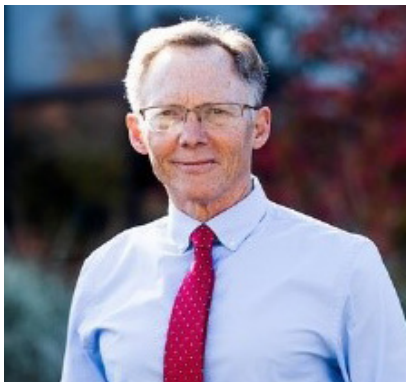
OU Health Harold Hamm Diabetes Center Quarterly Newsletter



Jed Friedman, Ph.D.,
Director,
OU Health Harold Hamm Diabetes Center
Chickasaw Nation Endowed Chair

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Director's Corner

These last few months have been exciting, as many of us have started to return to the laboratory and clinic, engaging in the activities we love and have missed over the past 18 months. Over the past year, the center's researchers reached a new milestone: we counted 79 diabetes-related projects totaling $13.6 million in annual direct federal funding, a 181% increase since 2019 (see list of new grants this quarter alone). We still have work to do to ensure our junior researcher's success, however, I find this very encouraging. Much of the past year has involved communications with key leadership from the Chickasaw Nation discussing how we can best partner to find a cure for diabetes. Governor Anoatubby and the tribe responded with a commitment to create the Chickasaw Nation Chair in Adult Endocrinology and to provide matching funds in research for up to ten years. This extraordinary gift is momentous, not only for its size, but for the impact it will have on the future of diabetes in Oklahoma for generations to come.

Other philanthropic opportunities are in the works and are we now well-positioned to focus our time, energy, and resources on exploring three potential pathways to a cure for diabetes. In this issue, you will find an important story about Dr. Jeanie Tryggestad, who focuses on the rising number of type 2 diabetes (T2DM) in youth in Oklahoma and nationwide to investigate the causes and possible interventions starting early in life.

Another goal of HHDC is to create measurable visibility around HHDC's work in educating and training junior researchers, as well as highlighting HHDC's clinician network spanning the diabetes field.

In 2020-21, we launched a revamped website, which included a refreshed graphic profile and a more user-friendly design. HHDC website traffic increased significantly to 19,200 views in 2021 compared to 7,000 in 2020. We also have an HHDC Facebook page that showed a 420% increase in engagement this year. We need your input to do more in the coming year with social media. Lastly, despite the challenging conditions related to the Covid-19 pandemic in 2021, HHDC remained agile and pivoted its approach to maintain high-quality online presentations, including the 18th Annual Virtual HHDC Research Symposium that will be held on November 12 (see details below).

Enjoy the fall, and we will see you at the symposium.

All the best,

Jed Friedman, Ph.D.
Director, HHDC

OU Health | Harold Hamm Diabetes Center

The HHDC Newsletter is a quarterly newsletter that offers articles on HHDC events, funding opportunities, publications, research news, and training opportunities. Sign up below to receive our quarterly newsletter as well as periodic updates on the HHDC.

To submit an item for the newsletter, please send your announcement to ***katie-hoefling@ouhsc.edu***

The First 1,000 Days

As research continues to demonstrate, the first 1,000 days, from conception through early childhood, shape a person's future health in powerful ways. At Harold Hamm Diabetes Center, the research focus on how metabolism is programmed during the first 1000 days continues to expand. Two new R01 grants from the National Institutes of Diabetes and Digestive and Kidney Diseases, together worth over $10 million, will further investigations in key areas of the first 1,000 days.

HHDC Director Jed Friedman, Ph.D., is the principal investigator for the project "Maternal Obesity and Pediatric NAFLD: Fetal Origins and Long-Term Outcomes in Non-Human Primates." The four-year grant totals $2.3 million.

Currently, nearly 50% of pregnant women in the U.S. are overweight or obese. Accompanying maternal obesity is an increase in non-communicable metabolic disorders in childhood, including obesity, type 2 diabetes mellitus, cardiovascular disease, and non-alcoholic fatty liver disease (NAFLD). Among these, NAFLD is the most common liver disease worldwide, and affects nearly 40% of obese youth and up to 10% of the general pediatric population. NAFLD is characterized by steatosis (excess liver fat) that over time that may progress to non-alcoholic steatohepatitis (NASH) with accompanying inflammation and fibrosis. **NAFLD is often silent but can progress rapidly in children, leading to end-stage liver disease and liver transplantation in early adulthood or for reasons that remain poorly understood.** Using a non-human primate model of maternal obesity, the project will investigate early mechanisms by which a mother's diet can reprogram immune cells and the liver, beginning in fetuses and ultimately preventing NAFLD and liver fibrosis in juvenile offspring. The results of the study will have direct clinical and translational implications for understanding and potentially halting pediatric NAFLD.

Friedman is the co-principal investigator of a second NIH team science grant titled "Metformin in Pregnancy: Fetal Consequences and Long-Term Offspring Outcomes in a Non-Human Primate Model." The five-year team science grant, totaling $8.4 million, was awarded to Baylor College of Medicine.

Metformin is prescribed to 50 million Americans annually, and is currently in widespread use before, during and after pregnancy. Over the past decade, clinical indications and pragmatic use of metformin have steadily expanded beyond the treatment of overt diabetes outside of pregnancy, and now include prediabetes and obesity, polycystic ovary syndrome, Type 2 diabetes and gestational diabetes. **With its expanded use, however, questions have arisen concerning long-term unintended harm to offspring exposed to metformin during gestation**.

Researchers hypothesize that maternal metformin use, in isolation or in conjunction with maternal obesity or high-fat diet, can cross the placenta and renders low birthweight but sets the stage for rapid catch-up growth, resulting in obesity and insulin resistance in juvenile offspring during puberty. In this grant, researchers will use a non-human primate model to understand and how early-life exposure to metformin (with and without maternal and post-weaning Western-style diet feeding) renders changes in the pancreas, liver, brain, and microbiome making the next generation susceptible to rapid weight gain and juvenile obesity in later life, beginning in utero.

By identifying factors responsible for changes in the first 1,000 days, researchers hope to slow the diabetes and obesity epidemic.

"Obesity and diabetes, and their complications, including pediatric NAFLD, represent a lifelong struggle, and there are no treatments except major lifestyle changes," Friedman said, **"Studies to examine early development and prevention methods using models that closely mimic the human condition are important to know how and when to prevent diseases before they start."**

Jeanie B. Tryggestad, M.D.
Associate Professor of Pediatrics,
Section Diabetes/Endocrinology
Children's Hospital Foundation
Paul and Ruth Jonas Chair in Pediatric
Diabetes/Endocrinology

Research Spotlight: Severity of T2DM in Youth

The number of new cases of type 2 diabetes (T2DM) in youth have been shown to be increasing by about 5% per year over the last 10 years. It is projected that by the year 2050 the number of children with youth-onset T2DM will quadruple. Within the section of Diabetes/Endocrinology at Children's the incidence of youth-onset T2DM had increased by 20% just in the last years such that 1 out of every 3 children diagnosed with diabetes will have youth-onset T2DM.

The Treatment Options for Type 2 Diabetes in Adolescents and Youth (TODAY) was a landmark trial to begin to explore the optimal treatment for youth-onset T2DM. TODAY was the first major comparative effectiveness trial for the treatment of type 2 diabetes in youth comparing three treatments for managing blood glucose: metformin alone, metformin plus rosiglitazone, and metformin plus an intensive lifestyle intervention. Metformin is the only oral medication approved by the U.S. Food and Drug Administration to treat type 2 diabetes in youth during the initial study. The study included 15 clinical centers with Oklahoma being the largest center with the highest recruitment of an of the sites. In the original trial, 45% of the youth in about 3.8 years of diabetes duration with metformin and rosiglitazone being better than metformin alone.

Approximately 500 of the original TODAY cohort continued on in an observational phase of the trial (TODAY2) with the explicit purpose of examining the rates of diabetes-associated comorbidities and complications in youth-onset type 2 diabetes. Overall, researchers saw a steady decline in blood glucose control over 15 years. In addition:

- 67% of participants had high blood pressure
- Nearly 52% had dyslipidemia, or high-fat levels in the blood
- Nearly 55% had kidney disease
- 32% had evidence of nerve disease
- 51% had eye disease

In addition, certain participants had a higher likelihood to develop multiple complications over time, with 28% developing two or more over the follow-up period. Participants who belonged to a minority racial or ethnic group, or who had high blood glucose, high blood pressure, and dyslipidemia were at higher risk for developing a complication.

"The TODAY study has demonstrated that youth-onset Type 2 diabetes is much more aggressive than Type 2 diabetes in adults"

During the initial years of TODAY in Oklahoma, the study was led by Kenneth Copeland, M.D., now Professor Emeritus in the Section of Diabetes and Endocrinology, Department of Pediatrics, of the OU College of Medicine. Following his leadership, the study has been directed by two other faculty members in the section, Associate Professor Jeanie Tryggestad, M.D., and Section Chief Steven Chernausek, M.D.

"The TODAY study has demonstrated that youth-onset Type 2 diabetes is much more aggressive than Type 2 diabetes in adults," said Tryggestad, who serves as the study's local principal investigator. "Youth experience multiple complications very early in their disease process. This demonstrates the need to aggressively treat youth-onset Type 2 diabetes as well as continue to strive for better treatment to prevent the disease progression."

Given the high rates of beta cell failure leading to poor glycemic outcomes and the need to intensify treatment, the Restoring Insulin Secretion (RISe) was designed to test interventions targeted to preserve or improve β-cell function in prediabetes or early type 2 diabetes. In the youth arm of the study, metformin or a short course of glargine followed by metformin was used to preserve beta cell function. The RISE Pediatric Medication Study found that beta cell function — key to the body's ability to make and release insulin — declined in both groups during treatment and worsened after treatment ended. This again demonstrated the need for early intervention to preserve beta cell function in youth.

Given the aggressive nature T2DM, future studies will be focused on identifying predictors that will differentiate youth that progress to beta cell failure and the role that insulin resistance in puberty in beta cell failure. Once these predicting factors are identified, intervention trials will be designed to preserve beta cell function in youth, improving glycemic control and preventing long-term complications.

Jennifer Chadwick, B.S. (Choctaw)
Native American Diabetes Research Program Coordinator
Department of Pediatrics

Native American Research Partners

This summer, Harold Hamm Diabetes Center was invited to participate in community health fairs. Attending health fairs throughout Oklahoma is an honorable opportunity for the center to meet Oklahomans and to provide prevention and treatment education information, including the diabetes services offered at Harold Hamm Diabetes Center.

On Saturday, June 26th, HHDC participated in the Shawnee Service Unit Health Fair at the Shawnee Mall. A large event, with healthcare representation from 5 tribes (Absentee Shawnee Tribe, Citizen Potawatomi Nation, Kickapoo Tribe of Oklahoma, Iowa Tribe of Oklahoma, and the Sac and Fox Nation) and approximately 500 attendees.

In August, HHDC was invited to attend a two-day health fair. The annual Indian Falls Creek Health Fair aims to provide medical resources and information for all campers. The event was located in the Fall Creek's Tabernacle Lobby with approximately 300 people stopping by HHDC's informational booth.

For those who are interested in workshops, the Office for Human Research Protections highlighted a practical and ethical framework for conducting and reviewing research involving American Indian/Alaska Native populations in August. The workshop also included a discussion on the importance of including Indigenous Communities in planning, reviewing, and conducting research.

Find more information about the workshop below:

Supporting Ethical Research Involving American Indian/Alaskan Native (AI/AN) Populations — Click here

18th Annual HHDC Research Symposium to be held VIRTUALLY on November 12

The 2021 Harold Hamm Diabetes Center Research Symposium will be held virtually on Friday, November 12, 2021. The symposium will consist of selected oral presentations and Symposia talks by:

UTPAL PAJVANI, M.D., Ph.D., Herbert Irving Associate Professor of Medicine, Division of Endocrinology, Columbia University

LORI SUSSEL, Ph.D., Professor of Pediatrics and Cell & Developmental Biology; Sissel and Findlow Stem Cell Chair, Barbara Davis Center for Diabetes; Associate Vice Chancellor for Basic Science Research University of Colorado, Denver; Professor of Medicine, University of Colorado Denver – Anschutz Medical Campus

KENT THORNBURG, Ph.D., M. Lowell Edwards Chair, Professor of Cardiovascular Medicine; Director, Center for Developmental Health, Knight Cardiovascular Institute; Director, Bob and Charlee Moore Institute for Nutrition & Wellness, Oregon Health Science University

For more information or to RSVP, please click here:

David Sparling, M.D., Ph.D.,
Assistant Professor
Associate Section Chief of Pediatric Endocrinology
CHF Paul and Ann Milburn Chair in Pediatric Diabetes

Clinic Updates

Pediatric Diabetes & Endocrinology Clinic

The pediatrics clinic continues to shine! There have been some recent external stresses on our system (including an ongoing pandemic) but the staff and providers have continued to rise to the challenge, and we are excited for the future.

We look to be bringing several new team members into our family in the coming months and will be sharing more information about them as they arrive. Our biggest recent news is that our amazing RN Brooklyn Gokey passed her CDCES exam, and is now a full-fledged diabetes educator.

Her hard work has really paid off, and she's been an invaluable team member! We continue to be excited about new technologies coming on to help our kids with Type 1 diabetes, and we hope to expand our services for our Type 2 Comprehensive Clinic in the coming months.

Dharambir Sanghera, Ph.D., FAHA,
Professor and Dr. Geoffrey Altshuler Endowed Research Chair in Genetics

In The News

Dharambir Sanghera, PhD, FAHA, Professor and Dr. Geoffrey Altshuler Endowed Research Chair in Genetics was interviewed on KFOR and News 9 to comment on the role of genetics in COVID-19 susceptibility. Dr. Sanghera discussed on the recent discovery of 13 genes to be associated with susceptibility to COVID-19 infection or severity of the disease published in the journal Nature.

Link to stories: News 4 link - click here KWTV News 9 link - click here

New Grants to HHDC Members:

PI: Jed Friedman, Ph.D.
Funding Organization: NIH
Grant Type: R01-DK128416-01
Title of Grant: ***Maternal Obesity and Pediatric NAFLD: Fetal Origins and Long-term outcomes in Non-Human Primates***
Dates: 09/30/2021 – 08/31/2024
Amount Awarded: $2,316,960

MPI: Jed Friedman, Ph.D.
Funding Organization: NIH
Grant Type: R01- DK128187-01
Title of Grant: ***Metformin in Pregnancy: Fetal Consequences & Long- term Offspring Outcomes in a NHP Model***
Dates: 09/30/2021 – 08/31/2025
Amount Awarded: $8,447,463

PI: Jolyn Fernandes, MS, PhD
Funding Organization: PHF
Other Key contributors: HHDC, INBRE, OSCTR
Grant Type: Equipment Grant
Title of Grant: ***Comprehensive High-Resolution Metabolomics Resource: Targeted and Untargeted Platforms***
Dates: July 1, 2021 – June 30, 2022
Amount: $692,430.32

PI: Venkataraman Kalyanaraman, MD
Funding Organization: OASH/OMH
Grant Program: Minority Health Community Programs to Improve Minority Health
Title of Grant: ***Improving Type 2 Diabetes Control and Prevention among American Indians in Central Oklahoma through Family-Centered Intervention***
Dates: 9/30/21 – 9/29/22
Amount: $499,000

PI: Venkataraman Kalyanaraman, MD
Funding Organization: Centers for Disease Control and Prevention
Title of Grant: ***Good Health and Wellness in Indian Country***
Dates: 10/01/21 – 10/01/25
Amount: $375,000

PI: Tiangang Li, PhD
Funding Organization: OCAST
Grant Type: FY21 Health Research Program
Title of Grant: ***Sulfur amino acid metabolism in the pathogenesis of fatty liver disease***
Dates: 11/1/2021 – 10/31/2024
Amount Awarded: $135,000

PI: Tieming Liu, Ph.D.
Funding Organization: National Eye Institute at NIH
Grant Type: R01- EY033861-01
Title of Grant: ***Harnessing Tensor Information to Improve EHR Data Quality for Accurate Data-driven Screening of Diabetic Retinopathy with Routine Lab Results***
Dates: 09/01/2021 – 08/31/2025
Amount Awarded: $1,200,000

PI: Chongle Pan, Ph.D.
Funding Organization: NIH, NCCIH and NIGMS
Grant Type: R01
Title of Grant: ***Proteomic Stable Isotope Probing as a Novel Approach for Linking Prebiotics with Active Gut Microbiota***
Dates: 08/15/2021 – 05/31/2026
Amount Awarded: $1,800,000

Co-PI: Dharambir Sanghera, PhD
Funding Organization: Presbyterian Health Foundation
Grant Type: Team Science Grant
Title of Grant: ***Serum Biomarkers of the Ischemic Stroke Core in Patients with Large Vessel Occlusion***
Dates: 7/1/2021 – 6/30/2022
Amount: $100,000

PI: David Sparling, MD
Funding Organization: OCAST
Grant Type: FY21 Health Research Program
Title of Grant: ***The Initial Characterization of the Novel Adipokine CRISPLD2***
Dates: 11/1/2021 – 10/31/2024
Amount Awarded: $135,000

HHDC Members New Publications:

Unnikrishnan, A., Matyi, S., Garrett, K., Ranjo-Bishop M., Allison D., Ejima K., Dickinson S., and **Richardson A** (2021). A Reevaluation of the Effect of Dietary Restriction on Different Recombinant Inbred (RI) Lines of Male and Female Mice. bioRxiv 2021.06.25.449984; doi: https://doi.org/10.1101/2021.06.25.449984. ***Accepted in Aging Cell***.

Elsakr JM, Zha SK, Ricciardi V, Dean TA, Takahashi DL, Sullivan E, Wesolowski S, Carrie E. McCurdy CE, Kievit P, **Friedman JE**, Aagaard KM, Digna R. Velez-Edwards DR, Gannon M. Western-style diet consumption impairs maternal insulin sensitivity and glucose metabolism during pregnancy in a Japanese macaque model. Scientific Reports, Jun 21;11(1):12977, 2021. PMID: 34155315.

Thornburg K, Hill, D, Bertram J, Kronke C, Kolahi KS, and **Friedman JE**. Structural Consequences of Fetal Neonatal Programming. In: *Developmental Origins of Health & Disease*, second edition, Poston, Godfrey, Gluckman and Hanson (Eds). Cambridge University Press, Shaftesbury Road, Cambridge CB2 8BS, UK, 2021.

Jonscher KR, Chowanadisai W, and Rucker RB. Pyrroloquinoline-quinone is more than an antioxidant: A vitamin-like accessory factor important in health and disease prevention. Biomolecules, 2021 (In press).

Hu, J., Zhu, M., Li, D., Wu, Q., **Le, Y**. (2021) VEGF as a direct functional regulator of photoreceptors and a contributing factor for diabetes-induced alteration of photoreceptor function. *Biomolecules*, 11, 988. doi.org/10.3390/biom11070988. PMC8301820.

Mandala A, Chen W, Armstrong A, Malhotra M, Chavalmane S, McCommis K, Chen A, Carpenter D, Biswas P, and Gnana-Prakasam J. ***PPARα Agonist Fenofibrate Attenuates Iron Induced Liver Injury in Mice by Modulating the Sirt3 and β-catenin Signaling***. Am J Physiol Gastrointest Liver Physiol. 2021 Sep 1;321(4):G262-G269. doi: 10.1152/ajpgi.00129.2021. Epub 2021 Jul 21. PMID: 34287090.

Rossetti ML, Dunlap KR, Salazar G, Hickner RC, Kim JS, Chase BP, **Miller BF**, Gordon BS. Systemic delivery of a mitochondria targeted antioxidant partially preserves limb muscle mass and grip strength in response to androgen deprivation. Mol Cell Endocrinol. 2021 Sep 15;535:111391.. PMID: 34245847

Griesel, B. A., Matsuzaki, S., Batushansky, A., Griffin, T. M., Humphries, K. M., **Olson, A**. L. (2021). PFKFB3-dependent glucose metabolism regulates 3T3-L1 adipocyte development. *The FASEB Journal*, 35(7). DOI: 10.1096/fj.202100381rr

Dogra, S., Neelakantan, D., Patel, M. M., Griesel, B., **Olson, A**. L., Woo, S. (2021). Adipokine Apelin/APJ Pathway Promotes Peritoneal Dissemination of Ovarian Cancer Cells by Regulating Lipid Metabolism. *Molecular cancer research* : MCR. PMID: 34172534. DOI: 10.1158/1541-7786.MCR-20-0991

R. Selvarani, S. Mohammed, and **A. Richardson**. *"Effect of rapamycin on aging and age-related diseases—past and future."* GeroScience, 43: 1135-1158, 2021.

A. Richardson. *"You have come a long way baby: Five decades of research on the biology of aging from the perspective of a researcher studying aging."* J. Gerontol. A Biol. Sci. Med. Sci., 76: 57-63, 2021

S. Mohammed, E.H. Nicklas, N. Thadathil, R. Selvarani, G.H Royce, M,Kinter, **A, Richardson**, and S.S. Deepa. *"Role of necroptosis in chronic hepatic inflammation and liver diseases in a mouse model of increased oxidative stress."* Free Radical Biol. Med., 164: 315-328, 2021.

K. Kurup, S. Matyi, C.B. Giles, J.D. Wren, K. Jones, A. Ericsson, D. Raftery, L. Wang, D. Promislow, **A. Richardson**, and **A. Unnikrishnan**. *"Calorie restriction prevents age-related changes in the intestinal microbiota."* Aging (Albany NY), 13: 6298-6329, 2021.

R.A. Towner, R. Gulej, M. Zalles, D. Saundres, N. Smith, M. Lerner, K.A. Morton, and **A. Richardson**. *"Rapamycin restores brain vasculaure, metabolism, and blood-brain barrier in an inflammaging model."* GeroScience, 43: 563-578, 2021.

HHDC Members New Publications:

Bejar CA , Goyal S, Afzal A, Mangino M, Zhou A, Most PVD, Yanchun B, Gupta V, Smart MC, Walia GK, Verweij N, Harst PVD, Power C, Prahbakaran D, Singh JR, Mehra NK, Wander GS, Ralhan S, Kinra S, Kumari M, De Borst MH, Hyppönen E, Spector TD, Nordestgaard BG, Blackett PR, **Sanghera DK**. A Bidirectional Mendelian Randomization Study to Evaluate the Causal Role of Vitamin D Deficiency in Type 2 Diabetes. ***Nutrition Journal*** (2021): 21:1-11

Goyal S, Bejar C, Zhang W, Tanigawa Y, Chai JF, Almeida M, Sim X, Chainakul J, Ramiu JG, Seraphin C, Apple B, Vaughan A, Muniu, J, Peralta J, Lehman DM, Ralhan S12, Wander GS, Singh JR, Mehra NK, Sidorov E, Curran JE, Tai ES, van Dam RM, Cheng CY, Duggirala R, Chambers JC, Blangero J, Sabanayagam C, Rivas M, Kooner JS, **Sanghera DK**. Multi-ethnic Study of Genetics of Dyslipidemia: Role of rare variants in *APOCIII* in cardiovascular disease. ***(2021) Lipids Health and Disease*** (in print)

Diabetes Technology Use for Management of Type 1 Diabetes Is Associated With Fewer Adverse COVID-19 Outcomes: Findings From the T1D Exchange COVID-19 Surveillance Registry. Noor N, Ebekozien O, Levin L, Stone S, **Sparling DP**, Rapaport R, Maahs DM. Diabetes Care. 2021 Aug;44(8):e160-e162. Epub 2021 Jun 18.

Stout MB, Scalzo RL, **Wellberg EA**. Persistent Metabolic Effects of Tamoxifen: Considerations for an Experimental Tool and Clinical Breast Cancer Treatment. Endocrinology. 2021 Sep 1;162(9). PMID: 34161568

TODAY Study Group, Shah AS, El Ghormli L, Gidding SS, Hughan KS, Levitt Katz LE, Koren D, **Tryggestad JB**, Bacha F, Braffett BH, Arslanian S, Urbina EM. Longitudinal changes in vascular stiffness and heart rate variability among young adults with youth-onset type 2 diabetes: results from the follow-up observational treatment options for type 2 diabetes in adolescents and youth (TODAY) study. Acta Diabetol. 2021 Sep 20. Epub ahead of print. PMID: 34542729.

Todd JN, Kleinberger JW, Zhang H, Srinivasan S, Tollefsen SE, Levitsky LL, Levitt Katz LE, **Tryggestad JB**, Bacha F, Imperatore G, Lawrence JM, Pihoker C, Divers J, Flannick J, Dabelea D, Florez JC, Pollin TI. ***Monogenic Diabetes in Youth With Presumed Type 2 Diabetes: Results From the Progress in Diabetes Genetics in Youth (ProDiGY) Collaboration***. Diabetes Care. 2021 Aug 6;. [Epub ahead of print] PubMed PMID: 34362814.

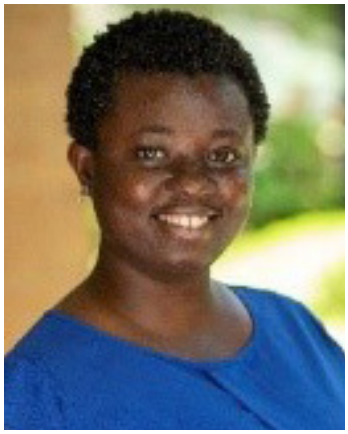
Bjornstad P, Drews KL, Caprio S, Gubitosi-Klug R, Nathan DM, Tesfaldet B, **Tryggestad JB**, White NH, Zeitler P. ***Long-Term Complications in Youth-Onset Type 2 Diabetes***. N Engl J Med. 2021 Jul 29;385(5):416-426. PubMed PMID: 34320286.

Manna Li, Ming Qian, Kathy Kyler, **Jian Xu**. Adipose Tissue-Endothelial Cell Interactions in Obesity-Induced Endothelial Dysfunction. Front Cardiovasc Med. 2021; 8: 681581. Published online 2021 Jul 1. doi: 10.3389/fcvm.2021.681581. PMCID: PMC8282205 PMID: 34277732

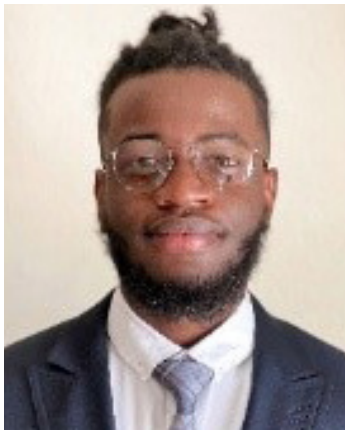
New HHDC Lab Staff:

Yung Dai (Demmy) Clayton
Graduate Student
Li Lab

Jacob Farriester, MS
Staff Research Assistant
Rudolph Lab

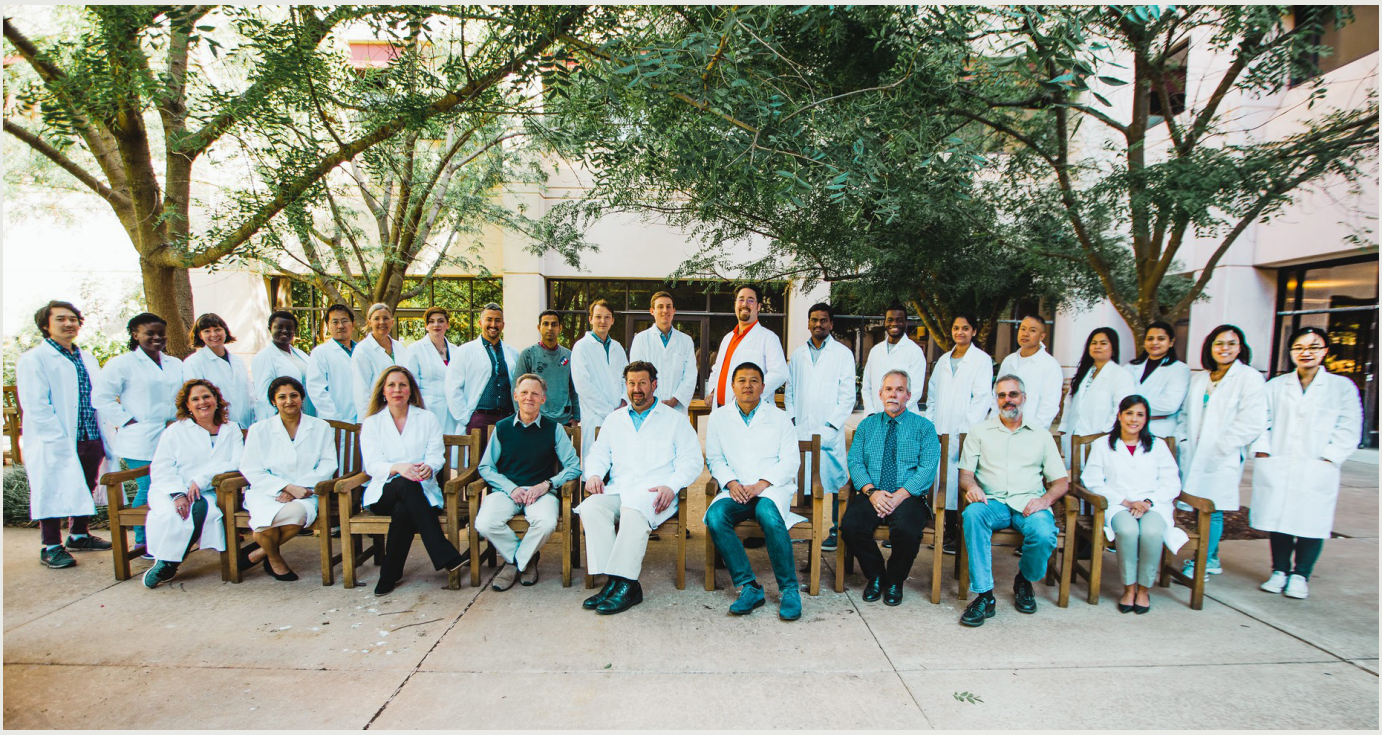


Gertrude Kyere-Davies
Graduate Student
Rudolph Lab



Abby Udeme
Laboratory Research Technician
Wellberg Lab

Not Pictured:
Nisha Thomas, Ph.D.
Postdoctoral Research Fellow | Wellberg Lab



SAVE THE DATE

2021 HHDC Research Symposium

Friday, November 12, 2021 | Virtual