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# Better Outcomes for Life.

2021 Research Report



 American  
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# Introduction

For over fifty years, the American Diabetes Association® (ADA) has provided critical funding to support innovative research that advances treatment and improves the lives of people with diabetes. As the ecosystem of diabetes continues to grow, the ADA remains committed to funding research, as well as identifying and nurturing the next generation of scientists.

**Robert A. Gabbay, MD, PhD**, Chief Science and Medical Officer says the ADA's ability to fund research quickly has been especially valuable throughout the pandemic. Health inequities in the U.S. were recognized prior to the pandemic, but COVID-19 was a magnifier of chronic problems in health care.

"We knew in May of 2020, that we needed to pivot and focus on COVID. Literally, in a matter of weeks, we had a call for applications, received and reviewed a large number of exceptional submissions, and selected the best of the best. We awarded that money rapidly so the research could make the most significant impact for those living with diabetes as soon as possible," says Dr. Gabbay.

The momentum was sustained through the 2021 Health Disparities targeted research grants, featured in the following pages. Applications for these grants were submitted by researchers who were tasked with showcasing innovative approaches to address inequities. Grant awards included research on engaging grandmothers in care, using texting to improve management among the diabetes homeless community, culinary education as a mechanism for diabetes education, and understanding trauma in diabetes diagnosis.

Dr. Gabbay says, "In this report, you will see how there are several important discoveries and ideas that have come from of these grantees that reinforce the benefits of targeted research." Research conducted by stem cell biologist Shuibing Chen, PhD discovered that the COVID-19 virus could attack the pancreas and damage insulin-producing cells, which then increases the rates of diabetes diagnoses.

VIEW DR. BOB GABBAY'S  
WELCOME MESSAGE



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Robert Gabbay



Looking ahead to 2022, the ADA will fund three more targeted areas of research, including the role of nutrition and behavior change to prevent diabetes. With more and more people developing diabetes, one of the enduring goals for the ADA is opening new doors of inquiry and bending the curve on the rate of diagnosis.

"Another targeted area is an effort that we've been leading for several years around precision medicine—identifying the right treatment for the right person at the right time," says Dr. Gabbay.

Historically, diabetes has been defined as two different diseases, type 1 and type 2. A more accurate definition is one that encompasses a variety of subtypes resulting from a variety of causes. Researching digital health technology and leveraging big data to have a better understanding of these differences enables a more precise, individualized treatment plan.

In 2022, targeted efforts will include identifying and nurturing the next generation of researchers. This priority ensures we help build the future pipeline of scientists/investigators, cultivate brilliant minds early, and invest in innovation or support ingenuity.

One of these critical programs is the Pathway to Stop Diabetes® initiative, an innovative and revolutionary project, which supports the most promising scientists in the world as they undertake exciting, early-stage research. We feature two of these Pathway researchers—Maureen Monaghan, PhD, CDCES, and Kathleen Page, MD—and their efforts to change the lives of people with type 1 and type 2 diabetes in this report.

Overall, this Annual Report captures our efforts in 2021, which were made possible by the generous support of the ADA community. We remain grateful for your partnership and look forward to working together to stop diabetes and all its burdens.

“Having just celebrated the 100<sup>th</sup> anniversary of the discovery of insulin, we are all reminded of the critical role of research in improving the lives of people affected by diabetes.”

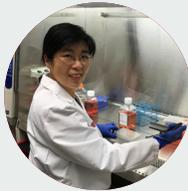
—Robert A. Gabbay, MD, PhD, Chief Science and Medical Officer

# COVID Research

In early 2020, as the COVID-19 pandemic began to circle the globe, the ADA responded quickly by identifying and investing in 10 research projects to investigate the link between COVID-19 and diabetes. In 2021, we began to see the dividends as we developed a better understanding of why people with obesity and diabetes are at higher risk for hospitalization, serious outcomes and death.

Intriguing findings by awardee **Shuibing Chen, PhD** (Weill Cornell Medicine)

suggest the virus causing the COVID-19 pandemic can infect insulin-producing beta cells and change their identity. In a two-pronged approach, the research team identified the virus in pancreatic tissue of patients who died of COVID-19. They demonstrated that they could readily infect cultured pancreatic cells in the laboratory and observe a striking change in the beta cells causing them to produce significantly less insulin and more glucagon.



Work by awardee **Tracey Lynn**

**McLaughlin, MD** (Stanford University)

may help explain why individuals with obesity are at higher risk of severe illness and death. Dr. McLaughlin found that the COVID-19 virus can directly infect fat and associated immune cells cultured in the laboratory. This could elicit a dramatic inflammatory response with the release of inflammatory cytokines that are also seen in the blood of very sick COVID-19 patients. The team's work suggests that the more fat cells a person has, the larger the reservoir for the virus to multiply. This increases the likelihood of an inflammatory response which can trigger problems throughout the body.



Research by awardee **Joshua L. Denson, MD** (Tulane University) followed outcomes for patients hospitalized for COVID-19 in New Orleans at the peak of the pandemic. Individuals with metabolic syndrome (characterized by having at least three of

the four conditions: hypertension, obesity, diabetes, and low HDL) were 3.4 times more likely to die from COVID-19 and nearly five times more likely to be admitted to an intensive care unit (ICU), need a ventilator, or develop acute respiratory distress syndrome. These findings suggest that the underlying inflammation seen with metabolic syndrome may be the driver leading to these more severe cases.



Studies by awardee **Senta K. Georgia, PhD** (Children's Hospital Los Angeles)

showed that virus delivered to the nose and throat of an animal model could later be found in the beta cells of the pancreas. Detailed electron microscopy of infected

beta cells revealed ultrastructural hallmarks that are seen in the pancreases of people with type 2 diabetes.

While there is still much work to be done, these findings have opened important new avenues of research and helped identify potential therapeutic strategies towards reducing the burden of COVID-19 disease in people with obesity and diabetes.

# Scientific Progress

Virus Research 304 (2021) 198508

Contents lists available at ScienceDirect

**Virus Research**

journal homepage: [www.elsevier.com/locate/virusres](http://www.elsevier.com/locate/virusres)

## SARS-CoV-2 specific memory T cell epitopes identified in COVID-19-recovered subjects

Juan Zhao<sup>a,b</sup>, Ling Wang<sup>a,b</sup>, Madison Schank<sup>a,b</sup>, Xindi Dang<sup>a,b</sup>, Zeyuan Lu<sup>a</sup>, Dechao Cao<sup>a</sup>, Sushant Khanal<sup>a,b</sup>, Lam N. Nguyen<sup>a,b</sup>, Lam N.T. Nguyen<sup>a,b</sup>, Jinyu Zhang<sup>a,b</sup>, Yi Zhang<sup>a</sup>, James L. Adkins<sup>a</sup>, Evan M. Baird<sup>a</sup>, Xiao Y. Wu<sup>a,b</sup>, Shunbin Ning<sup>a,b</sup>, Mohamed El Gazzaz<sup>a</sup>, Jonathan P. Moorman<sup>a,b,c</sup>, Zhi Q. Yao<sup>a,b,c,d</sup>

<sup>a</sup> Center of Excellence for Inflammation, Infectious Disease and Immunity, Quillen College of Medicine, East Tennessee State University, Johnson City, Tennessee, United States  
<sup>b</sup> Division of Infectious Diseases, Department of Internal Medicine, Quillen College of Medicine, ETSU, Johnson City, Tennessee 37614, United States  
<sup>c</sup> Hepatitis (HCV/HBV/HIV) Program, James H. Quillen VA Medical Center, Department of Veterans Affairs, Johnson City, Tennessee 37614, United States

Diabetes Care

Volume 44, Issue 6  
June 2021

**Spikes in Diabetic Ketoacidosis Rates in Pediatric Type 2 Diabetes During the COVID-19 Pandemic**

OBJECTIVE  
The impact of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on the incidence of new-onset type 2 diabetes and diabetic ketoacidosis (DKA) is unclear. It is unknown whether the co-occurrence of DKA related to adult patients with type 2 diabetes is an issue for youth during the coronavirus disease 2019 pandemic.

RESEARCH DESIGN AND METHODS  
A retrospective single-center medical record review was conducted in a large, urban children's hospital of pediatric subjects presenting with new-onset type 2 diabetes between March and August of 2020 to 2021.

PLOS MEDICINE

Cardiometabolic risk factors for COVID-19 susceptibility and severity: A Mendelian randomization analysis

Aston Leung<sup>1</sup>, Joanne B. Cole, Laura N. Brenner, James B. Meigs, Josee C. Florez, Josep M. Mercader

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bioRxiv

THE PREPRINT SERVER FOR BIOLOGY

bioRxiv posts many COVID-19-related papers. A reminder to guide health-related behavior or be reported in the press as

## SARS-CoV-2 infects human adipose response consistent with severe COVID

Giovanny J. Martínez-Colón, Kalani Ratnasiri, Heping C. Ren, Verma, Han Chen, Jason R. Andrews, Kirsten D. F. Garry, P. Nolan, Christian M. Schürch, Matthias S. Matte

<https://doi.org/10.1101/2021.10.24.465626>

This article is a preprint and has not been certified by peer review

Abstract | Full Text | Info/History | Metrics

The COVID-19 pandemic, caused by the viral millions of individuals around the world. Obese outcomes, but the underlying mechanism is unclear. Human adipose tissue from multiple depots is infected elicits an inflammatory response, including mediators of severe COVID-19. We identify two

BMC Part of Springer Nature

**Biology of Sex Differences**

Research | Open Access | Published: 06 February 2021

**Clinical characteristics and outcomes in women and men hospitalized for coronavirus disease 2019 in New Orleans**

Yilin Yoshida, Gilliet, Margot L. Brown, Yuanhao Zu, Sarah M. Wilson, Sabreen A. Ahmed, Saritha Trinulasetty, Draagna Lore, Marie Krouse-Wood, Joshua L. Denison & Franck Mauvais-Jarvis

Biology of Sex Differences 12, Article number: 20 (2021) | Cite this article

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Abstract  
Determine if sex differences exist in clinical characteristics and outcomes of adults hospitalized for coronavirus disease 2019 (COVID-19).

Design  
Case series study.

Setting and participant  
Sequentially hospitalized adult patients in New Orleans, LA.

Measures and outcome  
Measures included demographic characteristics, clinical characteristics, and outcomes.

Cell Metabolism

**Clinical and Translational Report SARS-CoV-2 infection induces beta cell transdifferentiation**

Xuming Tang<sup>1,2,3</sup>, Skyler Uhl<sup>2,3,4</sup>, Tuo Zhang<sup>2,3,4</sup>, Dongxiang Xue<sup>1,2,3</sup>, Bo Li<sup>1,2,3</sup>, J. Lon L. Bonnyassie<sup>2,3</sup>, Narisu Narisu<sup>1</sup>, Michael R. Erdos<sup>1</sup>, Yaron Bram<sup>1</sup>, Vasunel<sup>1</sup>, Lauretta A. Lacko<sup>1</sup>, Zaw Min<sup>1</sup>, Jean K. Lim<sup>1</sup>, Alain C. Borczuk<sup>1</sup>, Jenny Xiang<sup>1</sup>, A. Chengyang Liu<sup>1,2</sup>, Benjamin R. tenOver<sup>1,2</sup>, Robert E. Schwartz<sup>1,2,3,4</sup>, and Shuib<sup>1</sup>

<sup>1</sup>Department of Surgery, Weill Cornell Medicine, 1300 York Avenue, New York, NY 10005, U.S.A.  
<sup>2</sup>Department of Microbiology, Icahn School of Medicine at Mount Sinai, 1468 Madison Avenue, New York, NY 10005, U.S.A.  
<sup>3</sup>Genomics Resources Core Facility, Weill Cornell Medicine, 1300 York Avenue, New York, NY 10005, U.S.A.  
<sup>4</sup>Institutional PhD Program in Chemical Biology, Weill Cornell Medicine, The Rockefeller Center, New York, NY 10005, U.S.A.

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Article | Open Access | Published: 10 March 2021

**Blockade of SARS-CoV-2 spike protein-mediated cell-cell fusion using COVID-19 convalescent plasma**

Lina Wang, Jun Zhao, Liem N. T. Nguyen, James L. Adkins, Madison Schank, Sushant Khanal, Lam N. Nguyen, Xindi Dang, Dechao Cao, Bai Krishna Chand, Tharun, Zeyuan Lu, Jinyu Zhang, Yi Zhang, Xiao Y. Wu, Mohamed El Gazzaz, Shunbin Ning, Jonathan P. Moorman & Zhi Q. Yao

Scientific Reports 11, Article number: 5568 (2021) | Cite this article

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JAMA Network

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Research Letter | Public Health

July 2, 2021

**Evaluation of Health Equity in COVID-19 Vaccine Distribution Plans in the United States**

Amber Hardeman, MD, MPH, MSc<sup>1</sup>; Taylor Wong, BA<sup>2</sup>; Joshua L. Denison, MD, MSc<sup>3,4</sup>, et al.

JAMA Network Open. 2021;4(7):e2115653. doi:10.1001/jamanetworkopen.2021.15653

COVID-19 Resource Center

Introduction  
SARS-CoV-2 and the resulting COVID-19 pandemic has affected more than 106 million people worldwide with more than 2.31 million deaths as of February 2021.<sup>1</sup> Upon the emergency use authorization for a COVID-19 vaccine by the US Food and Drug Administration, the National Academies of Sciences, Engineering, and Medicine developed an overarching framework to assist US policy makers in planning for equitable allocation of COVID-19 vaccines.<sup>2</sup> Minority populations have approximately 5 times greater risk of adverse COVID-19 consequences related to social determinants of health that may exacerbate patient comorbidities.<sup>3,4</sup> Equitable distribution could eliminate vaccination disparities while mitigating the disproportionate burden of COVID-19.

Key Points  
**Question** What is the risk of acute respiratory distress syndrome (ARDS) and death in patients with COVID-19 with metabolic syndrome?  
**Findings** In this cohort study including 46 441 patients hospitalized for COVID-19, metabolic syndrome was associated with significantly increased odds of ARDS and death. With each metabolic syndrome criterion added from 1 to 4 criteria, the risk of ARDS significantly increased in an additive fashion.  
**Meaning** These findings suggest that metabolic syndrome and its associated comorbidities were critical risk factors for

Critical Care Medicine

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**Outcomes of Patients With Coronavirus Disease 2019 Receiving Organ Support Therapies: The International Viral Infection and Respiratory Illness Universal Study Registry**

Domen, Ioan Raicu MD PhD, Ames MBBS<sup>1</sup>, Sheldrick, Christopher R. PhD<sup>2</sup>, Kumar, Vishalika K. MD, MBA<sup>3</sup>, Boman, Karan<sup>4</sup>, Bolotta, Scott PhMD<sup>5</sup>, Bansal, Vikas MBBS, MPH<sup>6</sup>, Hurley, Michael O. PhD<sup>7</sup>, Hsu, Chenku, Sreeraksh MD, PhD<sup>8</sup>, Williams, Patrick K. MD<sup>9</sup>, JG, Kenneth W. MD<sup>10</sup>, Martin, HP, Rahul MBBS, MBA<sup>11</sup>

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Diabetes Care Volume 44, January 2021

**Metabolic Syndrome and COVID-19 Mortality Among Adult Black Patients in New Orleans**

Diabetes Care 2021;44:188–193 | <https://doi.org/10.2337/4c20-1714>

OBJECTIVE  
Coronavirus disease 2019 (COVID-19) mortality is high in patients with hypertension, obesity, and diabetes. We examined the association between hypertension, obesity, and diabetes, and mortality in patients hospitalized in New Orleans during the peak of the COVID-19 pandemic.

DESIGN  
A retrospective cohort study of 1,287 consecutive patients with COVID-19 hospitalized at Hennepin, LA, from 30 March to 5 April 2020. METS was defined as the presence of at least three of the following criteria: waist circumference ≥102 cm in men and ≥88 cm in women; systolic blood pressure ≥130 mmHg; fasting glucose ≥100 mg/dL; or triglycerides ≥150 mg/dL. Individuals who were hospitalized with COVID-19 and died were compared with those who survived.

# Health Disparities



During 2021, the ADA prioritized targeted research awards in the area of health disparities. Applicants submitted projects that were action-oriented and had an emphasis on implementation. The following projects were awarded funding in November 2021.



## Diabetes Learning in Virtual Environments Just in Time for Community Reentry

**Louise A. Reagan, PhD**  
University of Connecticut School of Nursing

People with **type 1 and type 2 diabetes** reenter the community after coming from high-security prison environments with constrained self-care lacking critical knowledge and skills for diabetes self-management regarding what foods to eat, how to control their blood glucose, how and when to take insulin and to access health care.

### The specific aims of this study are to:

1. Examine the feasibility and acceptability of the Diabetes Learning in Virtual Environments Just In time for Community Reentry (Diabetes LIVE JustICE) mobile application.
2. Examine the preliminary short-term impact of Diabetes LIVE JustICE compared to usual pre-release care supplemented with low literacy diabetes education on clinical, social, cognitive and behavioral outcomes.



## Improving Appetite Self-Regulation in African Americans with Type 2 Diabetes

**Rachel Goode, PhD**  
University of North Carolina at Chapel Hill

Diabetes self-management education and support (DSMES) services have produced suboptimal results among African Americans living with **type 2 diabetes**. One potential reason for this lack of efficacy is that DSMES does not address binge and emotional eating.

### The objectives for this research are to:

1. Examine the feasibility and acceptability of a three-month digital DSMES + appetite self-regulation (ASE) intervention among African Americans with type 2 diabetes and reported binge eating.
2. Assess the intervention's preliminary efficacy in improving A1C.

By examining the preliminary impact of an ASE program in African Americans with type 2 diabetes, this research will set the foundation to develop an effective intervention to improve long-term management of type 2 diabetes.



## SMS Texting for Diabetes Control among Homeless Persons

**Ramin Asgary, MD**  
The George Washington University

Approximately 3.5 million Americans are homeless (80% in shelters). **Type 2 diabetes** is common among homeless people. About 44% of homeless people with diabetes have uncontrolled diabetes. Strategies exist that support diabetes self-care and target behaviors for adherence to improve diabetes management, but these strategies are not accessible to homeless people.

**In collaboration with community organizations, this study seeks to:**

1. Evaluate the efficacy of a six-month text program for type 2 diabetes as the intervention vs. an attention control on A1C changes and adherence to diabetes self-care, medications, and appointments in homeless people with uncontrolled diabetes over 21 years-old.
2. Assess patients' and providers' attitude, acceptability and experience of texting strategy in homeless people with uncontrolled diabetes.



## Healthy Outcomes through Peer Educators (HOPE)

**Eva Marie Vivian, PharmD**  
University of Wisconsin-Madison

Grandmother caregivers influence their grandchildren's eating patterns by modeling their own eating behaviors and food preferences. Empowering African American grandmothers to serve as positive role models should facilitate behavior change and healthy behaviors for themselves and their grandchildren.

This study will augment the Diabetes Prevention Program (DPP) with a novel peer support program, Healthy Outcomes through Peer Educators (HOPE), where African American grandmothers serve as peers to other

grandmothers, providing the needed encouragement and positive reinforcement essential for successful and sustainable behavior change. Sixty grandmothers with **prediabetes** will be randomized to DPP or DPP + HOPE.

**The specific aims are to:**

1. Examine the feasibility and acceptability of the combined DPP + HOPE intervention for African American grandmothers.
2. Assess if DPP + HOPE decreases the chance of developing diabetes.
3. Assess the potential effectiveness of HOPE to reduce diabetes risk factors among overweight/obese African American grandmothers.



## Intensive Behavioral Health Intervention for Improving Health Equity in Pediatric Diabetes

**Anthony T. Vesco, PhD**  
Ann and Robert H. Lurie Children's Hospital of Chicago

Novel Interventions in Children's Healthcare (NICH) is a wrap-around behavioral health program targeting health disparities in high-risk youth with **type 1 and type 2 diabetes**. These high-risk youth have repeated A1Cs over 10% and/or repeated preventable diabetes-related hospital admissions. NICH improves health outcomes and is hypothesized to work by addressing social vulnerabilities, such as food and housing insecurity, health care access, and daily functioning of youth with diabetes and their caregivers. However, no scientific studies have examined these hypothesized mechanisms of action explaining why NICH is successful.

The proposed study will address this gap by assessing NICH impact on social vulnerability and daily functional impairment, and improvements in each as mediators of the impact of NICH relative to a high-risk treatment as usual comparison. The study will evaluate the predictive validity of an adapted caregiver-reported social vulnerability measure as a decision support tool for earlier referrals. Social vulnerability and functional impairment will be collected monthly for a year in two study locations.



## Pilot Study of a Culturally Tailored Diabetes Education Curriculum with Real-Time Continuous Glucose Monitoring in a Latinx Population with Type 2 Diabetes

Nicole M. Ehrhardt, MD  
University of Washington

Diabetes education is a cornerstone of treatment, but its implementation has been hindered by barriers, including the lack of culturally tailored content and limited patient access. Real-time continuous glucose monitoring (RT-CGM) is a patient-empowering tool to improve glycemic control but is not available to most peoples with type 2 diabetes, and scant data exist on its use in underserved populations.

Dr. Ehrhardt and colleagues hypothesize that a culturally tailored diabetes self-management education and support (DSMES) services curriculum delivered remotely through a team-based approach will improve glycemic control and health-related behaviors and enhance patient access in Latinx individuals with type 2 diabetes. We also hypothesize that RT-CGM coupled with DSMES will provide additional benefit for glycemia and behavioral change.



## Tailoring Initial Type 2 Diabetes Care to Meet the Needs of Younger Latinx Adults: A Randomized Pilot Study

Anjali Gopalan, MD  
Kaiser Permanente Northern California

Younger Latinx adults with **type 2 diabetes** have lower odds of achieving an A1C of less than 7% during the year following diagnosis compared to younger white adults, which is concerning given the lasting benefits conferred by optimal early glycemic control (i.e., the legacy effect). Care interventions that improve glycemic control in newly diagnosed younger Latinx adults could reduce long-term health disparities. However, current care approaches do not

typically address the distinct life demands of younger adults (e.g., parenting young children, working full-time). In addition, diabetes care that focuses primarily on individual well-being may be at odds with Latinx cultural values that prioritize family well-being (e.g., preventing diabetes in children).

**This study addresses these shortcomings in current diabetes care via two aims:**

1. Collaborating with patient and provider stakeholders to develop a diabetes care pathway tailored to meet the needs of younger Latinx adults who are caregivers to non-adult children.
2. Conducting a mixed-methods, patient-level, randomized pilot trial of the developed diabetes care pathway (vs. usual care) to assess effectiveness (A1C change at six-months) and feasibility.



## Diabetes Inspired Culinary Education (DICE): An Innovative Approach to Type 1 Diabetes Management for At-Risk Youth

Catherine R. McManus, PhD  
Case Western Reserve University

The steadily rising prevalence of **type 1 diabetes** is of heightened concern for youth of racial/ethnic minority due to significant disparities in disease prevalence, treatment, and health outcomes. Culinary medicine, the integration of food preparation/cooking with the science of medicine, shows great potential to mitigate these disparities. Yet, there is a complete absence of culinary medicine interventions for youth with type 1 diabetes. Therefore, Diabetes Inspired Culinary Education (DICE) has been designed as an innovative culinary medicine intervention to mitigate racial/ethnic and socioeconomic status (SES) disparities in the treatment and health outcomes of high-risk 8–16 year old youth with type 1 diabetes.

The goal of this study is to improve glycemic control and diabetes self-management among high-risk youth by evaluating the impact of the DICE intervention on youth (A1C, diabetes management behaviors, self-efficacy, and health care utilization) and family (well-being, social interactions, and mealtime environment) outcomes.



## Increasing Access to Diabetes Technology: A Multidisciplinary Intervention to Reduce Disparities and Improve Outcomes

**Kimberly Garza, MPH**  
Ann and Robert H. Lurie Children's Hospital of Chicago

Adolescents with **type 1 diabetes** are at high risk for poor glycemic and psychosocial outcomes. A major barrier to effective care for adolescents is the current underutilization of technology, particularly for racial and ethnic minorities and those on public insurance. There are many documented barriers that prevent technology use and lead to discontinuation in adolescents, including concerns about wear, social concerns, and worries about technology use. The proposed study will examine the effectiveness of a multidisciplinary intervention aimed at addressing barriers to continuous glucose monitoring (CGM) use in adolescents with type 1 diabetes who either have public insurance and/or identify as racial and ethnic minorities.



## Traumatic Stress, Resilience and Health Disparities in Youth with Diabetes

**Tamaki Hosoda-Urban, PhD**  
Massachusetts General Hospital

Racial/ethnic and sexual/gender minority youth tend to present with compromised glycemic control, which increases their risk for diabetes complications. These individuals also disproportionately experience traumatic or adverse childhood experience (e.g., child abuse, discrimination). Little is known about trauma experience and post-traumatic stress disorder (PTSD) in youth with **type 1 or type 2 diabetes**. Therefore, this project aims to better understand the impact of trauma experience and PTSD symptoms on health disparities and how resilience buffers the impact among youth age 14–25 years with diabetes.

Specifically, this project will examine how diabetes uniquely contributes to developing PTSD symptoms, as well as the associations between PTSD symptoms, other psychiatric

symptoms (e.g., depression), resilience and health outcomes—A1C, diabetes management behaviors—in relation to demographic variables. Additionally, this project aims to implement trauma screening in the diabetes clinic at Massachusetts General Hospital and assess its feasibility and acceptability.



## Group Visits to Improve Technology Use, Glycemic Control, and Quality of Life in High Risk Patients with Type 1 Diabetes

**Jody B. Grundman, MD**  
Children's Research Institute

Continuous glucose monitors (CGM) have been associated with improved glycemic control and health-related quality of life in youth with **type 1 diabetes**; however, use is lowest among youth from low-income households and racial/ethnic minorities. Shared medical appointments (SMA) have shown promise for improving outcomes in adolescents with type 1 diabetes but have not been specifically developed to meet the needs of underserved youth.

### The specific aims of this study are:

1. Evaluate the feasibility and acceptability of SMA.
2. Evaluate the impact of SMA on glycemic control.
3. Evaluate the impact of SMA on self-management skills, diabetes-related quality of life, and treatment satisfaction among underserved children with type 1 diabetes and their caregivers.

“ We can maximize the impact of our research investments by targeting areas that can provide the greatest benefit for people living with diabetes.”

—Robert A. Gabbay, MD, PhD, Chief Science and Medical Officer

# 2022 Targeted Research Awards

There is incredible value in a targeted research strategy. This approach allows the ADA to respond to pressing needs swiftly and decisively. The track record of success has been significant and we expect this to continue in 2022. Our selected priorities for 2022 highlight the need for precision medicine in diabetes, diabetes prevention research, and cultivating the next generation of scientists.

## THE ADA IS COMMITTED TO:

- **Leveraging Nutrition and Lifestyle for Diabetes Prevention across the Lifespan** through research that improves adoption of healthy diets and lifestyles at the individual and community level with interventions tailored to different racial and socioeconomic groups.
- **Leveraging Precision Medicine to Improve the Lives of People with Diabetes.** While this call is broad in scope and encompasses basic through clinical research, emphasis is placed on clinical research and translation.
- **Undergraduate and Graduate Internship Program.** The ADA is committed to fostering the next generation of diabetes researchers and professionals. This initiative focuses on cultivating young investigators and providing them exceptional learning opportunities.

These targeted research topics were selected based on a review of current literature, input from the Research Policy Committee and from the Science & Health Care Council Executive Committee, and consultation with ADA leadership. Targeted research topic areas must meet a specific need in the diabetes research community and must align with ADA strategic priorities.

Each research priority area offers up to four different types of awards (Post-doctoral Fellowships, Junior Faculty Awards, Innovative Clinical and Translational Science Awards, and Innovative Basic Science Awards). Information on submission deadlines can be found at [professional.diabetes.org/research-grants](https://professional.diabetes.org/research-grants).

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# Pathway to Stop Diabetes®

In 2013, the ADA launched its most innovative research initiative yet, Pathway to Stop Diabetes. The Pathway program has a simple, bold vision: Bring 100 brilliant scientists to diabetes research. The program identifies and selects individuals who possess transformative capacity and are considered among the most promising scientists in the world.

The ADA is committed to the acceleration of scientific progress and bringing imaginative vision to reality. The Pathway program creates momentum through long term investments in scientists who are **the best of the best**.

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“ We are investing in the person and giving that person the intellectual freedom to follow the path of discovery. This program is about identifying the best and the brightest and empowering them as they achieve great things in diabetes science.”

—Robert A. Gabbay, MD, PhD, Chief Science and Medical Officer

## PROGRAM GOALS:

- Galvanize critical scientific advancements
- Translate scientific advancements to patient care
- Advance diabetes scientific ingenuity



Our 34 awardees have filed patents, discovered therapeutic approaches, advanced science, and pioneered unique therapies.



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“ I have interacted extensively with several other Pathway awardees. I published a paper in collaboration with Michael Stitzel and Stephen Parker, and established a partnership with Paul Cohen. I am also pleased to note that my alliance with Phillip White has led to the joint filing of a patent application for a novel NASH therapeutic that has received additional financial support to advance our research!”

—Praveen Sethupathy, PhD

# Spotlight on Pathway Recipients

## Accelerator Award 2014

# Kathleen Page, MD

2014 Pathway recipient Dr. Kathleen “Katie” Page is a Physician specializing in diabetes and childhood obesity at the Keck School of Medicine of the University of Southern California (USC). She is an Assistant Professor and practicing Endocrinologist in the Department of Medicine at USC. Dr. Page has an active research program that seeks to understand the causes of obesity and diabetes so that more effective strategies can be developed for reducing the number of people affected by these health conditions.



### **Dr. Page, you are among the first group of researchers to receive the pathway grant. How do you feel looking back?**

Looking back, I remember feeling absolutely thrilled to be among the first group of researchers to receive the Pathway Award. It provided the resources I needed early in my career to establish the *Brain Child Study*, which was the first study in humans to combine state-of-the-art brain imaging with assessments of body fat and metabolic testing to determine how prenatal exposure to maternal gestational diabetes impacts brain pathways that regulate food intake and body weight in children.

### **What have your studies shown and why are they important?**

So far, our studies have shown that prenatal exposure to maternal gestational diabetes may program appetite systems in the brain to favor greater food intake and a higher risk of obesity and insulin resistance in children. We have promising preliminary data suggesting that some of this risk may be attenuated if the children engage in higher levels of physical activity and get better sleep.

### **What are your hopes for this research?**

I think our findings offer some insights on why some people may be more susceptible to weight gain and metabolic

disorders than others. Obesity is a disease and one’s risk for developing obesity may start even before birth. We hope that our findings will help identify children who are at high risk for obesity so that steps can be taken early in life to help prevent obesity and its associated complications.

### **What are the advantages of being a Pathway recipient?**

The Pathway program provides generous funding and allows investigators the freedom to take their work in new directions. In my case, I was able to build onto the Pathway Award with additional NIH (National Institute of Health) funding and have completed neuroimaging and metabolic studies in over 160 children so far. In addition, with institutional funding, my team has started longitudinal studies in the Brain Child cohort to examine how prenatal exposure to gestational diabetes affects brain development and metabolic risks during childhood to adolescence, critical time period for brain plasticity and metabolic changes, and when others have shown that weight gain after gestation exposure accelerates. We are also currently examining how specific lifestyle factors (e.g., physical activity, diet, sleep, etc.) may influence obesity and metabolic risks in the offspring so we can later test the effects of specific interventions on the mitigation of obesity and type 2 diabetes in children. In the long-term, we hope to continue longitudinal studies of the Brain Child Cohort through adulthood to truly test the transgenerational effects of intrauterine exposure to gestational diabetes on risks in the offspring.

### **How has the Pathway mentorship been helpful?**

Unlike most grant mechanisms, the Pathway Award provides junior investigators with a community of scientists—who are among the world’s top diabetes researchers—to discuss problems that arise in the course of conducting the studies. This community helps determine alternative strategies, discuss new findings, and their potential significance, as well as offering advice on career decisions. My mentor is Betsy Seaquist, MD, and she has been incredibly helpful and supportive of my research and my career development.

# Maureen Monaghan, PhD, CDCES

One of the biggest challenges for young adults (YAs) with diabetes is transitioning from pediatric to adult care. Leaving home to attend college or enter the workforce requires adjusting to new schedules, classes, and living arrangements and balancing the day-to-day logistics of diabetes management. This is a critical time of life when intervention and support can influence the trajectories of young adults with diabetes toward positive outcomes.



As the recipient of the 2018 Accelerator grant from the ADA Pathway to Stop Diabetes initiative, Dr. Maureen Monaghan, Associate Professor of Department of Psychology & Behavioral Health at Children's National, has developed a program to successfully help YAs transition from pediatric to adult care. The Pathway program includes one-on-one mentorship from leaders in the diabetes field offering guidance, advice, support, and inspiration.

"I was fortunate to be paired with Dr. Barbara Anderson as my primary mentor," says Monaghan. "Dr. Anderson's support and guidance has significantly advanced my research and career. Her expertise in behavioral interventions helped to inform the design and evaluation of the PREP-DC intervention, and she also helped me navigate some of the unanticipated disruptions due to the COVID-19 pandemic."

“Blending the literature, clinical experience, and behavioral intervention experience, we designed our intervention to build on key transition skills including health communication, empowerment, and how to leverage support networks for the transition to adult care in a structured and meaningful way.”

—Maureen Monaghan, PhD, CDCES

"Part of the goal (with this research) is to help YAs be the primary reporters of their diabetes and make sure they're the ones sharing information with the health care provider."

These communication skills are necessary for productive conversations between YAs and health care professionals (HCP). Preparing for the visit, knowing what questions to ask, and asking for help are among the tools necessary to establish a good relationship between the YA and HCP, which can lead to long term benefits.

"The American Diabetes Association published a position paper on diabetes care for emerging adults in 2011 that highlighted key skills to support the transition from



Barbara J. Anderson, PhD is a behavioral scientist and licensed clinical psychologist with 30 years of experience in diabetes research as well as in clinical work with youth with diabetes and their families. She has published extensively on the relationships between emotional and family factors with adherence, medical, and quality of life outcomes in youth with diabetes. Dr. Anderson is currently working with two multi-site NIH-funded trials—one with youth with type 1 and families and the other with youth with type 2 and families. Her favorite work is advocacy for families living with diabetes. Dr. Anderson is currently Professor of Pediatrics-Psychology at Baylor College of Medicine in Houston, TX.



pediatric to adult diabetes care,” says Dr. Monaghan. “Blending the literature, clinical experience, and behavioral intervention experience, we designed our intervention to build on key transition skills including health communication, empowerment, and how to leverage support networks for the transition to adult care in a structured and meaningful way.”

When YAs leave the nest, one of the first challenges they face is creating a safety net. Many have been accustomed to the support of parents, teachers, friends, and an established relationship with their HCP. Transitioning to college or the workforce often means leaving that safety net behind, which can feel isolating.

“Rebuilding that support network is crucial because diabetes is never do-it-yourself, it’s absolutely a team-based effort,” says Dr. Monaghan.

PREP-DC is a multicomponent intervention program that stands for: Plan, Reflect, and Engage with Providers in Diabetes Care. Behavioral interventions were designed to help YAs advocate for themselves, ask questions, disclose risky behaviors, and go into that new relationship feeling more confident and competent.

Participants in the nine-month, remotely delivered intervention ranged in age from 17–22. They completed questionnaires, talked with researchers on the phone or with video conferencing, and received customized text messages.

Hodalís Gaytan was diagnosed with type 1 diabetes when she was 14 and has been very active in the diabetes community at Children’s Health. As a participant in PREP DC, she says the most helpful skill she learned was what to look for in a provider.

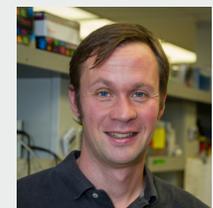
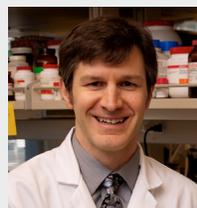
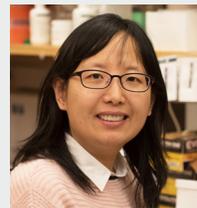
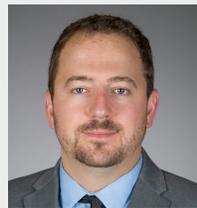
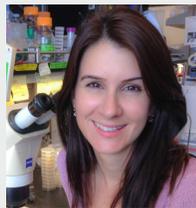
“Going to college and being out on my own was a big step in my life,” she says. “Advocating for yourself is easier said than done. The first time I tried to speak up for myself to my HCP, it didn’t work. But the skills I learned at PREP DC gave me the confidence to keep trying until I was able to find a provider that was a good fit.”

“The American Diabetes Association has been so incredibly supportive of this work. They are such a fabulous patient-oriented organization and person-focused organization. And I feel like they really are doing everything that they can to understand and hear and raise the needs of the diabetes community, and also advance research that meets the challenges that we know persons with diabetes manage every day. I, as a researcher, have been incredibly grateful for the support from the American Diabetes Association. It has strengthened both my own research, but also my connection to the diabetes community. The ADA plays such a vital role. And it’s been wonderful to partner with them in this work.”



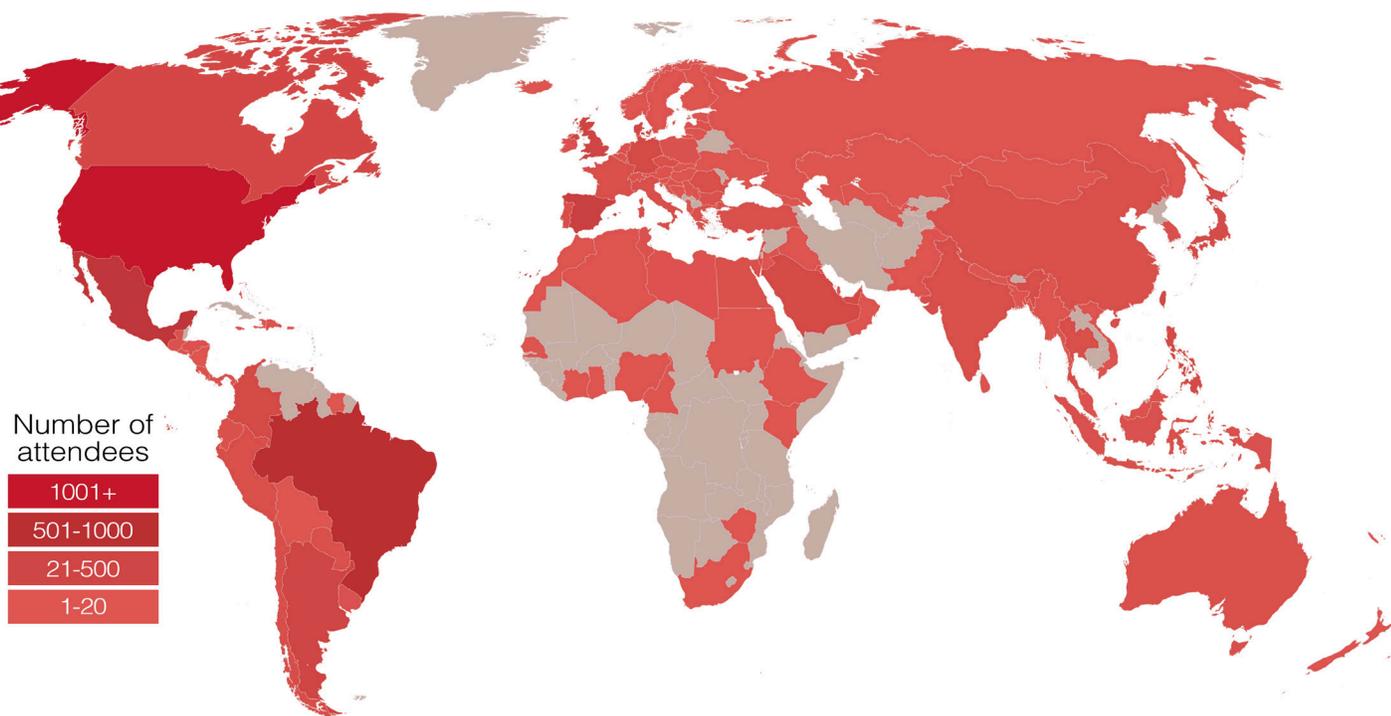


**34 Awardees**  
Countless Advancements,  
Innovations and Developments



# Science on Display

The ADA's annual conference, known as the ADA Scientific Sessions, is always the biggest diabetes event of the year, worldwide. In 2021, this five-day conference was held completely online for the second time because of the lingering COVID-19 pandemic.



Whether in person, virtual, or future hybrid meetings, the ADA Scientific Sessions give scientists a place to share their latest research findings, provides an opportunity for physicians to understand how to best treat patients, and the chance for diabetes educators, behavioral and mental health professionals to share information on how to help patients manage diabetes. Today, this extraordinary event is more accessible than ever.

**191**

Educational Sessions

**900+**

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Countries

**1,489**

scientific abstracts

**1,098**

e-poster presentations

**90**

days of unlimited  
on-demand access



# ADA Scientific Sessions Highlights

A few highlights from the 81<sup>st</sup> ADA Scientific Sessions in 2021 include impressive research results related to COVID-19, racial disparities, and clinical care. We also highlight innovation in patient engagement through the use of technology and new guidelines for adults with type 1 diabetes.

## **COVID-19 Pandemic and Diabetes Uncovers Health and Racial Disparities**

The disproportionate impact of the global COVID-19 pandemic on people with diabetes was a major theme at the 81<sup>st</sup> ADA Scientific Sessions. Five symposia highlighted cutting edge science and the latest diabetes developments learned during the pandemic. Over 100 oral and poster presentations focused on/or included references to COVID-19.

For example, a retrospective cohort study by Sameer B. Murali, MD, and colleagues showed body mass index (BMI) was associated with an increased risk of death from COVID-19. The authors suggested this may be related to increased inflammation, prothrombotic state, and hormonal rearrangement driven by high BMI and obesity.

Research from the T1D Exchange showed that among people with type 1 diabetes (T1D), use of diabetes technology lowered the risk of adverse outcomes with COVID-19. However this was offset by the common barriers of access and affordability, as well as racial and ethnic disparities.

The COVID-19 pandemic also had negative psychosocial consequences for people with diabetes. In a study by Sarah C. Westen, PhD, and colleagues, one in five adults with diabetes reported anxiety or depression at levels moderate to severe during the COVID-19 pandemic.

Type 2 diabetes in children dramatically increased during the COVID-19 pandemic. Stay-at-home orders exacerbated risk factors for type 2 diabetes, including limiting physical activity, increasing screen time and sedentary behaviors, disturbing sleep, and increasing the intake of processed foods.

Findings from the two separate retrospective chart reviews, one conducted by Brynn E. Marks, MD, MDHPEd, and colleagues and the other by Daniel S. Hsia, MD, and colleagues, revealed a doubling of the rates of hospitalizations for type 2 diabetes among youth. Also, more children presented with serious conditions like diabetic ketoacidosis and hyperosmolar hyperglycemic syndrome.

## **Diabetes complications and the ‘foot selfie’**

Access to care and regular physical examinations are crucial for people with diabetes who are experiencing foot complications. Both were a challenge in 2020. As such, institutions had to rapidly pivot to telemedicine and other communication strategies to stay connected and provide care to patients. Among the innovative adaptations was the “diabetes foot selfie” where people snapped and shared photos of their feet so their clinicians could review and help guide decision-making.

The author noted, “A large part of us being able to treat these patients as best we could, especially with using different telemedicine technologies, was the ‘foot selfie.’” She continued, “although this was not a replacement for inpatient visits, I think we were still able to manage to keep a lot of patients safe, keep them out of the hospital, and keep them moving.”

## **Guidelines on diagnosis and management of type 1 diabetes in adults**

The ADA and European Association for the Study of Diabetes (EASD) presented a draft consensus report with key recommendations on the diagnosis and management of type 1 diabetes in adults which has been now finalized and published.

The report laid out that to achieve individualized care, patients should undergo an initial needs assessment. It also addressed behavior considerations such as alcohol and tobacco use, sleep, sick day management, driving, employment, physical activity, and nutrition.

A key recommendation is that all people with type 1 diabetes should have access to continuous glucose monitors (CGM). In addition, the report reviews a variety of insulin regimens, including hybrid closed loop systems and analogue insulins, which are the preferred insulin in type 1 diabetes.

 **See you in New Orleans in 2022!**

# Translating Research into Impact

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New Grant Awards

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Start Ups through 2021 by Pathway Awardees

\$16.5M

Research Funding Awarded

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Patent Applications through 2021 from Pathway Awardees

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