

# Decoding Diabetes

BY ANN CARNEY

SOMEHOW, WHEN YOU WALK into the Pediatric Epidemiology Center at USF, you expect to see babies and building blocks, stimulating colors and neatly pressed lab coats. After all, the National Institutes of Health just awarded the center a \$169 million grant—the largest in USF history—to study the triggers of juvenile diabetes.

But it's a different kind of work that goes on here.

The center, led by USF Health Professor Jeffrey Krischer, was tapped to coordinate and analyze the results of an international study known as “TEDDY” (The Environmental Determinants of Diabetes in the Young). The study will follow more than 7,800 newborns genetically at risk for type 1 diabetes to understand the infectious agents, dietary factors or other environmental exposures that are associated with the disease. That means eventually recording and tracking more than one million samples.

“We want to know why the incidence of diabetes in the very young has doubled since the 1980s,” explains Krischer, co-chair of the study and principal investigator of the coordinating center. And the team hopes to explain why some children get the disease.

Type 1 diabetes, also known as juvenile diabetes, is one of the most common and serious long-term diseases in children. Affecting one out of every 300 children, it is a disease in which the body's immune sys-

A data center, led by USF Health's Jeffrey Krischer, is at the heart of a \$169 million international study to understand the triggers of juvenile diabetes.

tem attacks the cells that make insulin—a hormone that keeps blood sugar levels stable. Children with the disease must take insulin shots and monitor their blood sugar levels constantly to stay alive and healthy.

“We know that some children have a greater genetic risk of diabetes, but only 10 percent of those children eventually develop the disease by 10 years of age,” says Krischer. “This study gives us a large enough group of newborns to analyze genetic risk factors and factors in their lifestyle, diet or environment that may trigger the illness.”

Until now, none of the studies of the environmental factors involved in the development of type 1 diabetes have had the statistical power to advance researchers' understanding of the disease.

“Here we can look at not only individual environmental exposures that others have examined, but also the combinations of various exposures,” says Krischer. “And we can examine and compare differences across cultures.”

JOSEPH GAMBLE



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## Impact on Families

### The Brown Family Denver, Colorado

SINCE MY HUSBAND HAS DIABETES, we knew that there was a chance that we would have a child or children who would either be a carrier or would actually develop diabetes," says Sonja Brown, who lives with her husband Chris, one-and-a-half-year-old son Keller, and two chocolate Labradors, in the Denver area. As it turns out, Keller does have a genetic profile that puts him at increased risk for type 1 diabetes. "Keller's pediatrician suggested that we go and have Keller tested for diabetes-related genes. That's how we found out that, lo and behold, Keller does have high-risk genes," Brown says. She and Chris decided to enroll Keller in TEDDY not only to help the cause of diabetes research but also to have Keller closely monitored for development of the disease.

The TEDDY consortium, comprising Krischer's data coordinating center and six clinical sites located in Seattle, Washington; Denver, Colorado; Augusta, Georgia; Turku, Finland; Malmo, Sweden; and Munich, Germany, will allow for a coordinated, multidisciplinary approach to the complex disease. Information and samples will be collected in a standardized manner, yielding significant statistical power. And, a central repository of data and biologic samples will be established in Germantown, Maryland, allowing for further hypothesis-based investigations.

"I believe we have the right combination of science and strategy that we might be able to eliminate type 1 diabetes for the next generation," says Krischer.

To date, the TEDDY study has enrolled more than 4,000 participants. Krischer and his colleagues expect to reach their target enrollment of 7,800 newborns by late 2009. In all, about 360,000 babies will be screened to reach the enrollment figure.

Over a 15-year period, the diet, illnesses, allergies and other life experiences of study participants will be tracked and recorded. Blood samples will be analyzed every three months for the first four years, and every six months thereafter.

"The families are to be commended more than any of us," says Susan Smith, TEDDY study research administrator and USF alumna. "This is a difficult study to be involved in. There is a lot of responsibility."

Last year, Krischer was awarded a \$20.1 million NIH grant to study the disease. The new grant continues that research for the next decade.

"Dr. Krischer's team is the focal point for virtually every major study of type 1 diabetes prevention in the world," says Stephen Klasko, vice president for USF Health and dean of the College of Medicine. "He has created the premier center for unlocking auto-immune diseases of which juvenile diabetes is one of the most common and most serious."

Krischer and his team, which includes epidemiologists, statisticians, data managers, computer programmers, nutritionists and coordinators, are aided

by the resources of a sophisticated data center. The center includes a server farm of more than 40 multi-processor and highly redundant servers, backed up nightly and maintained in a secure location. The system provides a highly scalable environment for growth and can react quickly to changes in demand for storage.

While the TEDDY study is the largest study under way at the center, it is certainly not the only one. Krischer and his team are currently working on more than 10 independent initiatives, providing the technical means to advance knowledge and improve research on many different types of diseases.

The latest award has catapulted USF's Department of Pediatrics ranking to number three in the nation.



JOSEPH GAMBIE

**"I believe we have the right combination of science and strategy that we might be able to eliminate type 1 diabetes for the next generation."** — Dr. Jeffrey Krischer



PHOTO ILLUSTRATION: JOSEPH GAMBIE

## Facts About Juvenile Diabetes\*

### 5%-10%

Only five to ten percent of individuals who are genetically susceptible to type 1 diabetes develop the disease.

### 90%

About 90 percent of children who are diagnosed with type 1 diabetes have no family history of the disease.

### X2

The incidence of type 1 diabetes has been doubling worldwide every 20 years, so the incidence of the disease is twice as high as it was in the mid-1980s.

\*Facts and Brown family story excerpts from the *Juvenile Diabetes Research Foundation International Countdown to a Cure*, Fall 2006