Cellular Differentiation in Mesenchymal Stem Cells from Infants Born to Obese Mothers: The Healthy Start BabyBUMP Project. *2016 American Diabetes Association 76<sup>th</sup> Scientific Sessions, New Orleans, LA.*
9. Keleher M, Shubhangi S, Brown A, Duensing A, Dabelea D, and **Boyle KE**. Maternal Obesity Linked to Hypertrophy in Adipogenic Infant MSCs: The Healthy Start ECHO Cohort 2019 The Obesity Society ObesityWeek 2019, Las Vegas, NV.

## MEDIA

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1. TIME Magazine, "How Obese Moms May Wire Kids for Obesity". June 9, 2015.
2. The Denver Post, "Obese Moms Program Offspring for Obesity and Metabolic Disease". June 12, 2015.
3. CBS, Channel 4: "Diabetes Study Tracks New Moms, Children: Colorado Researchers Look at what Causes Obesity". This interview focused on our research identifying greater adipogenesis in mesenchymal stem cells from infants of obese versus normal weight mothers. 2015.

## TEACHING

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### *Course Instruction*

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| 2003-2005 | <i>Ohio University, Athens, OH</i><br><b>BIOS 3450: Human Physiology Laboratory (2.0 credit hours)</b><br>25-30 undergraduate students. Developed and implemented course structure including lecture, lab practicum, and exams. Assessed and administered all grades.   |
| 2003-2005 | <i>Ohio University, Athens, OH</i><br><b>BIOS 4150: Exercise Physiology Laboratory (2.0 credit hours)</b><br>25-30 undergraduate students. Developed and implemented course structure including lecture, lab practicum, and exams. Assessed and administered all grades.  |
| 2006      | <i>East Carolina University, Greenville, NC</i><br><b>EXSS 3805: Physiology of Exercise (3.0 credit hours)</b><br>60-70 undergraduate students. Developed and implemented course structure including lecture, syllabus and exams. Assessed and administered all grades.   |
| 2013-2016 | <i>University of Colorado Anschutz Medical Campus, Aurora, CO</i><br><b>IDPT 7823/7809: Biomedical Sciences Core Course III: Systems Biology of Energetics</b><br><i>Lecture Topic: Regulation of Cellular Metabolism.</i> 50-60 graduate students. Lecture topics included anabolic and catabolic metabolism and the control of these systems by substrate availability, energetic demand, and oxygen availability. Methodology for measuring metabolism in cells and tissues. Includes selection and instruction for guided readings, quiz and exam preparation/grading (1 x 2 hour lecture/year, research article discussion). |
| 2017      | <i>University of Colorado Anschutz Medical Campus, Aurora, CO</i><br><b>Journal Club Core Director: Pediatrics, Nutrition Section</b>   |

*Lecture Topic: Adipose Tissue Expansion and Metabolic Health.* 10-15 students, post-docs, and faculty members. Selected topic and developed lecture, led discussion (2 x 1 hr lectures).

- 2020 *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**CSDV 7606: Critical Analysis of Research in Cell Biology, Stem Cells and Development**  
*Lecture Topic: Cell/Environment Interplay.* 10 graduate students. With co-lead: selected topic, developed lecture, facilitated discussion, graded mock proposals (5 x 1.5 hr classes).

*Guest Lectures*

- 2003 *Ohio University, Athens, OH*  
**BIOS 4500/5500: Principles of Endocrinology**  
25-30 undergraduate and graduate students. Developed and taught lecture on topics including growth hormone and IGF function, hypothalamic-pituitary-IGF axis, normal and abnormal growth patterns, pathology and treatment
- 2010-2012 *Metro State University, Denver, CO*  
**NUT 3400: Nutrition and Weight Management**  
30-35 undergraduate students. Developed and taught lecture on topics including obesity in pregnancy, gestational diabetes and epigenetic modification (2 x 1 hr lectures/semester).
- 2011 *Colorado School of Public Health MPH Program, Aurora, CO*  
**CBHS 6623: Nutrition in Global Community**  
20-25 graduate students. Developed and taught lecture on topics including obesity in pregnancy, gestational diabetes and epigenetic modification.
- 2015 *Colorado State University, Fort Collins, CO*  
**FSHN 750: Nutrition Pathophysiology**  
25-30 graduate students. Developed and taught lecture on topics including mechanisms of metabolic fetal programming and epigenetics.
- 2015, 2019 *University of Colorado Graduate School, Aurora, CO*  
**RSPC 7801: Molecular Mechanisms of Reproductive Endocrinology and Metabolism**  
10 graduate students. Developed and taught lecture on topics including lipid metabolism in reproduction and fetal programming.

*Seminar Development/Retreat Planning*

- 2014 *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Assisted: Respite/Wellness Seminar (1 hr seminar)**  
25-30 junior faculty members. Hosted by the Department of Pediatrics Junior Faculty Interest Group. Developed format, invited expert speaker.
- 2016 *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Assisted: Bi-Annual Zoo Retreat (half-day retreat)**  
40-50 junior faculty members. Hosted by the Department of Pediatrics Junior Faculty Interest Group. Developed format, invited speakers, hosted event.

Topics included promotion readiness, lab and personnel management, work-life balance, and time management.

- 2017 *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Co-Lead: How to Network (1 hr panel discussion)**  
25-30 junior faculty members. Hosted by the Department of Pediatrics Junior Faculty Interest Group. Developed format, invited expert panel members, facilitated discussion.
- 2018 *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Co-Lead: Annual Faculty Retreat (full-day retreat)**  
25 faculty members. Hosted by the Department of Pediatrics, Section of Nutrition. Developed format, invited speakers, facilitated catering, hosted event. The theme was “Team Science”, with outside speakers, panel discussion, and team building events focused on this topic. Fellows and faculty presented research.
- 2018 *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Co-Lead: Research Finance 101 (1 hr seminar)**  
30-40 junior faculty members. A joint event hosted by the Department of Pediatrics Junior Faculty and PhD Faculty Interest Groups. Developed format, invited speakers, hosted event. Topics included budgeting for grants, managing finances post-award, and a panel discussion with local research, grants management, and center director experts.
- 2018 *University of Colorado Anschutz Medical Campus, Aurora, CO*  
**Co-Lead: Bi-Annual Zoo Retreat (half-day retreat)**  
40-50 junior faculty members. Hosted by the Department of Pediatrics Junior Faculty Interest Group. Developed format, invited speakers, hosted event. Topics Included promotion and tenure, wellness, and lab management.

## **TRAINING & MENTORING**

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### *Postdoctoral Fellows*

2019-2021

**Lauren Gyllenhammer, PhD, University of California, Irvine**  
Lauren is a postdoc at University of California Irvine who is funded on a K99/R00. Lauren researches maternal stress during pregnancy and the impact on offspring body composition. I will mentor Lauren as she transitions into her faculty position using the umbilical cord stem cell model we use in our lab.

*Role:* Cell Culture & Metabolism Mentor

*Project:* Synergistic effect of maternal insulin-resistance and cortisol in pregnancy on fetal programming of child mitochondrial function and obesity risk

2017-2019

**Nicholas Broskey, PhD, Pennington Biomedical Research Center**

Nick is a post-doctoral fellow at the Pennington Biomedical Research Center under the primary mentorship of Leanne Redman, PhD. I have been mentoring Nick on career development and mesenchymal stem cell differentiation and metabolism by phone and in person since 2017. Nick will visit my lab in fall 2018 to learn hands-on techniques unique to my lab. For this role I am listed as a collaborator on Nick's recent American Diabetes Association Pathway Accelerator grant application (highly competitive, high risk/high reward), which will fast-track his transition to junior faculty.

*Role:* Cell Culture & Metabolism Mentor

*Project:* Intergenerational inheritance of Type 2 diabetes: How exercise in pregnancy affects infant metabolism in mothers at risk for developing diabetes

*Mentee Accomplishments:*

- Received a Louisiana NORC Pilot award to complete his post-doctoral research project in 11/2017
- Submitted an American Diabetes Association Pathway Accelerator grant application in July 2018.
- Currently an Assistant Professor at East Carolina University

2017-2019

**Rebecca Scalzo, PhD, University of Colorado School of Medicine**

Becky is a post-doctoral fellow at the University of Colorado under the primary mentorship of Jane Reusch, MD. I have been meeting informally with Becky monthly since 2017 to discuss career development topics. This mentorship was recently formalized as a co-mentor relationship (with Dr. Reusch) as part of her KL2 application to the Colorado Clinical and Translational Sciences, which will foster her transition to career independence as a junior faculty member.

*Role:* Cell Culture & Metabolism Mentor

*Project:* Diabetes disrupts estrogen-mediated support of skeletal muscle mitochondria

*Mentee Accomplishments:*

- Submitted a KL2 Junior Faculty Fellowship application to the Colorado Clinical and Translational Sciences Institute (7/2018)

2018-Present

**Madeline Keleher, PhD University of Colorado School of Medicine**

Madeline is a postdoctoral fellow in my laboratory (since February 2018). I mentor her in the use of our primary umbilical cord stem cell

model, experimental design for *in vitro* mechanistic investigation, project development, manuscript writing, and grantsmanship.

*Role:* Primary Mentor

*Education:* Madeline earned her PhD in Biology from Washington University in St. Louis (2017) investigating offspring epigenetic effects of maternal obesity in a mouse model.

*Project:* Maternal obesity impacts infant stem cell adipogenesis and insulin sensitivity.

*Mentee Accomplishments:*

- Submitted NIH F32 Application 08/2018
- 1 First author paper published
- 1 first author manuscript submitted with 2 others being drafted

*\*Dr. Keleher took 1-year hiatus from 7/2019-8/2020.*

### Graduate Students

2012-2015

#### **Allison Shapiro, PhD, Colorado School of Public Health**

Allison was a PhD student in Epidemiology at the Colorado School of Public Health under the primary mentorship of Dana Dabelea, MD, PhD. I mentored Allison basic cell culture techniques, primary mesenchymal stem cell differentiation and metabolism.

*Role:* Primary Cell Culture & Metabolism Mentor

*Project:* Investigating the mediating role of Sirtuin 1 and PPAR- $\gamma$  in the relationship between maternal dietary niacin intake and infant adiposity.

*Mentee Accomplishments:*

- First author on 1 original research article, co-authorship on 3 original research articles
- First author on 2 abstracts, co-authorship on over 10 abstracts
- Received PhD degree in December 2015
- Currently a postdoctoral fellow in the University of Colorado Department of Psychiatry with Dr. Jason Tregellas

2014-2016

#### **Zachary Patinkin, Student Worker**

Zachary worked in my lab while pursuing a Master's degree in Public Health. I mentored Zachary in laboratory techniques, including sterile cell culture techniques, protein assessments, and metabolism. I also mentored Zachary on hypothesis generation, experimental design, manuscript drafting, and publication of results.

*Role:* Primary Research Mentor/Supervisor

*Project:* Human Mesenchymal Stem Cells and the Epigenetic Programming of Obesity

*Mentee Accomplishments:*

- Co-authorship on 4 original research articles
- Co-authorship on over 10 abstracts
- Currently attending Netter School of Medicine at Quinnipiac University

2018-2019

**Lillian Svete, University of Colorado School of Medicine**

Lily is a graduate student in the Medical Scientist Training Program at the University of Colorado School of Medicine pursuing an MD/PhD degree. Lily began her 10-week rotation in my lab in May 2018, where I am training her in use of the primary umbilical cord stem cell model and experimental design for *in vitro* mechanistic investigation. During this time, Lily is optimizing molecular biology techniques such as chromatin immunoprecipitation and luciferase gene reporter assays.

*Role:* Primary Research Mentor

*Project:* The role of *SDHC* and *PRKAG2* promoter methylation on transcription factor binding and gene transcription

2018-Present

**Nathan De Jong, Colorado State University**

Nathan is a PhD student at the University of Colorado under the primary mentorship of Audrey Bergouignan, PhD. I will mentor Nathan on mechanistic and *in vitro* metabolic investigations using primary stem cells obtained from the human subjects in his clinical research project.

*Role:* Basic Science Research Mentor

*Project:* Metabolic effects of breaking up sedentary time

*Mentee Accomplishments:*

- Has received a TL1 Pre-Doctoral Fellowship from the Colorado Clinical and Translational Sciences Program

**Graduate Student Thesis Committee Member**

<i>Student (deg.)</i>	<i>Advisor</i>	<i>Years</i>
Esteban Lucero (PhD)	Huntington Potter, PhD	2016-
Diane Gumina (PhD)	Emily Su, MD	2019-
Rosmary McDonald (PhD)	Raj Kumar, PhD	2019-
Arely Diaz (PhD)	Tania Reis, PhD	2020-

*Undergraduate Students*

2012

**John Davy, Summer Research Intern**

*Children's Hospital Colorado Child Health Summer Research Internship*

*Role:* Co-research mentor (with Jed Friedman)

*Project:* Analysis of skeletal muscle from the transgenic Fat-1 mouse in response to high fat diet

*Mentee Accomplishments:*

- John graduated from medical school at the University of Virginia, Class of 2018.

2015-2017

**Reilly Quist, Summer Research Intern & Student Worker**

Reilly is an undergraduate in the Pre-med program at the University of Colorado Denver. Reilly began working in my lab as a research intern in the June, 2015 and stayed on to complete her project. As her class schedule allows, Reilly returns to work on ongoing research projects.

*Role:* Primary Research Mentor

*Project:* Mesenchymal Stem Cells of Infants Born to Mothers with Obesity May Provide Clues to Future Obesity Risk: Analysis of AMPK Subunit Protein Content

*Mentee Accomplishments:*

- First author on 1 abstract presented at the University of Colorado Research and Creative Activities Symposium in April 2016.
- Accepted to the University of Colorado School of Medicine, Class of 2022.

*High School Students*

2016

**Phoebe Barr, Summer Research Intern**

*Children's Hospital Colorado Child Health Summer Research Internship*

*Role:* Primary Research Mentor

*Project:* Measuring the capacity for osteogenesis in mesenchymal stem cells derived from umbilical cord tissue of infants born to normal weight and obese mothers

*Mentee Accomplishments:*

- Phoebe graduated from the Denver Center for International Studies in 2017.
- Presented research at the CHC Research Internship seminar

2018-2019

**Shreya Shubhangi, Summer Research Intern**

*Children's Hospital Colorado Child Health Summer Research Internship*

*Role:* Primary Research Mentor

*Project:* Maternal obesity impacts infant stem cell adipogenesis.

*Mentee Accomplishments:*

- First author on 1 abstract presented at the Aspen/Snowmass Perinatal Biology Symposium in August 2019.
- Travel Award for Aspen/Snowmass Perinatal Biology Symposium in August 2019.
- Attending to Stanford University, Class of 2023.



## GRANT SUPPORT

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### Active

#### Extramural

2016-2022

**NIH, 1UG3OD023248-01**

**Role: Investigator**

*Environmental Influences on Child Health Outcomes*

*Principal Investigator: Dana Dabelea, MD, PhD*

The Early Life Exposome and Childhood Health – The Colorado Healthy Start 3 Cohort Study. The goal of this project is to estimate the early life “exposome”, across a wide range of exposures (social, metabolic, chemical, physical), and conduct integrative analyses of early life exposure related to child health outcomes that are informed by molecular biomarkers (‘omics) and pathways.

2018-2020

**American Diabetes Association CORE #1-18-ICTS-016**

**Role: Principal Investigator**

*Umbilical cord-derived stem cell metabolism: Understanding mechanisms for childhood obesity risk*

The goal of this project is to comprehensively interrogate umbilical cord-derived mesenchymal stem cell response to metabolic stress, such as glucose starvation or excess fat exposure, to determine the role of stem cell metabolic outcomes as predictors of child metabolic health outcomes.

*\$545,321 direct costs (\$600,000 total)*

2018-2023

**NIH R01 DK 117168**

**Role: Principal Investigator**

*Epigenetic programming of infant mesenchymal stem cells: mechanisms for obesity and diabetes risk in humans*

The goal of this project is to determine the epigenetic mechanisms for perturbations in lipid metabolism of umbilical cord-derived mesenchymal stem cells from infant of obese versus normal weight mothers.

*\$1,122,625 direct costs (\$1,677,087 total)*

### Pending

#### Extramural

A1 Submitted  
Mar. 2020

**NIH R01 NIEHS**

**Role: Co-Principal Investigator**

*Principal Investigators: Anne Starling, PhD; Kristen E. Boyle, PhD*

*Prenatal POPs exposure and Child obesity and metabolic disruption: Linking functional outcomes, DNA methylation, and epidemiologic approaches*

The goal of this project is to determine whether maternal exposure to persistent organic pollutants is associated with child adiposity and metabolic health outcomes. In addition, this project will determine whether DNA methylation outcomes are mechanistically linked to phenotypic adiposity outcomes using primary umbilical cord-derived mesenchymal stem cells.

Scored 5<sup>th</sup> %ile  
October 2020

**NIH R01 NICHD**  
**Role: Co-Investigator**

*Principal Investigators: Lynn A. Barbour, MD; Teri L. Hernandez, PhD, RN*  
*Triglycerides as a Predictor of Newborn Subcutaneous and Liver Fat: Contributors to Fetal Fat Accretion in Obese Pregnancies*

The goal of this project is to determine the predictive power of maternal triglycerides in fetal subcutaneous and liver fat, with a focus on early vs. late pregnancy and fasted vs. postprandial measures. Obese and overweight pregnant women will be included and placental transport of lipids, cord blood lipidomics, and infant adiposity and infant-derived stem cell adipogenesis will be measured.

Submitted  
June 2020

**NIH R01 NICHD**  
**Role: Co-Principal Investigator**

*Principal Investigators: Kristen E. Boyle, PhD; Sonja Entringer, PhD; Pathik D. Wadhwa, MD, PhD*

*Maternal Stress and Fetal Programming of Telomere and Mitochondrial Biology*

The goal of this study is to provide a more clear and complete understanding of how maternal stress exposure during pregnancy influences her child's intrauterine development to shape life-long health and disease risk. We will examine stem/progenitor cells obtained from fetal tissues (umbilical cord blood and cord tissue) at the time of birth, for key cellular processes that relate to genomic integrity and bioenergetic function (telomere and mitochondrial biology systems).

Submitted  
October 2020

**NIH R01 NIDDK**  
**Role: Co-Principal Investigator**

*Principal Investigators: Kristen E. Boyle, PhD; Suzanne Phelan, PhD; Leanne M. Redman, PhD*

*Effect of Gestational Fat Mass Loss and Metabolic Health on offspring Phenotype: An Ancillary Study to the Healthy Mamas Randomized Controlled Trial*

This project is ancillary to a newly funded randomized controlled feeding study that will maintain maternal weight during pregnancy in women with obesity. The goal of this ancillary project is to determine the effects of the intervention and pre-intervention maternal health on infant obesity-related outcomes. Results from this study will determine whether maternal lifestyle intervention exclusively in women with obesity will improve offspring obesity risk.

**Completed**

*Extramural*

2015-2019

**NIH K01 DK106347**

**Role: Principal Investigator**

*Human Mesenchymal Stem Cells and the Epigenetic Programming of Obesity.*

This is a mentored research scientist career development award. The goal of this project is to identify epigenetic signatures related to differences in mesenchymal stem cell differentiation and metabolism based on mother's obesity status, that may give insight into the developmental programming of neonatal adiposity.

**\$368,227 direct costs (\$397,687 total)**

2016-2018

**P30GM118430-RedmanPF-01**

**Role: Co-Investigator**

*IMAGINE COBRE Pilot*

*Investigation of the mechanisms for transmission of impaired glucose metabolism in infants exposed to diabetes in utero*

*Principal Investigator: Leanne M. Redman, PhD*

The goal of this project is to test the hypothesis that *in utero* exposure to maternal substrate oxidation and placental lipotoxicity, characteristics of diabetic pregnancy, programs a metabolically inflexible phenotype in the offspring as measured by infant substrate oxidation and metabolism in umbilical cord derived mesenchymal stem cells from the infants.

*\$14,857 direct costs (sub-award)*

2011-2012

**NIH F32 DK 089743**

**Role: Principal Investigator**

*Cellular Mechanisms for Insulin Resistance in Human Gestational Diabetes Mellitus*

The F32 award provides support for promising postdoctoral scholars who have the potential to become productive, independent investigators within the broad scope of biomedical, behavioral, or clinical research. The goal of this project is to investigate the role of skeletal muscle metabolism on the etiology of insulin resistance in women with gestational diabetes mellitus.

*\$97,264 direct costs (no indirect costs)*

2013-2014

**The Obesity Society Early Career Research Grant**

**Role: Principal Investigator**

*The Effect of Maternal Obesity on Skeletal Muscle Cell Differentiation*

The goal of this project is to explore molecular pathways whereby fetal exposure to maternal obesity contribute to adiposity at birth and longitudinally at 5 months of life by measuring epigenetic modification of fetal mesenchymal stem cells.

*\$25,000 direct costs, no indirect costs*

*Intramural*

2009-2010

**NIH T32 DK 007658**

**Role: Postdoctoral Fellow**

*Principal Investigator: Nancy F. Krebs, MD*

The primary goal of this training program in Nutrition is to train the next generation of physician scientists and basic researchers who are committed to the prevention of disease and health promotion through careers in human nutrition.

*No Direct Costs*

2013-2015

**NIH K12 HD 057022**

**Role: Research Scholar**

*Principal Investigator: Judith G. Regensteiner, PhD*

*The Colorado Building Interdisciplinary Research Careers in Women's Health Program (BIRCWH)*

The BIRCWH Award is a mentored career development award that connects junior faculty to senior faculty with shared interest in women's health and sex difference research with the goal of creating a pathway to independent research funding for the junior faculty in the field of women's health research. Application Title: Maternal Programming of Fetal Stem Cells.

*No Direct Costs*

2014-2015

**BERD Seed Program Grant**

**Role: Principal Investigator**

*The Colorado Clinical & Translational Sciences Institute (UL1 TR001082)  
Mesenchymal Stem Cells and the Epigenetic Programming of Neonatal Adiposity*

This program offers one time funds to offset the cost of biostatistical consulting for junior faculty at the University of Colorado.

*\$1,000 direct costs, no indirect costs*

2014-2015

**Center for Women's Health Research, Research Development Award**

**Role: Principal Investigator**

*Mesenchymal Stem Cells and the Epigenetic Programming of Neonatal Adiposity*

This grant is awarded to exceptional junior faculty members for the conduct of research focused in areas that will help improve the diagnosis, treatment, or management of cardiovascular disease and/or diabetes in women. The goal of this project is to identify differences in mesenchymal stem cell adipogenesis, based on mother's obesity status, that potentially contribute to the developmental programming of neonatal adiposity.

*\$25,000 direct costs, no indirect costs*

## **PUBLICATIONS**

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- 22 peer-reviewed publications, 10 as first-author
- >1,400 citations, with >900 in Thompson Reuters-indexed journals
- Publications in **bold** were published in journals with impact factor >7 or have >50 citations
- *h*-index: 13

### *Peer-Reviewed*

1. **Berggren JR, Boyle KE, Chapman WH, Houmard JA. Skeletal muscle lipid oxidation and obesity: influence of weight loss and exercise. *Am J Physiol Endocrinol Metab*, 294(4):E726-32, 2008. PMID: 18252891.**
2. **Hittel DS, Berggren JR, Shearer J, Boyle K, and Houmard JA. Increased secretion and expression of myostatin in skeletal muscle from extremely obese women. *Diabetes*, 58(1):30-8, 2009. PMID: 18835929.**
3. **Anderson EJ, Conniff ME, Boyle KE, Woodlief TL, Kane DA, Price III JW, Ravinovich PS, Szeto HH, Houmard JA, Cortright RN, Wasserman DH, and Neuffer PD. Mitochondrial H<sub>2</sub>O<sub>2</sub> emission and cellular redox state link excess fat intake to insulin resistance. *J Clin Invest*, 119(3):573-581, 2009. PMID: 19188683. **\*\*Web of Science: Top Cited in the Field.****
4. Howe HR III, Heidal K, Choi MD, Kraus RM, **Boyle KE**, and Hickner RC. Increased adipose tissue lipolysis after a 2-week high-fat diet in sedentary overweight/obese men. *Metabolism*, 60(7):976-81, 2011. PMID: 21040937.
5. **Boyle KE** and Friedman JE. Maternal obesity and oxidative stress in the fetus: Mechanisms underlying early life shifts in skeletal muscle metabolism. *Fetal Matern Med Rev* 22:219–246, 2011. *Review.*
6. **Boyle KE<sup>#</sup>, Canham JP, Consitt LA, Zheng D, Koves TR, Gavin TP, Holbert D, Neuffer PD, Muoio DM, and Houmard JA. A high fat diet elicits differential responses in genes coordinating lipid oxidative metabolism in the skeletal muscle of lean and obese humans. *J Clin Endocrinol Metab*, 96(3):775-81, 2011. PMID: 21190973. <sup>#</sup>corresponding author.**
7. **Boyle KE<sup>#</sup>, Zheng D, Anderson EJ, Neuffer PD, and Houmard JA. Mitochondrial lipid oxidation is impaired in cultured myotubes from obese humans. *Int J Obes (Lond.)* 36:1025-31, 2012. PMID: 22024640. <sup>#</sup>corresponding author.**
8. **Boyle KE<sup>#</sup>, Newsom SA, Janssen RC, Lappas M, and Friedman JE. Skeletal muscle MnSOD, mitochondrial complex II, and SIRT3 enzyme activities are decreased in maternal obesity during human pregnancy and gestational diabetes mellitus. *J Clin Endocrinol Metab*. 98(10):E1601, 2013. PMID: 23956348. <sup>#</sup>corresponding author.**

9. Newsom SA, **Boyle KE**, and Friedman JE. Sirtuin 3: A major control point for obesity-related metabolic diseases? *Drug Discov Today Dis Mech* 10:e35-e40, 2013. *Review*. PMID: 23997790.
10. **Boyle KE**<sup>#</sup>, Hwang H, DeVente JM, Barbour L, Hernandez T, Mandarino LJ, Lappas M and Friedman JE. Gestational diabetes is characterized by reduced mitochondrial protein expression and altered calcium signaling proteins in skeletal muscle. *PLoS One*. 9(9):e106872, 2014. PMID: 25216282. **#corresponding author. \*\*Top 25% most cited PLOS ONE articles.**
11. Schlaepfer IR, Glode LM, Hitz CA, Pac CT, **Boyle KE**, Maroni P, Deep G, Agarwal R, Lucia SM, Cramer SD, Serkova NJ, and Eckel RH. Inhibition of lipid oxidation increases glucose metabolism and enhances 2-deoxy-2-[18F]-fluoro-D-glucose uptake in prostate cancer mouse xenografts. *Mol Imaging Biol*. 17(4):529-38, 2015. PMID: 25561013.
12. Baker P\*, **Boyle KE**<sup>\*\*</sup>, Muoio DM, Houmard JA, Friedman JE. Metabolomic analysis reveals altered skeletal muscle amino acid and fatty acid handling in obese humans. *Obesity* 23(5):981-8, 2015. PMID: 25864501. **\*equal author contribution, #corresponding author.**
13. **Boyle KE**<sup>#</sup>, Patinkin ZW, Shapiro ALB, Baker PR II, Dabelea D, Friedman JE. **Mesenchymal Stem Cells from Infants Born to Obese Mothers Exhibit Greater Potential for Adipogenesis: The Healthy Start BabyBUMP Project.** *Diabetes*. 65(3):647-59, 2016. PMID: 26631736. **#corresponding author. \*\*Featured in Nature Reviews Endocrinology. \*\*F1000 Recommended Exceptional New Finding.**
14. Shapiro ALB, **Boyle KE**, Dabelea D, Patinkin ZW, De la Houssaye B, Ringham BM, Glueck D, Barbour LA, Norris J, Friedman JE. Nicotinamide promotes adipogenesis in umbilical cord-derived mesenchymal stem cells and corresponds to neonatal adiposity: The Healthy Start BabyBUMP Project. *PLoS One*. 11(7):e0159575, 2016. PMID: 27414406.
15. **Boyle KE**, Friedman JE, Underkofler C, Houmard JA, and Rasouli N. Fenofibrate increases skeletal muscle fatty acid oxidation in obese, insulin resistant humans. *Horm Metab Res*. Jan;49(1):50-57, 2017. PMID: 28103623.
16. **Cavalli G, Justice JN, Boyle KE, D'Alessandro A, Eisenmesser EZ, Herrera JJ, Hansen KC, Nemkov T, Stienstra R, Garlanda C, Mantovani A, Seals DR, Dagna L, Joosten LA, Ballak DB, Dinarello CA. Interleukin 37 reverses the metabolic cost of inflammation, increases oxidative respiration, and improves exercise tolerance.** *Proc Natl Acad Sci USA*. 114(9):2313-2318, 2017. PMID: 28193888.
17. **Boyle KE**<sup>#</sup>, Patinkin ZW, Shapiro ALB, Bader C, Vanderlinden L, Kechris K, Janssen RC, Ford RJ, Smith BK, Steinberg GR, Davidson EJ, Yang IV, Dabelea D, Friedman JE. Maternal obesity alters fatty acid oxidation, AMPK activity, and associated DNA methylation in mesenchymal stem cells from human infants. *Mol Metab*, 6(11):1503-1516, 2017. PMID: 29107296 **#corresponding author.**
18. Baker PR II, Patinkin ZW, Shapiro ALB, De La Houssaye B, Woontner M, **Boyle KE**, Vanderlinden L, Dabelea D, and Friedman JE. Maternal Obesity and Increased

Neonatal Adiposity Correspond with Altered Infant Mesenchymal Stem Cell. *JCI Insight*, 2(21), 2017. PMID: 29093265.

19. Reusch JEB, Kumar TR, Regensteiner JG, Zeitler PS, and Conference Participants (31 other authors, including **Boyle KE**). Identifying the Critical Gaps in Research on Sex Differences in Metabolism Across the Life Span. *Endocrinology*, 159(1):9-19, 2018. *Review*. PMID:29300998.
20. Bruce KD, Gorkhali S, Given K, Coates AM, **Boyle KE**, Macklin WB, Eckel RH. Lipoprotein Lipase is a feature of alternatively-activated microglia and may facilitate lipid uptake in the CNS during demyelination. *Front Mol Neurosci*.11:57, 2018. PMID: 29599706.
21. **Boyle KE**<sup>#</sup>, Magill-Collins MJ<sup>\*</sup>, Newsom SA, Janssen RC, and Friedman JE. Maternal fat-1 transgene protects offspring from excess weight gain, oxidative stress, and reduced fatty acid oxidation in response to high-fat diet. *Nutrients*, 12(3):767, 2020. PMID: 32183350. **\*equal author contribution, #corresponding author**
22. Keleher MR, Erickson L, Kechris K, Yang IV, Dabelea D, Friedman JE, **Boyle KE**, and Jansson T. Associations between the activity of placental nutrient-sensing pathways and neonatal and postnatal metabolic health: The ECHO Healthy Start cohort. *Int. J. Obes*. Accepted 2020: doi: 10.1038/s41366-020-0574-y. PMID: 32327723

#### *In Progress*

1. Keleher MR, Erickson K, Smith H, Vanderlinden L, Kechris K, Yang IV, Dabelea D, Friedman JE, **Boyle KE**, and Jansson T. Associations Between of Placental Insulin signaling Pathways and Postnatal Metabolic Health: The Healthy Start ECHO Cohort. *Under Review, Diabetes*.

#### *Book Chapters*

1. Consitt LA, **Boyle KE**, and Houmard JA. Exercise as an effective treatment for type 2 diabetes. In Contemporary Endocrinology: Type 2 Diabetes Mellitus: An Evidence-Based Approach to Practical Management. Eds. Feinglos MN & Bethel MA. Humana Press; Totowa; NJ, pgs 135-150, 2008.
2. Janssen RC and **Boyle KE**. Microplate Assays for Spectrophotometric Measurement of Mitochondrial Enzyme Activity. Ed. D'Alessandro A. *Methods in Molecular Biology: High-Throughput Metabolomics*, Humana Press. 2018.

#### *Scientific Abstracts (Boyle KE presented if type of presentation is indicated)*

1. **Boyle KE**, Thuma JR, and Loucks AB. Short-term effects of low energy availability on ghrelin reflect effects on body size, not leptin or insulin. 2003 American College of Sports Medicine 50<sup>th</sup> Annual Meeting, San Francisco, CA. Oral Presentation.
2. Loucks AB, **Boyle KE**, Gendelman S, Thuma JR, Wiese T, and Wolke ET. Low energy availability suppressed LH pulse frequency in younger but not older women. The

- Endocrine Society's 86<sup>th</sup> Annual Meeting, New Orleans, June 2004. Abstract #: P2-534, pg. 440.
3. Redman LR, Laughlin GA, **Boyle KE**, and Loucks AB. 24-h mean ghrelin concentrations are normal in amenorrheic athletes. The Endocrine Society's 86<sup>th</sup> Annual Meeting, New Orleans, June 2004. Abstract #: P2-254, pg. 367.
  4. Molskness SM, Berggren JR, Bajpeyi S, **Boyle KE**, Newton C, Tanner CJ, and Houmard JA. Effect of 10 days of training on fat oxidation in diabetics. American Diabetes Association's 66<sup>th</sup> Scientific Sessions, Washington D.C., June 2006. Abstract #: 21-LB.
  5. **Boyle KE**, Canham JP, Consitt LA, Zheng D, Gavin TP, and Houmard JA. Evidence for metabolic inflexibility in response to dietary lipid with obesity. APS Intersociety Meeting: The Integrative Biology of Exercise V, Hilton Head, September 2008. Abstract #: 22.15. Poster Presentation.
  6. Anderson EJ, **Boyle KE**, Houmard JA, and Neuffer PD. Excess dietary fat depletes glutathione, increases mitochondrial oxidant emitting potential and shifts redox balance to a more oxidized state in human skeletal muscle. Experimental Biology, San Diego, April 2008. Abstract #: 958.7, S374.
  7. **Boyle KE**, Zheng D, Anderson EJ, Neuffer PD, and Houmard JA. Mitochondrial function is impaired in cultured myotubes from obese humans. International Biochemistry of Exercise Conference, University of Guelph, Ontario, Canada, June 2009. Abstract #: 14. Oral Presentation.
  8. Anderson EJ, **Boyle KE**, Houmard JA, and Neuffer PD. Obesity is associated with reduced glutathione content, increased mitochondrial H<sub>2</sub>O<sub>2</sub> emitting potential and a more oxidized redox environment in human skeletal muscle. 2008 American Diabetes Association's 68<sup>th</sup> Scientific Sessions, San Francisco, CA.
  9. Kwak H-B, Thalacker-Mercer A, Anderson EJ, **Boyle KE**, Houmard JA, Cortright RN, Bamman MM, and Neuffer PD. Simvastatin Impairs ADP-Stimulated Mitochondrial Respiration and Alters Apoptotic Signaling and Morphology in Human Skeletal Myotubes. 2009 American Diabetes Association's 69<sup>th</sup> Scientific Sessions, New Orleans, LA.
  10. Kwak H-B, Lin C-T, Kane DA, Lee N-S, **Boyle KE**, Houmard JA, Cortright RN, Neuffer PD. Simvastatin Increases Mitochondrial Oxidative Stress and Reduces Mitochondrial Ca<sup>2+</sup> Retention Capacity in Human Skeletal Myotubes, 2010 American College of Sports Medicine 57<sup>th</sup> Annual Meeting, Baltimore, MD.
  11. **Boyle KE**, Hwang H, DeVente JM, Barbour L, Hernandez T, Bowen B, Zhengping Y, Mandarino LJ, and Friedman JE. Quantitative Proteomic Profile in Skeletal Muscle from Women with Gestational Diabetes Reveals Potential for Reduced Mitochondrial Function, 2010 American Diabetes Association 70<sup>th</sup> Scientific Sessions, Orlando, FL. Oral Presentation.
  12. **Boyle KE**, Heerwagen MJ, and Friedman JE. Transgenic mice enriched for omega-3 fatty acids show improved skeletal muscle mitochondrial fuel switching in response to



- high-fat diet. August 2011, FASEB Summer Research Conference: Nutrient Control of Metabolism and Cell Signaling, Steamboat Springs, CO. Oral Presentation.
13. Schlaepfer IR, **Boyle KE**, Glode ML and Eckel RH, Role of Lipid Oxidation in Cancer Metabolism, August 2011 Kern Lipid Conference, Vail, CO.
  14. **Boyle KE**, Houmard JA, Friedman JE, and Rasouli N. Fenofibrate increases lipid oxidation in human skeletal muscle, Poster Presentation at 2012 American Diabetes Association 72nd Scientific Sessions, Philadelphia, PA. Poster Presentation.
  15. **Boyle KE**, Newsom SA, Janssen RC, Lappas M, and Friedman JE. Decreased SIRT3 activity contributes to oxidative stress and reduced mitochondrial enzyme activity in skeletal muscle of obese pregnant women. *2013 American Diabetes Association 73<sup>rd</sup> Scientific Sessions, Chicago, IL* Poster Presentation.
  16. Baker PR II, **Boyle KE**, Buti AL, Dabelea D, Barbour LA, Friedman JE. Stem Cells from Offspring of Mothers Demonstrate Evidence for Developmental Programming in Obesity. 2014 American Society of Human Genetics, San Diego, CA.
  17. Baker PR II, **Boyle KE**, Shapiro ALB, Patinkin ZW, Dabelea D, and Friedman JE. Maternal Obesity Influences Amino Acid Metabolism in Offspring Umbilical Derived Stem Cells. 2015 Keystone Symposia: Diabetes and Metabolic Dysfunction, Santa Fe, NM.
  18. Baker PR II, **Boyle KE**, Shapiro ALB, Patinkin ZW, Dabelea D, and Friedman JE. Maternal Obesity and Newborn Adiposity Correlate with Amino acid and Acylcarnitine Metabolism in Mesenchymal Stem Cells. 2015 Society for Inherited Metabolic Disease, Salt Lake City, UT.
  19. **Boyle KE**, Patinkin Z, Shapiro ALB, Dabelea D, Friedman JE. Human mesenchymal stem cells from offspring of obese mothers have increased adipogenesis and evidence for insulin resistance: The Healthy Start Study. *2015 American Diabetes Association 75<sup>th</sup> Scientific Sessions, Boston, MA.* Oral Presentation at President's Oral Session.
  20. Shapiro ALB, **Boyle KE**, Dabelea D, Patinkin Z, Glueck D, Barbour LA, Norris J, Friedman JE. Nicotinamide promotes adipogenesis in umbilical cord-derived mesenchymal stem cells and corresponds to neonatal adiposity: The Healthy Start study. *2015 American Diabetes Association 75<sup>th</sup> Scientific Sessions, Boston, MA.*
  21. **Boyle KE**, Patinkin ZW, Shapiro ALB, Baker PR II, Dabelea D, Friedman JE. Disrupted GSK-3 $\beta$ / $\beta$ -catenin signaling induces greater adipogenesis in mesenchymal stem cells derived from babies of obese women: The Healthy Start BabyBUMP Project. *2015 The Obesity Society ObesityWeek 2015, Los Angeles, CA.* Late Breaking Oral Presentation.
  22. **Boyle KE**, Patinkin ZW, Shapiro ALB, Vanderlinden L, Kechris K, Dabelea D, & Friedman JE. DNA hypermethylation of metabolic genes corresponds to lower fatty acid oxidation in mesenchymal stem cells from infants of obese mothers: The Healthy Start BabyBUMP Project. *2016 Obesity and Adipose Tissue Biology, Keystone Symposia, Banff, Alberta, CA.* Oral presentation.

23. Baker PR II, Patinkin ZW, Shapiro ALB, De La Houssaye, B, Woontner M, **Boyle KE**, Dabelea D, and Friedman JE. Dysregulated Lipid Metabolism in Adipocyte Differentiated Umbilical Derived Mesenchymal Stem Cells Predicts Increased Infant Adiposity at 5 Months of Age. *2016 American Diabetes Association 76<sup>th</sup> Scientific Sessions, New Orleans, LA.*
24. **Boyle KE**, Patinkin ZW, Shapiro ALB, Yang I, Davidson B, Vanderlinden L, Kechris K, Dabelea D, & Friedman JE. DNA Hypermethylation Corresponds to Differences in Metabolism and Cellular Differentiation in Mesenchymal Stem Cells from Infants Born to Obese Mothers: The Healthy Start BabyBUMP Project. *2016 American Diabetes Association 76<sup>th</sup> Scientific Sessions, New Orleans, LA. Oral Poster Presentation.*
25. **Boyle KE**, Patinkin ZW, Shapiro ALB, Yang I, Davidson B, Vanderlinden L, Kechris K, Dabelea D, & Friedman JE. Reduced fatty acid oxidation in mesenchymal stem cells from infants of obese mothers corresponds to DNA hypermethylation of genes regulating fatty acid metabolism: The Healthy Start BabyBUMP Project. *2016 Perinatal Biology Symposium, Aspen, CO. Poster Presentation.*
26. Cavalli, G, Ballak D, Justice JJ, **Boyle KE**, D'Alessandro A, Joosten LA, Dagna L, C. A. Dinarello CA. Interleukin 37 reverses the metabolic cost of inflammation, increases oxidative respiration, and improves exercise tolerance. *2017 European League Against Rheumatism (EULAR) Congress, Madrid, Spain.*
27. Patinkin ZW, Bader C, Dabelea D, **Boyle KE**. Oxidative Stress Linked to Lower Mitochondrial Fat Oxidation in Human Mesenchymal Stem Cells from High Adiposity Infants Born to Mothers with Obesity: The Healthy Start BabyBUMP Project. *2017 American Diabetes Association 77<sup>th</sup> Scientific Sessions, San Diego, CA. Late Breaking Poster Presentation.*
28. Keleher M, Friedman JE, Dabelea D, and **Boyle KE**. Maternal glucose and insulin are associated with AMPK and GSK3 $\beta$  proteins in human umbilical cord derived mesenchymal stem cells: The Healthy Start ECHO Cohort *2019 American Diabetes Association 79<sup>th</sup> Scientific Sessions, San Francisco, CA*
29. Keleher M, Shubhangi S, Brown A, Duensing A, Dabelea D, and **Boyle KE**. Maternal Obesity Linked to Hypertrophy in Adipogenic Infant MSCs: The Healthy Start ECHO Cohort, *ObesityWeek 2019, Las Vegas, NV. Oral Presentation.*

#### *Abstracts (Non-Competitive)*

1. **Boyle KE**, Heerwagen MJ, and Friedman, JE. Maternal Inflammation Programs Offspring Skeletal Muscle Metabolism, Regardless of Postnatal Diet. Annual BIRCWH Scholars Meeting, Washington D.C., October 2013. *Poster Presentation.*
2. **Boyle KE**, Hwang H, DeVente JM, Barbour L, Hernandez T, Mandarino LJ, Lappas M and Friedman JE. Proteomic analysis reveals reduced mitochondrial protein expression and altered calcium signaling proteins in human skeletal muscle during gestational diabetes Center for Women's Health Research Women's Health Research Day 2013. *Poster Presentation, Poster Award.*

3. **Boyle KE**, Patinkin ZW, Shapiro ALB, Vanderlinden L, Kechris K, Dabelea D, & Friedman JE. Maternal obesity programs reduced fatty acid oxidation and DNA hypermethylation of metabolic genes in infant umbilical cord derived mesenchymal stem cells: The Healthy Start BabyBUMP Project. 2016 University of Colorado School of Medicine Department of Pediatrics Research Day. Poster Presentation.
4. Buti AL, **Boyle KE**, Dabelea D, Gleuck D, Barbour LA, Norris J, and Friedman JE. Nicotinamide and its effect on adipogenesis in human umbilical cord-derived mesenchymal stem cells: The Healthy Start Study. Translational Science Conference, Washington D.C., 2014.
5. **Boyle KE**, Patinkin ZW, Shapiro ALB, Vanderlinden L, Kechris K, Dabelea D, & Friedman JE. Maternal obesity programs reduced fatty acid oxidation and DNA hypermethylation of metabolic genes in infant umbilical cord derived mesenchymal stem cells: The Healthy Start BabyBUMP Project. 2016 University of Colorado School of Medicine Department of Pediatrics Research Day, Aurora, CO. Poster Presentation.
6. Quist RE, Patinkin ZW, and **Boyle KE**. Mesenchymal Stem Cells of Infants Born to Mothers with Obesity may Provide Clues to Future Obesity Risk: The Healthy Start BabyBUMP Project. 2016 University of Colorado 19<sup>th</sup> Annual Research and Creative Activities Symposium.
7. **Boyle KE**, Patinkin ZW, Shapiro ALB, Yang I, Davidson B, Vanderlinden L, Kechris K, Dabelea D, & Friedman JE. Reduced fatty acid oxidation in mesenchymal stem cells from infants of obese mothers corresponds to DNA hypermethylation of genes regulating fatty acid metabolism: The Healthy Start BabyBUMP Project. 2016 Center for Women's Health Research Day, Aurora, CO. Poster Presentation, Poster Award.
8. Salzmann-Sullivan M, Su L-J, Jihye Kim, **Boyle K**, Lam E, Flaig T, and Schlaepfer IR. CPT1A and AR blockade result in differential regulation of genetic and metabolic pathways in castration resistant prostate cancer cells. 2018 University of Colorado Department of Medicine Research Day.
9. Shubhangi S, Keleher M, Duensing A, Dabelea D, and **Boyle KE**. Adipogenic Differentiating Mesenchymal Stem Cells from Infants of Obese Mothers Have Greater Lipid Content and Cell Size in 3-Dimensional Culture, Aspen Snowmass Perinatal Biology Symposium 2019, Snowmass CO. Poster Presentation.