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"Accelerating Breakthroughs: How the Special Diabetes Program Is Creating Hope for those Living with Type 1 Diabetes"

Statement of

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Chair Murray, Vice Chair Collins, and Members of the Committee, as Director of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), I thank you for your invitation to testify at this hearing on type 1 diabetes. On behalf of NIDDK and the other Institutes and Centers of the National Institutes of Health (NIH) within the U.S. Department of Health and Human Services (HHS), I am honored to be here today to update you on recent scientific advances and future research opportunities in type 1 diabetes and its complications, including research supported by the *Special Statutory Funding Program for Type 1 Diabetes Research* (*Special Diabetes Program*).

Diabetes takes an enormous personal and economic toll on our country, but we are making great strides in reducing that burden through the support of biomedical research. NIH invests over $1 billion a year in diabetes research, and NIDDK supports the majority of that research, including studies on both prevention and treatment of type 1 diabetes, type 2 diabetes, gestational diabetes, and diabetes complications. This NIH investment includes funding from the *Special Diabetes Program*, which has enabled the agency to expand type 1 diabetes research beyond what is possible with our regular appropriations and to conduct clinical trials that were unlikely to have been performed in the private sector. NIH's efforts also have been complemented by our research partners—academic institutions; the U.S. Food and Drug Administration (FDA); the Centers for Disease Control and Prevention (CDC); and charitable, professional, and patient advocacy groups such as JDRF, the Endocrine Society, the American Diabetes Association (ADA), and the Leona M. and Harry B. Helmsley Charitable Trust.

The important progress I will discuss today has only been possible through the invaluable support of Congress, the hard work of our researchers, and the dedication of our clinical study participants. Together, we are all working toward the goal of helping those with type 1 diabetes live longer, healthier lives.

IMPROVING THE LIVES OF PEOPLE WITH TYPE 1 DIABETES

Type 1 diabetes can arise at any age, but it often begins in childhood or adolescence. It is an autoimmune disease, where the immune system attacks and destroys the insulin-producing beta cells in clusters called islets in the pancreas. Since their pancreas cannot make enough insulin, people with type 1 diabetes (or their caregivers) must monitor their blood glucose (sugar) levels, administering insulin as needed depending on their food intake, physical activity levels, and other factors. This is an enormous and relentless burden, and despite constant vigilance, keeping blood glucose levels in a healthy range day in and day out is a challenge. NIDDK-supported studies have shown that early, intensive management of blood glucose levels can prevent or delay the development of devastating complications such as eye, kidney, nerve, and heart disease. Therefore, it is imperative that we continue to develop effective ways to prevent and treat type 1 diabetes, and that we search for a cure.

Furthermore, the SEARCH for Diabetes in Youth study, supported by CDC and NIDDK, has reported that type 1 diabetes incidence is increasing in youth under age 20 in the United States. Also, the rates of increase were higher among racial and ethnic minority groups, such as non-Hispanic Black and Hispanic youth.[1] These findings underscore a major goal in NIDDK's

[1] https://pubmed.ncbi.nlm.nih.gov/36868256

management of the *Special Diabetes Program:* to identify ways to overcome barriers to using new treatments and technologies. New research advances should benefit all people with type 1 diabetes, regardless of where they live, their socioeconomic status, their age, their race or ethnicity, or their medical status. Yet individuals from backgrounds traditionally underrepresented in research can also have more difficulty managing blood glucose levels and can have worse health outcomes and more complications. People with a history of high blood glucose levels or with frequent episodes of hypoglycemia (low blood glucose) also can be ineligible to participate in some clinical research studies, leaving open questions about whether a new approach will work for people with complex, "real-world" experiences and needs.

NIH is pursuing a multi-pronged approach to type 1 diabetes research, focusing on key questions such as: how can we prevent this disease, how can we improve treatment, and how can we develop a cure? As the *Special Diabetes Program* celebrates its 25th anniversary this year, I am happy to report that Congress' investment in the *Program* has led to life-changing improvements for people with the disease. When I testified at the 2015 Children's Congress, there were no artificial pancreas devices on the market. Today, there are six, with still more under FDA review. Some of these devices are now available to children as young as two years old, which is a tremendous advance given that it can be difficult to manage blood glucose levels in young children. As of the last Children's Congress in 2019, there were no therapies on the market to slow type 1 diabetes progression. Now, we have an FDA-approved medication that delays clinical diagnosis of type 1 diabetes. These are only two examples of how the *Special Diabetes Program* has helped improve the lives of those with type 1 diabetes. There is much more progress to report, and a lot of work still to be done.

PREVENTING TYPE 1 DIABETES INITIATION AND PROGRESSION

Preventing type 1 diabetes has been a long-standing goal of NIH-funded research. I am pleased to report that long-term research supported by the NIH and the *Special Diabetes Program* recently culminated in the FDA approval of the first early, preventive treatment that can delay clinical diagnosis of type 1 diabetes. In November 2022, FDA approved the use of the immune-modulating drug teplizumab to delay progression of type 1 diabetes in those eight years and older who are at high risk of developing the disease.[2]

Key research underlying this FDA approval stemmed from a clinical trial conducted by the NIDDK- and *Special Diabetes Program*-supported Type 1 Diabetes TrialNet, which is a large, collaborative, international consortium designed to perform clinical trials of therapies to delay or prevent type 1 diabetes progression. The clinical trial found that teplizumab delayed type 1 diabetes onset by over 32 months.[3] This important finding has ushered in a new era of type 1 diabetes clinical management, allowing nearly three years without having to take insulin and nearly three years toward preventing or delaying complications. The landmark FDA approval of teplizumab based on these clinical trial results underscores the importance of TrialNet, which continues to be a unique and critical network for testing novel type 1 diabetes preventive therapies.

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[2] https://www.fda.gov/news-events/press-announcements/fda-approves-first-drug-can-delay-onset-type-1-diabetes
[3] https://pubmed.ncbi.nlm.nih.gov/31180194, https://pubmed.ncbi.nlm.nih.gov/33658358

This clinical trial was made possible by decades of NIH- and *Special Diabetes Program*-supported research on teplizumab, and by other research to understand how type 1 diabetes progresses and to identify potential therapeutic targets and agents. For example, it built on research conducted by the Immune Tolerance Network, led by the National Institute of Allergy and Infectious Diseases (NIAID) with *Special Diabetes Program* support, showing that teplizumab delayed the loss of insulin production in people with newly diagnosed type 1 diabetes. Additionally, for many years, NIDDK has invested in research looking for ways to reliably identify those at risk for type 1 diabetes. Data from TrialNet and a long-term clinical research study called The Environmental Determinants of Diabetes in the Young (TEDDY) have been critical to understanding and identifying markers of the early stages of type 1 diabetes. Thanks to these studies and others, we now know that there are distinct stages of type 1 diabetes, several of which happen before symptoms appear. Being able to identify those in these early stages of type 1 diabetes before their disease progresses to clinical diagnosis has enabled testing of type 1 diabetes prevention therapies, such as teplizumab. To this end, TrialNet has screened over 200,000 people, identifying those at risk of type 1 diabetes who are eligible to enroll in clinical trials testing ways to prevent disease onset or slow its progression.

TrialNet is now testing multiple agents, as well as combination therapies, in those at high risk of type 1 diabetes and in the newly diagnosed, with new trials ready to launch. Researchers outside TrialNet are also testing another promising treatment: the blood pressure medication verapamil. A small clinical trial supported by the *Special Diabetes Program* has found that in people newly diagnosed with type 1 diabetes, taking oral verapamil can delay disease progression and lower insulin requirements for at least two years.[4] Due to these and other advances, I am happy to report that the long-term goal of preventing type 1 diabetes is now closer than ever, thanks to decades of dedicated work from scientists and clinical trial participants.

UNDERSTANDING THE CAUSES OF TYPE 1 DIABETES

Understanding the causes of type 1 diabetes could also help identify and advance new prevention strategies. We know that a person's risk for developing type 1 diabetes is dependent on both genetic and environmental factors. We now know over 90 percent of the genetic contributions to type 1 diabetes risk in those of European ancestry, who have the highest prevalence of the disease. We also continue to expand our knowledge of type 1 diabetes in those with other backgrounds, and a recent large, ancestrally diverse study identified 36 new gene regions associated with type 1 diabetes, offering potential new drug targets to treat or prevent disease.[5]

But genetics is only part of the story, and a person's environment and environmental exposures also play a role in their risk of developing type 1 diabetes. Identifying these environmental influences will give us a better understanding of the disease and may point to new prevention strategies.

[4] https://pubmed.ncbi.nlm.nih.gov/35241690
[5] https://pubmed.ncbi.nlm.nih.gov/34127860

To identify these environmental components of type 1 diabetes risk, NIDDK, through the *Special Diabetes Program*, supports an ambitious, long-term clinical research study called TEDDY. TEDDY has screened over 425,000 newborns, enrolling 8,000 who were at high genetic risk of type 1 diabetes. These children are being followed until they are 15 years old, and they and their families have donated over 4 million biological study samples to date. The youngest TEDDY participant will turn 15 in 2025, at which point final data analyses can begin. In the meantime, the TEDDY study is generating insights made possible by analysis of the "big data" collected by such a large study. TEDDY researchers are looking at genes, proteins, and metabolites and are also studying the children's microbiomes, viromes, and environmental exposures to understand how these evolve during childhood and how they might influence disease. Analyses of these factors have yielded new insights into how the microbes in a child's gut change as they age, and how those changes are affected by breastfeeding.[6] Various TEDDY findings have also allowed researchers to construct a risk score tool that uses both genetic and immune factors to predict an individual's risk of type 1 diabetes. Finally, new research is also illustrating how type 1 diabetes is not a single disease but a "heterogeneous" one that does not progress the same for every person. For example, type 1 diabetes diagnosed before six years of age is more aggressive than that diagnosed in older children, and these two different courses of disease are associated with specific autoimmune reactions.[7] These important findings could lead to more personalized preventive strategies in the future as we move toward the goal of precision medicine.

DEVELOPING APPROACHES TO IMPROVE GLUCOSE MANAGEMENT AND QUALITY OF LIFE

For people already diagnosed with type 1 diabetes, keeping blood glucose levels within a healthy range is a key step to maintaining good health. NIDDK-supported research has demonstrated that intensely managing blood glucose levels, beginning as soon as possible after a type 1 diabetes diagnosis, can prevent or delay the development of long-term complications of the eyes, kidneys, nerves, heart, and other organs. However, intensive management also brings with it the risk of potentially dangerous and distressing episodes of hypoglycemia. New tools and approaches to glucose management—and ways to ensure that these new technologies meet peoples' real-world requirements—are critically needed.

The *Special Diabetes Program* has supported pivotal research in this area by contributing to the development of glucose management technologies, including artificial pancreas systems that automate insulin delivery in response to blood glucose levels. This support has successfully moved devices out of the lab and into peoples' daily lives. In the last eight years, the number of commercially available, FDA-approved artificial pancreas devices has increased from zero to six, offering people with type 1 diabetes more tools to manage their health.

I am pleased to report that NIDDK and *Special Diabetes Program*-supported research contributed to the development or testing of five of the six commercial devices, demonstrating the impact that research has had on improving the health and quality of life of people with type 1 diabetes. For example, the *Special Diabetes Program* supported development of the technology

[6] https://pubmed.ncbi.nlm.nih.gov/30356183, https://pubmed.ncbi.nlm.nih.gov/30356187
[7] https://pubmed.ncbi.nlm.nih.gov/34291312

underlying the Control-IQ hybrid artificial pancreas system, and then later supported clinical trials demonstrating the system's effectiveness at managing blood glucose levels in both children and adults. This research helped support FDA approval of Control-IQ technology for people with type 1 diabetes who are six years old and older.[8] Further *Special Diabetes Program*-supported research has since tested the safety and efficacy of this device in children as young as two years old.[9]

We are also looking ahead to developing the next generation of artificial pancreas systems. As mentioned earlier, the *Special Diabetes Program* plays a unique role in expanding our knowledge of how new glucose management technologies can benefit all with type 1 diabetes, with the goal of having multiple artificial pancreas technologies available to fit people's individual needs. An example of this is studying the use of these devices during pregnancy or in populations where managing blood glucose levels is particularly challenging, such as very young children and people with high hemoglobin A1c (HbA1c) levels (a measure of average blood glucose levels).

A recent *Special Diabetes Program*-supported clinical trial is a successful example of the benefits of studying advanced artificial pancreas devices in groups that are representative of the type 1 diabetes community. This trial demonstrated that the iLet bionic pancreas device—which requires minimal user input and handles dosing decisions autonomously—improved blood glucose management for a diverse group of children and adults, keeping their blood glucose levels in a healthy range better than standard care.[10] This trial specifically sought to recruit volunteers from a variety of backgrounds, including people with lower income and education levels, those from previously underrepresented racial and ethnic groups, and people with high HbA1c levels that put them at increased risk for developing long-term complications. As a result, this trial found that people from all backgrounds benefitted from use of the bionic pancreas, including those who had never used an artificial pancreas device previously. Additionally, those who had more difficulty managing blood glucose levels at the study's start appeared to benefit most from using the bionic pancreas, reducing racial and ethnic disparities in average HbA1c levels.[11]

Of note, the artificial pancreas research community is a prime example of the power of teamwork, and we look forward to continued collaboration with our partners who have advanced this field. Just this past May, NIH hosted the 5th Artificial Pancreas Workshop organized collaboratively with the Diabetes Technology Society, the Helmsley Charitable Trust, JDRF, and FDA to discuss the current and potential future challenges in this field.

NIDDK also continues to support academic and small business investigators at all stages to build upon past successes and advance research into innovative blood glucose management tools, including artificial pancreas systems. This includes supporting development of new technologies such as sensors, pumps, and algorithms; clinical trials to test safety and efficacy;

[8] https://www.fda.gov/news-events/press-announcements/fda-authorizes-first-interoperable-automated-insulin-dosing-controller-designed-allow-more-choices
[9] https://pubmed.ncbi.nlm.nih.gov/36920756
[10] https://pubmed.ncbi.nlm.nih.gov/36170500
[11] https://pubmed.ncbi.nlm.nih.gov/37000680

and research into behavioral, psychosocial, and other "human" factors that affect peoples' ability to use these new technologies. One example of the positive impact this support has had on people's lives is the *Special Diabetes Program*-supported development of an improved glucagon formulation that does not require refrigeration. This research resulted in a ready-to-use rescue pen that is now commercially available to treat low blood glucose, a daily concern for people with type 1 diabetes.[12]

RESTORING BETA CELL FUNCTION

Technologies for managing type 1 diabetes are important tools for alleviating the burden of this disease, but they are not a cure. Finding a biological cure for type 1 diabetes—a way to restore the body's ability to produce insulin and regulate blood glucose levels—is another major, long-term goal of NIDDK- and *Special Diabetes Program*-funded research. One approach to a cure is the development of islet transplantation strategies. The Clinical Islet Transplantation Consortium—co-led by NIDDK and NIAID—demonstrated that transplantation of islets into a person with type 1 diabetes can eliminate severe hypoglycemic events, with some participants achieving near-normal average blood sugar levels and an improved quality of life. Though we are excited about this progress, we also recognize that, because of current limitations, including the need for lifelong immunosuppressive drugs and the low availability of donated islets, islet transplantation would only be suitable for a small number of people with type 1 diabetes. Therefore, it remains critically important to pursue research toward developing cell replacement strategies that could benefit more people.

Advances in islet transplantation have also informed other studies of beta cell function. NIDDK's Human Islet Research Network (HIRN) is a large, multidisciplinary group of consortia with the goal of understanding how beta cells are lost in type 1 diabetes and how they can be protected or replaced in people. HIRN investigations into how beta cells develop and mature are expanding our understanding of how to make new beta cells. For example, HIRN researchers recently found that cells from a person's stomach can be coaxed in the lab to form pancreatic islet-like mini-organs or "organoids" that secrete insulin and can manage blood glucose levels in mice.[13]

Information on beta cell biology is also fueling the study of beta cell replacement strategies. *Special Diabetes Program*-supported researchers are working on approaches to develop bioartificial cell replacement technologies such as building multicomponent "designer islets" in the lab. Other researchers are developing improved techniques and technologies needed to place and maintain these beta cell replacements in the body. For example, *Special Diabetes Program* funding has supported work on improved islet transplantation procedures and has provided key support for developing the specialized encapsulation technologies needed to protect the transplanted cells from immune attack. Early investment in the development of these technologies through grants to academic labs and small businesses is providing the technical know-how required for future advances.

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[12] https://xerispharma.gcs-web.com/news-releases/news-release-details/xeris-pharmaceuticals-receives-us-fda-approval-gvoketm-glucagon

[13] https://pubmed.ncbi.nlm.nih.gov/37106062

PREVENTING AND TREATING DIABETIC COMPLICATIONS

People with type 1 diabetes are living longer than ever thanks to new therapies, devices, and other improvements in treatment. Therefore, it is critically important to find ways to prevent and treat the diabetes complications that can arise throughout the lifespan. To this end, NIDDK is collaborating with other NIH Institutes to study these potentially life-threatening complications, including through research supported by the *Special Diabetes Program*.

Cardiovascular disease (CVD) is a leading cause of death for people with type 1 diabetes, and CVD risk remains increased even with standard-of-care measures to treat underlying risk factors. However, many questions remain about how CVD may be different (or may be prevented) in people with type 1 diabetes compared to those without diabetes or with type 2 diabetes. NIDDK and the National Heart, Lung, and Blood Institute (NHLBI) have teamed up to investigate these questions by forming the Cardiovascular Biorepository for Type 1 Diabetes (CaRe-T1D). The CaRe-T1D biorepository is collecting donated tissues from human donors with and without type 1 or type 2 diabetes. This repository of biological samples will be a critical resource for future research into how type 1 diabetes and CVD interact, and how type 1 and type 2 diabetes affect the heart differently. Such studies could lead to potential insights into new therapeutic targets and care strategies.

Another major research opportunity is to investigate drugs already protecting the cardiovascular health of people with type 2 diabetes. For example, sodium-glucose cotransporter-2 (SGLT2) inhibitor medications, which are approved to help manage blood glucose levels in type 2 diabetes, have heart-protective effects and may also protect against kidney disease. Determining if these treatments are safe and effective for people with type 1 diabetes could provide a much-needed tool for preventing multiple important complications.

Another debilitating and often-feared diabetes complication is blindness. For two decades, research from the National Eye Institute's DRCR Retina Network, with *Special Diabetes Program* support, has been changing how diabetic eye disease is treated. Network studies—including studies comparing different drugs, which were unlikely to be performed by industry—have transformed clinical practice guidelines for diabetic eye care. Recently, DRCR Retina Network investigators continued to help guide management of diabetic eye disease by showing that early treatment of diabetic-related eye disease slowed progression to more serious disease but did not improve visual acuity compared with treating more severe disease once it developed.[14] This result indicates that monitoring patients with diabetic retinopathy and treating eyes only as needed is the best approach.

We are also supporting research to study a potentially serious complication called impaired awareness of hypoglycemia. Repeated episodes of severe hypoglycemia can diminish a person's ability to recognize these episodes, leaving them unaware that they need assistance and increasing the risk of injury or even death. Impaired awareness of hypoglycemia also can make someone ineligible to participate in a type 1 diabetes clinical trial, leaving this serious condition understudied. A new international research consortium is seeking to shed light on this condition,

[14] https://pubmed.ncbi.nlm.nih.gov/36749332

with the goals of identifying the factors that can lead to life-threatening hypoglycemic events and developing strategies to mitigate these factors and improve quality of life.

Additionally, NIDDK is supporting important efforts to improve care for another serious and understudied complication of type 1 diabetes: diabetic foot ulcers. Foot ulcers that become infected or do not heal can lead to amputations, but little is known about why some ulcers heal while others do not, and few treatments are available. NIDDK's Diabetic Foot Consortium is the first consortium of its kind and is laying the foundation for a clinical trials network to test new strategies to improve diabetic wound healing and prevent amputations. Among other successes, Consortium scientists have gained new insights into factors that impair wound healing by comparing wound healing response in diabetes foot ulcers and normal skin.[15] This Consortium, with *Special Diabetes Program* support, plans to accelerate advances in foot ulcer clinical care, including using machine learning techniques on the Consortium's gathered data to identify wound characteristics that predict successful healing.

EMERGING OPPORTUNITIES IN TYPE 1 DIABETES RESEARCH

The scientific achievements that I described today are just a few examples of recent progress in understanding and combatting type 1 diabetes and its complications. The investments we have made in infrastructure, technology, bold ideas, research talent, and enduring collaborations are bearing fruit, improving the lives of people with type 1 diabetes and others. Blood glucose monitoring and management technologies are also benefitting those with type 2 diabetes, and insights into the immune system's role in type 1 diabetes can shed light on other autoimmune diseases. Likewise, the study of type 1 diabetes complications can also inform research into other diseases and conditions of the heart, eyes, kidneys, skin, and other organs. In these ways, type 1 diabetes research, including that supported by the *Special Diabetes Program,* continues to reap broad benefits.

As we celebrate our successes, we recognize that there is still much critical work to be done. Our efforts were significantly strengthened by the renewal of the *Special Diabetes Program* through the end of Fiscal Year 2023, which enabled NIH to continue many of these successful, long-running programs. Sustained long-term funding of the Program has allowed NIH to launch new clinical trials and support novel research areas, capitalizing on emerging opportunities in type 1 diabetes. Maximizing the value of the *Special Diabetes Program* and responsibly administering its funds is one of NIDDK's highest priorities.

As mentioned throughout this testimony, further research will help us maintain the momentum we have built. Tomorrow's research advances are already on the horizon as we continue to build upon past successes and advance into emerging areas of interest. "Big data" analysis of large datasets such as those amassed by TEDDY and the DRCR Retina Network are unlocking even more insights from these long-standing efforts, and cutting-edge machine learning, artificial intelligence, "omics" technologies, and other emerging methods offer new opportunities to inform clinical care approaches. These technologies also underscore the importance of NIDDK's long-standing commitment to making biosamples and data from completed studies available to the broad scientific community. Data sharing is critically

[15] https://pubmed.ncbi.nlm.nih.gov/32938916

important for maximizing the return on our research investments, and the NIDDK Central Repository continues to share resources from completed studies with the scientific research community.

Significant opportunities also exist to identify existing barriers to good health and ways to overcome them. The *Special Diabetes Program* is supporting multiple approaches toward this end. One such effort is searching for ways to improve technology adoption, for instance by identifying behavioral factors that contribute to successful artificial pancreas usage. Other researchers are investigating the use of social and medical care interventions to improve diabetes outcomes by addressing social barriers to good diabetes management. People with type 1 diabetes are also disproportionately affected by mental health issues, which can affect their diabetes outcomes. To help understand this possible barrier to diabetes care, research is ongoing on how to treat the "diabetes distress" that can result from the demands of living with type 1 diabetes. There is also growing evidence of neurocognitive complications of type 1 diabetes, and NIDDK-supported studies are seeking to better understand the neurocognitive impact of type 1 diabetes in children and adults.

It is imperative that we foster a talented, diverse biomedical workforce to conduct tomorrow's cutting-edge research into type 1 diabetes and its complications. The NIDDK Diabetes-Docs program strives to bolster the pipeline of pediatric endocrinologists and other physicians committed to careers in diabetes research. Additionally, the New Investigator Gateway Awards in Type 1 Diabetes Research will support innovative projects by promising new investigators by embedding them in the rich intellectual environment of existing large NIDDK collaborative research programs. These and other training and career development efforts—as well as consistent funding for type 1 diabetes research—will help recruit and support the next generation of type 1 diabetes researchers.

Looking forward, NIDDK solicited input from scientific and lay experts about future research directions in type 1 diabetes and its complications at a workshop held in March 2022 under the auspices of the statutorily required Diabetes Mellitus Interagency Coordinating Committee. Numerous opportunities were identified at that meeting to build upon the significant progress to date. NIDDK's support of type 1 diabetes research will also continue to be guided by strategic planning efforts and input from scientific conferences and workshops. These varied streams of input will continue to ensure that NIDDK-supported type 1 diabetes research benefits people of all ages and backgrounds who are living with or at risk for type 1 diabetes.

CONCLUDING REMARKS

I appreciate this opportunity to share these exciting scientific advances, ongoing efforts, and emerging opportunities in type 1 diabetes research. We are extremely grateful for the continued support of Congress that has allowed NIH to vigorously support research to combat type 1 diabetes and its complications. We are also grateful for the extension and increase in *Special Diabetes Program* funding requested in the Fiscal Year 2024 President's Budget, which would extend the *Program* through Fiscal Year 2026. We look forward to continuing our strong partnerships with patient advocacy groups, professional organizations, research institutions, and our sister federal agencies. We also thank our dedicated clinical study participants, without

whom the clinical research I described today would not be possible. The *Special Diabetes Program* has catalyzed remarkable progress in type 1 diabetes research and has ushered in a new era where individuals with type 1 diabetes have significantly improved health, longevity, and, importantly, quality of life. We have shown for the first time that type 1 diabetes can be delayed, and NIH remains steadfast in our goals of preventing, treating, and ultimately curing type 1 diabetes. With continued research, we hope to move even closer to the day that *all people* can be free from the burden of type 1 diabetes and its complications.

Thank you, Chair Murray, Vice Chair Collins, and Members of the Committee. I will be pleased to answer any questions you have.

Griffin P. Rodgers, M.D., M.A.C.P.
Director, National Institute of Diabetes and Digestive and Kidney Diseases

Dr. Griffin P. Rodgers was named Director of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)—one of the National Institutes of Health (NIH)—on April 1, 2007. He had served as NIDDK's Acting Director since March 2006 and had been the Institute's Deputy Director since January 2001. As the Director of NIDDK, Dr. Rodgers provides scientific leadership and manages a staff of over 600 employees and a budget of approximately $2.3 billion.

Dr. Rodgers received his undergraduate, graduate, and medical degrees from Brown University in Providence, R.I. He performed his residency and chief residency in internal medicine at Barnes Hospital and the John Cochran VA, respectively, at Washington University in St. Louis, MO. His fellowship training in hematology was in a joint program of the NIH with George Washington University. In addition to his medical and research training, he earned an MBA, with a focus on the business of medicine/science, from Johns Hopkins University in 2005, and a Master's in Legal Studies in 2017.

As a research investigator, Dr. Rodgers is widely recognized for his contributions to the development of the first effective—and FDA approved—therapy for sickle cell anemia. In addition, he and his collaborators have reported on a modified blood stem-cell transplant regimen that is highly effective in reversing sickle cell disease in adults and is associated with relatively low toxicity. He has been honored for his research with numerous awards, including the 1998 Richard and Hinda Rosenthal Foundation Award, the 2000 Arthur S. Flemming Award, the Legacy of Leadership Award in 2002, a Mastership from the American College of Physicians in 2005, the Herbert C. Nickens Award 2018, and a Fellowship in the Royal College of Physicians (London) in 2018, among others.

Dr. Rodgers has been an invited professor at medical schools and hospitals both nationally and internationally. He has been honored with many named lectureships at American medical centers; has published over 250 original research articles, reviews, and book chapters; has edited four books and monographs; and holds three patents.

Dr. Rodgers is a member of the American Society of Hematology, the American Society of Clinical Investigation, the Association of American Physicians, the American Academy of Arts and Sciences, the American Association for the Advancement of Science, and the National Academy of Medicine, among others. He served as Governor to the American College of Physicians, as Chair of the Hematology Subspecialty Board, and as a member of the American Board of Internal Medicine Board of Directors.

Dr. Rodgers serves as a chair, co-chair, and member of numerous high-level NIH and HHS scientific and administrative committees. He is co-chair of the NIH Obesity Research Task Force and serves on the Executive Committee leading the Accelerating Medicines Partnership. He also co-leads the Illuminating the Druggable Genome program of the NIH Common Fund and is a member of the NIH Steering Committee, NIH-Food and Drug Administration (FDA) Joint Leadership Council, and NIH-Centers for Medicare & Medicaid Services (CMS) Leadership Council, among others.