Needle in a haystack

U immunology team seeks to track down the rare, renegade cells in the body that cause diabetes—and then shut them down

Immunologist Brian Fife, Ph.D., is playing a high-stakes version of “Where’s Waldo” in his quest to eliminate diabetes.

Scientists know that CD4 T cells cause type 1 diabetes. But even finding the specific subset of T cells among trillions of other cells in the human body presents an enormous challenge.

At the University of Minnesota, Fife is leading an effort to track down these renegade cells and shut them down. Once the cellular culprits are located, a treatment designed by Fife aims to stop diabetes by eliminating or “re-educating” the T cells—in essence teaching them not to instigate the immune response that causes diabetes.

Fife, an assistant professor in the Department of Medicine’s Division of Rheumatic and Autoimmune Diseases and the Center for Immunology, has been working on this novel therapy for about five years. First, he and his 10-person lab proved that the approach works in mice; they used biomarkers to find the diabetes-causing T cells and reversed the disease. Now they are developing the same technology for people who have type 1 diabetes.

It’s not easy work. The lab is scouring patients’ blood samples...

Even one of these rare CD4 T cells, stained blue in this image from a diabetic mouse pancreas, can set off the immune reaction that causes type 1 diabetes.
for cells that are found at a frequency of one in 1 million to 5 million. “It’s a very rare and hard-
to-find antigen-specific CD4 T cell in the blood,” Fife says. “We’re looking for a rare event—a
needle in a haystack.”

In type 1 diabetes, the immune system
mistakenly attacks insulin-producing beta cells
in the pancreas and damages the organ. “The
body thinks it’s fighting a foreign threat and will
continue to fight it until it’s gone. That’s why
diabetes is so devastating,” Fife says. “We have
to re-educate the body so it knows it shouldn’t
fight itself.”

Long term, Fife aims to develop a way to identify
type 1 diabetes in at-risk people, like siblings
of people who have the condition, long before
it starts destroying the pancreas. Subsequent
cell therapy would prevent diabetes from taking
root. He also wants to treat people with early-
onset and long-term diabetes to stop the disease
from causing deeper damage.

The Fife lab now is working on developing
several biomarkers for tracking down the
antigen that triggers the immune system to
attack itself. It’s complicated work that mirrors
the complex nature of the disease. Once
diabetes is established, it may be fueled by
additional antigens. That might require diverse
therapies for different cells, Fife explains.

Ultimately, once the technology is proven for
combating diabetes in humans, Fife believes it
could be modified to treat other autoimmune
conditions such as multiple sclerosis, celiac
disease, rheumatoid arthritis, and inflammatory
bowel disease.

Fife’s work has received significant funding from
the National Institutes of Health, Minnesota
Partnership for Biotechnology and Medical
Genomics (which involves the University
and Mayo Clinic), Minnesota Lions Diabetes
Foundation, Juvenile Diabetes Research
Foundation, and American Diabetes Association.

Fife says these critical dollars have helped further
his research and build out his team of Ph.D.-level
scientists, doctoral students, and technicians.

“I’ve been very fortunate to have been funded
during these difficult funding times,” he adds.
“The more money you have, the more research
you can do, and the faster you can test ideas and
discover answers to these complicated questions.”

Make a gift to Fife’s research today at give.umn.
edu/giveto/fifelab, or learn more by contacting
Russell Betts at the University of Minnesota
Foundation: 612-626-4569 or rbetts@umn.edu.
Collaborating for better diabetes control

New educational materials aim to improve diabetes knowledge among Minnesota-Somali children and their families

Researchers from the University of Minnesota and Children’s Hospitals and Clinics of Minnesota are teaming up to develop new diabetes educational materials for Minnesota-Somali children and their families.

“We’ve noticed that the Somali children we’re treating have worse type 1 diabetes control than their non-Somali counterparts,” says Muna Sunni, M.B.B.Ch., a pediatric endocrinologist at University of Minnesota Masonic Children’s Hospital and an assistant professor at the U. “We believe that a potential contributing factor stems from a lack of culturally relevant education materials.”

Sunni and Jennifer Kyllo, M.D., an endocrinologist at Children’s Hospitals and Clinics of Minnesota, will be developing new educational materials to address this issue with funding provided by the first Child Health Collaborative Grant, a two-year, $200,000 award funded by the University’s Clinical and Translational Science Institute (CTSI); the Medical School’s Department of Pediatrics; and Children’s Hospitals and Clinics of Minnesota.

Sunni and Kyllo will work with parents of Somali children who have type 1 diabetes to identify cultural gaps and barriers affecting care, such as mealtime customs, religious practices, and food preferences. Educational materials—including videos that are intended to reach a larger audience and bypass literacy barriers—will be produced in Somali.

“We hope these videos and other culturally relevant materials will be implemented in Somali communities across the United States,” says Kyllo. “By creating a model for educating Somali and other minority groups, we could make a huge impact on a wide range of health issues.”

Through the Child Health Collaborative Grant, CTSI and its community research partners will continue to fund collaborations outside the University that address important yet unmet child health issues in Minnesota. The grant will be awarded every two years.

Don’t miss the 20th annual
Jeff Passolt’s Golf Classic ‘fore’ Diabetes Research

Monday, June 13 • The Meadows at Mystic Lake, Prior Lake

This event benefits work at the University of Minnesota’s Schulze Diabetes Institute and its research partner, Spring Point Project, to advance a cure for diabetes. Join in the fun and help support a tournament that has raised more than $6 million for diabetes research since its inception.

For more information, visit diabetesgolfclassic.org.
The new, state-of-the-art University of Minnesota Health Clinics and Surgery Center has just opened its doors.

The 342,000-square-foot facility houses 37 medical specialties, as well as lab and imaging services, a retail pharmacy, a café, an outpatient surgery center, and other clinical services. Endocrinology clinics and diabetes educators are located on the building’s third floor.

Housing so many specialties under a single roof promotes greater communication between the various medical specialists who may be part of each patient’s care team. In fact, the building incorporates several “collaboration spaces” for providers to discuss patients’ care plans.

The Clinics and Surgery Center also makes prominent the latest research and medical innovations through its “Discovery Experience.” Visitors will find video monitors promoting clinical trials and other research opportunities in the center, as well as kiosks throughout the building that offer quick access to StudyFinder, a U of M website that highlights health research opportunities for both patients and healthy volunteers.

Other enhancements to the patient experience include an easier-to-access location (just off of I-94), extended clinic hours, convenient scheduling, easy check-in and check-out, and improved valet parking services. Learn more at mhealth.org/clinics-and-surgery-center.