# Special

TYPE 1 DIABETES

# Paving the way for healthier T1D pregnancies

When she was a teenager, Vanessa Oliver was told that if she wanted to have children, it would be better to do so sooner rather than later to minimize diabetic complications.

"I felt that I had barely gone through puberty when I was told not to wait too long to have kids," recalls Ms. Oliver, who was diagnosed at age six with type 1 diabetes (T1D), an autoimmune disease that makes an individual insulin dependent for life.

She learned that pregnancy is one of the biggest accelerators of diabetic complications, such as kidney failure, blindness and amputation. "I remember a doctor reminding me of this when I was in my late 20s," she said, adding that women have a biological clock, but there is added pressure for diabetics.

Ms. Oliver says luckily things worked out – she married a wonderful man, the father of her now 10-month-old baby. And even though there were some complications related to T1D, doctors consider her pregnancy to have been very successful. Yet it was far from easy. Planning ahead for her next baby, Ms. Oliver has started discussions about participating in a JDRF (formerly Juvenile Diabetes Research Foundation) trial through JDRF Canadian Clinical Trial Network (JDRF CCTN) called Continuous Glucose Monitoring in Women with Type 1 Diabetes in Pregnancy Trial (CONCEPTT) that aims to give pregnant women with T1D the tools to better monitor and control their blood glucose levels.

"Managing T1D is already a daily challenge, without the added stress of preparing for pregnancy and carrying a child. Both mother and baby can experience potentially serious complications during pregnancy if the mother's diabetes is not managed with the utmost care," says Dave Prowten, JDRF Canada's president and CEO, adding that the outcomes of CONCEPTT could potentially reduce these risks and complications.

**ONLINE?**

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**In preparation for conception and birth, Vanessa Oliver says she had to ensure that her blood glucose levels were stable to minimize complications related to T1D.** SUPPLIED

"Through all the years of discussion around pregnancy, I knew it was big deal," Ms. Oliver said. "On average, you need to start working with your diabetes team up to a year before you're planning to conceive."

In preparation for pregnancy and birth, women with T1D have to try to keep their blood glucose levels in a near-perfect range, Ms. Oliver explained. "When you're not dealing with a healthy pancreas that produces insulin on demand, it's difficult to keep your blood glucose under such tight control, especially when things as simple as your emotions might cause levels to go too high or too low. And when you're pregnant, you're dealing with all kinds of hormonal changes."

"Maintaining stable blood glucose levels meant having to monitor every single thing I ate, counting how many carbohydrates I consumed and how much insulin I gave for each of the meals," says Ms. Oliver. She had to make weekly trips to the hospital to meet with nutritionists, diabetes nurses, educators, endocrinologists and OB/GYN doctors specializing in high-risk pregnancies. She and her team carefully evaluated her week's intake of food and insulin to determine whether the insulin to carbohydrate ratio was optimal.

"That was our routine from pre-conception to the day my daughter was born," Ms. Oliver says. "It's a lot of pressure when you know that not only your own quality of life depends on that control, but also the health of your child."

Ten days before she was due to deliver, Ms. Oliver noticed that her blood glucose levels were low, regardless of what she was eating. "I had been told to go into the hospital if this were to happen," she said. At the hospital, Ms. Oliver learned that she had high blood pressure and protein in her urine – a sign that her kidneys were starting to malfunction. "I was told I had pre-eclampsia and needed to have a C-section right away," she said.

Despite the complications – Ms. Oliver's daughter was born with low blood sugar and a small hole in her heart – doctors felt the pregnancy had gone well. "It looks like none of the things that were at risk, such as my eyes and kidneys, have become any worse as a result of the pregnancy," Ms. Oliver says. "And my daughter is doing extremely well."

What attracts her to the CONCEPTT study is that continuous glucose monitoring (CGM) reduces the margin of error. "It's a technology that was fairly recently developed," Ms. Oliver said. She explained that the CGM device has a sensor on the person's body that wirelessly communicates with an external device (an insulin pump), continuously relaying blood glucose readings that also show whether the numbers are trending up or down, allowing the patient to have better insulin management.

Typically, Ms. Oliver tests her blood glucose levels five times a day. But during her pregnancy, she doubled, sometimes tripled the number of tests, even getting up during the night. She believes access to CGM could potentially result in fewer complications for mothers, as well as lowering the risks for babies.

It is Ms. Oliver's opinion that preventative measures like CGM can save health-care dollars in the long run, and she commends JDRF for its work in that field.

"JDRF CCTN is a groundbreaking effort to accelerate solutions for the management, care and cure of T1D," Mr. Prowten says. "Through trials such as CONCEPTT, we are positioning Canada as an international hub for diabetes science and innovation, creating new technologies and therapeutics that will enable the diabetes community to lead better, longer and healthier lives."

RESEARCH

# JDRF study evaluates continuous glucose monitoring in T1D pregnancies

"Women with type 1 diabetes (T1D) continue to have adverse pregnancy outcomes, even when they strive to achieve stable blood glucose levels. Attending pre-pregnancy and pregnancy clinics provides benefits, but more needs to be done," says Dr. Denice Feig, head of the diabetes and endocrinology in pregnancy program at Mount Sinai Hospital, Toronto, and study principal investigator for JDRF Canadian Clinical Trial Network's (JDRF CCTN) Continuous Glucose Monitoring in Women with Type 1 Diabetes in Pregnancy Trial (CONCEPTT).

Dr. Feig explained that poor glucose control during pregnancy can result in a number of serious complications for both mother and infant. Pregnant women with T1D have a higher incidence of elevated blood pressure and preterm births, and babies born are significantly larger than average, leading to a higher incidence of delivery complications. In addition to these complications during pregnancy, the infants are at increased risk of health problems after birth, and may have a higher risk of developing type 2 diabetes later in life.

"Complications in diabetic pregnancies can be reduced with improved glycemic control," says Dr. Feig. The primary goal of CONCEPTT is to help women with T1D, who are planning pregnancy or who are early in their pregnancy, achieve stable blood glucose levels, in order to reduce adverse outcomes.

CONCEPTT is the first large-scale and international trial testing the use of continuous glucose monitoring technology in T1D pregnancies. CONCEPTT will determine if real-time continuous glucose monitoring can improve glycemic control in pregnant women with T1D. Real-time continuous glucose monitoring devices feature technology that displays a person's blood glucose levels when a measurement is taken every few minutes. Could the use of these devices increase healthy outcomes for pregnant women with T1D?

While there have been studies to test the use of technologies for glucose control in pregnant women with gestational diabetes, the newest technologies have not been adequately tested, particularly in T1D pregnancies. "We hypothesize that real-time continuous glucose monitoring will assist women with T1D improve their glycemic control before and during pregnancy, and improve maternal and fetal outcomes," says Dr. Feig.

The CONCEPTT study is currently active in two Canadian provinces, Ontario and Alberta, with additional collaborating sites in the U.S., the U.K., Spain and Italy. The results from the study are expected to influence standards of obstetric care for women with T1D worldwide.

JDRF CCTN is focused on accelerating research leading to better management and an eventual cure for T1D. JDRF CCTN studies cover a wide range of therapeutic areas, and provide opportunities for children, adolescents and adults with type 1 diabetes to participate in clinical trials.

*For more information on this trial or other JDRF clinical trials, visit **jdrf.ca/cctn**.*

**SOLUTIONS**

**JDRF's Canadian Clinical Trial Network**

JDRF Canadian Clinical Trial Network (JDRF CCTN) is a groundbreaking effort to accelerate solutions for the management, care and cure of T1D. JDRF CCTN is currently conducting several high-profile clinical trials in association with leading diabetes researchers at partner universities and medical centres. Globally, JDRF is funding more than 50 human clinical trials, several of which are in the advanced stages of testing.

JDRF CCTN is supported by the Government of Canada, which committed $20 million through the Federal Economic Development Agency for Southern Ontario in 2009, JDRF, which provided an additional $13.9 million, and $3 million from the WB Family Foundation. This $36.9 million investment is helping to bring new technologies and treatments to the marketplace and will help ensure that Canadians living with the disease and its complications are among the first to benefit from the latest research.

**The goals of JDRF CCTN are:**

To create an improved, nationwide infrastructure for diabetes trials in Canada, in order to enable greater clinical trial capacity.

To conduct clinical trials of leading-edge treatments and technologies for T1D.

To provide Canadians with T1D access to the latest diabetes breakthroughs via participating in clinical trials.

To create new partnerships between academic researchers, non-profit organizations, industry and government to accelerate preventions, better treatments, and a cure for T1D and its complications.

JDRF CCTN's mission is to accelerate the development of new treatments and technologies for the treatment of T1D and its complications in Canada.

*To learn more, please visit **jdrf.ca/cctn**.*

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