

# ADVANCES IN ENDOCRINOLOGY



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## On the Front Lines of Diabetes Prevention and Treatment

Before 1922, children diagnosed with type 1 diabetes would have died. But in that year, Dr. Frederick Banting and his assistant Charles Best discovered how to extract insulin from a dog's pancreas, completely altering the once fatal diagnosis and changing the paradigm for care.

"Since then strides in clinical care for the treatment of diabetes have been spectacular, but it is not enough," says **Robin S. Goland, MD**, a renowned endocrinologist and Co-Director of the Naomi Berrie Diabetes Center at NewYork-Presbyterian/Columbia University Medical Center. Dr. Goland, along with her Co-Director **Rudolph L. Leibel, MD**, and the physicians, scientists, and healthcare team at the Berrie Center are relentless in their pursuit of reducing barriers to care and to finding a cure for diabetes.

"Those two things are what the Berrie Center does best," says Dr. Goland. "Our research labs are located next to the physicians' offices, so advances are translated to the patient as rapidly as possible.



*Dr. Magdalena M. Bogun and Dr. Robin S. Goland*

It seems to us the fastest way to a cure is to have everyone talking to each other. And what we never imagined, and what has turned out to be so powerful, are the insights our patients provide to the scientists."

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## Type 1 Diabetes: It's Professional and Very Personal



*Dr. Jason C. Baker*

When **Jason C. Baker, MD**, was in his last year of medical school he journeyed to Ghana for a six-week radiology project, bringing first-class, state-of-the-art equipment and deepening skills,

ready to deliver care and get to know a patient population in a completely different environment. The previous year, as a 25-year-old, third-year medical student at Emory School of Medicine, Dr. Baker discovered he had type 1 diabetes. He found, in Ghana's environment, he had to be startlingly vigilant, husbanding his medical supplies and carefully sifting dietary resources, knowing, throughout the trip, he would in due time be on a plane going home to easy access to resources.

"What if I lived here full-time? What if I were Ghanaian?" Dr. Baker remembers thinking. "It was a huge learning curve to manage myself in Ghana. It planted seeds. What would happen to me in an environment where air conditioning, refrigeration, and maintaining a nutritional diet are so challenging?"

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**NewYork-Presbyterian  
Diabetes and Endocrinology  
ranks #5 in the nation.**

## On the Front Lines of Diabetes Prevention and Treatment *(continued from page 1)*

Established in 1998, the Naomi Berrie Diabetes Center is internationally recognized for excellence and innovation in patient care and research in diabetes. One of the largest multidisciplinary diabetes centers in the world, the program provided some 14,000 patient visits and 500 screenings of patients' relatives for antibodies indicating risk for type 1 diabetes (T1D) in 2016. Half of the adult patients at the Berrie Center have T1D and virtually all of the pediatric patients. "We're experts in treating people with new onset type 1 diabetes and transitioning patients from pediatric to adult care," says Dr. Goland. "Caring for teenagers and young adults with diabetes is especially rewarding and, at the same time, it is so complex for the patients, their families, and the care team."

Dr. Goland notes that the Center's doctors, diabetes educators, nutritionists, and mental health specialists emphasize the importance of self-care in diabetes management. "This is a very challenging disease to control. It's a constantly changing and demanding landscape. If patients take too much insulin they can make themselves very sick. If they take too little they could develop diabetes complications. So it's a balancing act that requires an enormous amount of effort from patients and their families."

### A Robust Research Program

While their sights are firmly set on finding a cure, Dr. Goland and her colleagues are also working to prevent clinical onset and to delay progression of T1D. To that end, Columbia University Medical Center participates in Type 1 Diabetes TrialNet, an international network of leading academic institutions, physicians, scientists, and healthcare teams that is exploring ways to prevent, delay, and reverse the progression of T1D.

Jointly funded by the National Institute of Diabetes and Digestive and Kidney Diseases, the National Institute of Allergy and Infectious Diseases, and the National Institute of Child Health and Development, TrialNet conducts clinical research and clinical trials in a number of areas. These include the preservation of insulin-generating islet cells in those newly diagnosed with T1D and in the etiology and prevention of the onset of diabetes in individuals at high risk for developing the disease. Patients with autoimmune pre-diabetes are followed to evaluate factors associated with the development of diabetes and are also enrolled in studies of agents to prevent diabetes onset. TrialNet is also conducting studies of the use of immunosuppression or immunomodulation to preserve beta cell function in individuals newly diagnosed.

Pathway to Prevention is a TrialNet research screening program that serves as the first step for all TrialNet prevention studies. Screening is offered free to relatives of patients with T1D to evaluate their personal risk of developing the disease. "TrialNet's goal is to identify the disease at its earliest stage, delay progression, and ultimately prevent it," says Dr. Goland, a TrialNet Principal Investigator. "At the Berrie Center we offer screening and clinical trials for every stage of type 1 diabetes and close monitoring for disease progression."

"We are making progress in identifying individuals at risk for developing T1D," says **Magdalena M. Bogun, MD**, an endocrinologist whose clinical practice focuses on adults with type 1 and type 2 diabetes. "Earlier identification gives patients an opportunity to enter clinical trials that hopefully can delay or prevent the onset of type 1 diabetes."

### Clinical Trials at a Glance

In addition to TrialNet studies, the Berrie Center is currently conducting a number of clinical trials, including:

- Noninvasive Imaging of Pancreatic Beta Cell Mass Using PET Scan
- Skin Biopsies for the Generation of Disease-Specific Stem Cells
- Teplizumab (Anti-CD3) for Prevention of Type 1 Diabetes
- Type 2 Diabetes Onset in Adolescence and Youth: Genetics Study
- CTLA-4 Ig (Abatacept) for Prevention of Abnormal Glucose Tolerance and Diabetes in Relatives at Risk for Type 1 Diabetes Mellitus

For a complete listing of clinical trials underway or in the enrollment phase, visit <http://www.nbdiabetes.org/our-clinical-trials>.

Relatives of individuals with T1D are 15 times more likely to develop the disease than the general population. The increased risk is linked to the presence of five diabetes-related autoantibodies. The Juvenile Diabetes Research Foundation, American Diabetes Association, and the Endocrine Society now classify having two or more of these autoantibodies as early stage T1D.

In 2015, Dr. Bogun was one of four physicians selected to participate in the TrialNet Emerging Leader Program designed to promote the engagement of new investigators in diabetes clinical research. "My research focuses on the natural history of type 1 diabetes drawing on TrialNet data," says Dr. Bogun, whose project is a longitudinal study of insulin secretion in patients who have had metabolic testing both before and after diagnosis of T1D. "Understanding the patterns of insulin secretion would give us more understanding about the pathogenic evolution of the disease – which could in turn guide our treatments."

According to Dr. Bogun, TrialNet is the only cohort that includes data on glucose and insulin secretion before, at diagnosis, and after diagnosis of type 1 diabetes mellitus. "We then follow them every six months, watching the glucose levels and tracking their endogenous insulin production," she says. "The goal of new onset studies is to preserve endogenous insulin secretion as measured by C-peptide. Studies have shown that preservation of C-peptide is linked to reduced risk of progression of microvascular complications such as retinopathy, nephropathy, and neuropathy."

The natural history of type 1 diabetes differs depending on age, adds Dr. Bogun. "For example, we know that children when diagnosed with T1D will start with a much lower endogenous insulin production. They also drop their endogenous insulin production much quicker than patients who are diagnosed later in life."

"Over the last 23 years that I've been working in this field the life expectancy of patients with diabetes has gotten closer and closer to normal," says Dr. Goland. "The outlook for people diagnosed today is much brighter. However, we need a new way of looking at a world without diabetes, and I believe we are on the brink of a revolution in science to achieve that goal."

### For More Information

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## Type 1 Diabetes: It's Professional and Very Personal *(continued from page 1)*

That same year, in September 2001, a second event imprinted itself on his career. “While helping to run the morgue at Ground Zero, I remember excusing myself and going over to a burned-out corner to check my blood sugar,” says Dr. Baker. “I realized that even in the most extraordinary and unorthodox situations, I couldn’t ignore my type 1 diabetes otherwise it would conquer me.” The thought stirred him and, today as an attending endocrinologist with NewYork-Presbyterian/Weill Cornell Medical Center, he maintains a professionally focused empathy for individuals with type 1 diabetes who, in particular, are trying to manage their disease in unusual or challenging circumstances.



*Dr. Jason Baker with the late Marjorie Namayanja and with a student on graduation day for a diabetes education program in Rwanda*



baking, hairdressing, and more. Each participant leaves the Education Center with a new understanding and skill in managing his or her type 1 diabetes, and with vocational training, which enables them to find work that will, in turn, help them afford T1D supplies and nutritious food.

Dr. Baker spends approximately 30 percent of his time administering Marjorie’s Fund, traveling to its various sites on a regular basis. He and his Fund colleagues reach out to government officials, patient advocacy groups, and NGOs trying to create, in Dr. Baker’s words, “a much more sustainable approach.”

### A Global Cause

In 2010, Dr. Baker met Marjorie Namayanja, a Ugandan, at an international educational symposium on type 1 diabetes (T1D) for healthcare providers. Ms. Namayanja had been diagnosed with T1D at age three. At 27 years old, she had long outlived almost all who receive such a diagnosis in developing countries and had already begun dialysis. She had spent most of her life advocating to bring sufficient modern supplies and education about type 1 diabetes to Uganda, where here and in other developing countries, glucose strips and sufficient insulin are generally unavailable. Two years after their first meeting, Ms. Namayanja died awaiting a kidney transplant.

“I have no doubt in my mind that had she been in the United States, her diabetes would have been better controlled, and if she developed kidney issues at some point, she would have received a transplant and be alive today,” Dr. Baker says. “In that area of the world, when you develop a complication like she did, it’s a death sentence. We have so many resources available to us in this country, but the developing countries of the world are really struggling with access to care. And we still have communities in the United States that don’t have adequate access.”

In 2011, Dr. Baker founded Marjorie’s Fund; its stated mission is “to empower adolescents and adults living with type 1 diabetes in resource-poor settings to not only survive, but to effectively manage their diabetes and survive.” Run almost entirely by volunteers through donations and small grants, Marjorie’s Fund is currently in Rwanda, Uganda, Gambia, Ethiopia, India, and New York City.

In Rwanda, Marjorie Fund’s Education Center works with a local diabetes association to create comprehensive education programs for adolescents and young adults. “We’re not interested in going in with just goodwill and supplies,” notes Dr. Baker. “Students in the Rwandan program get insulin and glucose testing strips, accompanied by lessons in diabetes management and nutrition.” The Rwandan Diabetes Education Center also offers vocational training in sewing,

### The Treatment Challenge

“Diabetes is an evolving field,” acknowledges Dr. Baker, who also maintains a busy practice and teaching schedule at Weill Cornell. “It is on the rise and has become a huge issue in every nation. It’s not as simple as type 1 versus type 2. You can have an obese type 1 or a thin type 2. There are many different ‘flavors’ of diabetes: maturity-onset diabetes of the young, latent autoimmune diabetes in adults, and gestational. Malnutrition diabetes can diagnostically look like type 1 diabetes mellitus, leading to dangerously incorrect treatment. There is no algorithm that we as clinicians can follow in terms of saying, ‘This is the right step. After this step we have the next step and the step after that.’ Treatment has to be individualized in terms of choosing the medications, but also in providing the patient with the right type of lifestyle advice.” Dr. Baker himself wears a continuous glucose monitor, which he shows to patients in order to demonstrate that, even with his level of expertise, his blood sugar can go too high.

Determining the right medication is particularly complex. “There are approaches that work for some people, but not for others,” notes Dr. Baker. “For example, many medications, while they lower glucose, promote weight gain in patients who already have issues with weight and contribute to a worsening of control. Some medications can precipitate beta cell burnout. Used in the setting of those who may have poor beta cell reserves to begin with, the medications could ultimately destroy their ability to make insulin. The more we can minimize adverse effects of medications and identify alternatives, the better our patients’ outcomes will be. The take-home is that we have a lot of treatment options, but we have to do our best to explore those options before we consider the treatment regimen stable and the right one for that patient.”

#### For More Information

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