The past year brought about significant advances in type 1 diabetes (T1D) therapies that are bringing us closer to a cure and universal prevention of T1D and improving how people live with the disease. Here’s a list of some of the top JDRF-supported advances that have helped make this a pivotal moment in the history of T1D research.

**The JDRF Encapsulation Program** funds development of cell-replacement therapies that can be implanted to provide long-term relief from insulin dosing without the need for immune suppression.

Two JDRF industry partners, ViaCyte and Beta-O2, took their experimental therapies into human clinical trials in late 2014.

**ViaCyte™**
- In October 2014, JDRF industry partner ViaCyte launched a human clinical trial of its groundbreaking encapsulated cell therapy for treatment of T1D. The study marks the first-ever clinical evaluation of a stem-cell-derived islet replacement therapy. Once implanted, the encapsulated islet progenitor cells should develop over time into islets with the potential to restore normal insulin function in people with T1D.
- At least four volunteers with T1D have received VC-01, the company’s experimental implant, to date.

**Beta-O2**
- JDRF enabled the clinical trial of a second novel encapsulated cell therapy in October 2014 with the launch of Israel-based-company Beta-O2’s pilot human study of ßAir.
- The device features two ports which inject oxygen to nourish and support the islets their survival and optimal function.
JDRF-supported researchers made significant progress this past year developing methods for converting human stem cells into mature insulin-producing islets. Once fully developed, these techniques should deliver plentiful supplies of mature islets for use in encapsulated cell therapies that become functional relatively shortly after implantation.

- Doug Melton, Ph.D., of Harvard University has developed a method for rapidly converting human stem cells into insulin-producing cells in the lab.
- Timothy Kieffer, Ph.D., at the University of British Columbia has developed a novel protocol for rapidly converting human embryonic stem cells into insulin-producing cells.
- JDRF funding supports both Dr. Kieffer’s and Dr. Melton’s research.
- The JDRF Encapsulation Consortium will be creating experimental encapsulated cell therapy products that should be useful in using these new sources of beta cells.

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**TWO APPROACHES TO DEVELOPING READILY AVAILABLE SUPPLIES OF IMPLANTABLE ISLET CELLS MAKE HEADWAY**

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**Artificial Pancreas**

**NEW DEVICES MOVE TOWARD THE MARKETPLACE**

The JDRF Artificial Pancreas (AP) Program supports the development of novel technologies that deliver more effective and precise insulin therapy. These automated systems will provide tighter control of blood-sugar levels and significantly reduce the need for frequent glucose testing and manual insulin dosing.

**Medtronic’s New MiniMed 640G made history with Australian launch**

- A four-year-old Australian boy was the first to receive the device, which is now also available in Denmark and the UK and is moving toward approval in the U.S.

**Medtronic’s MiniMed 670G pushes the AP timeline**

- In early 2015, Medtronic announced plans to bring to market the first hybrid system with the ability to automatically start and stop insulin delivery based on predicted blood-sugar levels.
- This hybrid closed-loop system will still require meal bolusing, but it will make life easier by automatically adjusting insulin delivery 24 hours a day, reducing the occurrence of hypoglycemic and hyperglycemic events.
- Medtronic announced that the MiniMed 670G will most likely be available in debut markets in 2017.
Tidepool devises a data platform to connect people with T1D and their caregivers around the clock

- In September 2014, JDRF and Silicon Valley-based nonprofit Tidepool partnered to complete development of an app that will allow people using insulin pumps and continuous glucose monitors (CGMs) to upload and share their data with family members and healthcare providers.
- The data-sharing technology will help reduce the burden of managing T1D by allowing consistent remote data sharing with caregivers.

Dexcom Share CGM transmitter allows real-time sharing of blood-glucose data

- JDRF industry partner Dexcom launched the G4© Platinum CGM System with Share. Share is a wireless transmitter that communicates data via Bluetooth to a mobile phone app.
- The Food and Drug Administration (FDA) approved the Dexcom Share device in October 2014. As a part of the funding arrangement, Dexcom distributed a prototype version of this transmitter to members of the JDRF AP Consortium for use in designing experimental AP systems.

The JDRF Glucose Control Program supports the development of novel insulin formulations and drugs that can be used in conjunction with insulin therapy to provide better control of blood-sugar levels.

In summer 2014, JDRF industry partner MannKind received FDA approval for Afrezza, a rapid-acting inhaled insulin that can be used at the beginning of meals to more tightly control the rise in blood-sugar levels that occur after eating.

- A JDRF-supported study published in the Journal of Diabetes Science and Technology’s May 2015 issue showed that use of Afrezza as a mealtime bolus in conjunction with an experimental AP system significantly increased the percentage of time that people using the system stayed in ideal blood-glucose range.

WATCH THIS
https://www.youtube.com/watch?v=j_2vhGDzvuM
JDRF is exploring ways to restore the body’s ability to produce insulin while preventing the autoimmune attack that triggers T1D and causes the destruction of new beta cells.

Verapamil, a generic drug, shows promise in saving beta cells

- A JDRF-supported human clinical trial testing whether the common blood pressure drug verapamil can improve beta cell health and survival began in February 2015 at the University of Alabama, Birmingham. The study is part of JDRF’s strategy to speed development of new T1D therapies by repurposing drugs that are already FDA approved for other indications.

- The trial participants will receive either verapamil or a placebo for one year while continuing insulin pump therapy, and researchers will track their blood-sugar control and C-peptide levels to measure any impact on beta cell numbers and related insulin production.

 Restoration

Prevention

The JDRF Prevention Program aims to keep individuals from ever developing T1D. JDRF is pursuing both primary and secondary prevention strategies:

Primary Prevention means preventing the autoimmune attack from occurring so people never develop T1D.

Secondary Prevention is focused on insulin dependence in individuals where the autoimmune attack on beta cells has already begun.

JDRF-support researcher Danny Chou, Ph.D., at the University of Utah made progress in developing a glucose-responsive insulin that self-activates when blood sugar begins to rise.

- This glucose responsive insulin is being designed for delivery through a non-invasive system and could possibly require only a single daily dose, giving people with T1D a more convenient, effective and safer form of administered insulin.

JDRF-SUPPORTED RESEARCHERS BUILD MOMENTUM ON REPURPOSING EXISTING DRUGS FOR TREATMENT OF T1D

WATCH THIS https://vimeo.com/111213628
JDRF-funded researchers at Harvard, MIT and Massachusetts General Hospital, and in Finland, published a study in the February issue of *Cell*, *Host and Microbe* identifying a link between changes in gut bacteria and the onset of T1D.

- They found that in some young children a change in normal intestinal bacteria can occur a year before T1D diagnosis.
- This discovery could lead to an early diagnostic test for T1D and development of therapies that prevent the development of symptomatic T1D.

In April 2015, *JAMA* published results from the Pre-POINT trial, a four-year, JDRF-funded international clinical trial to investigate the ability of daily doses of oral insulin to stimulate the immune system in a way that may prevent T1D associated autoimmunity.

- The preventive oral insulin treatment is intended to stop the development of diabetes autoantibodies in children with high genetic risk. The aim of the study was to find the most appropriate dose for accomplishing this goal.
- The findings could lead to another clinical trial of the proposed intervention, further exploring the dose and age range of children that can be treated.

JDRF initiated a medical-community review of current T1D staging criteria and establishes a working agreement to revamp these criteria to define and include earlier stages of the disease.

- Currently, you either have symptomatic T1D or you don’t, which does not fully capture the fact that the disease is present prior to it being symptomatic, which can be identified with risk screening today.
- Diagnosing a person with T1D during the asymptomatic phase of the disease would have implications for research, drug development and regulatory guidelines for clinical trials, as well as awareness of the disease, which should limit DKA at diagnosis.

JDRF partnered with the German government and Institute for Diabetes Research Munich, Germany, in January 2015 to launch Frida, the first population-based screening for T1D in healthy three and four year olds.

- As the incidence of T1D rises worldwide, Frida attempts to investigate the early stages of development of the disease and identify new pathways to prevent it.
- The study aims to achieve early diagnosis and intervention for children living with T1D.
These advances don’t happen overnight and the associated costs are high. All of our advances are the result of years of teamwork, collaboration and support of research aimed at preventing, treating and ultimately curing T1D. For more information on all of our research projects, please visit jdrf.org.

Join us in turning type one into type none