Curing Type 1 Diabetes
Recent Research Progress

IMPROVING LIVES. CURING TYPE 1 DIABETES.

Cure

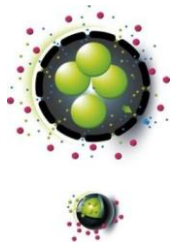
type 1 diabetes by replacing or regenerating beta cells, and halting the autoimmune process.

JDRF envisions the day when a cure will be available to people with T1D. We define a cure in patient terms as safe, durable, convenient, widely available, and cost-effective normal glucose control with insulin independence. To achieve this goal, JDRF is working to develop two distinct therapies. One is a replacement therapy - implanting encapsulated glucose-responsive, insulin-secreting cells. The other is regenerating a person's beta cells coupled with a therapy to block the autoimmune attack. Over the past roughly 5 to 7 years significant progress has been made towards achieving these goals. Read more to learn about the amazing progress of JDRF's priority programs to cure T1D.

JDRF Beta Cell Encapsulation Program – Insulin Independence via Cell Implantation

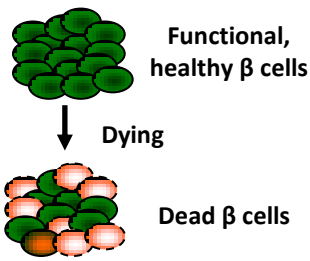
Why This Program Is Important

- Islet and pancreas transplantation proved T1D can be cured by cell replacement but it is not widely available due to limited human islet availability and the need for life-long immunosuppression
- JDRF's program is generating abundant insulin-producing cell sources and novel immune protective encapsulation materials to avoid immunosuppression



2005 Encapsulation Status	Key Advances Since 2005
Failure of early encapsulation attempts due to inadequate materials	Long-term animal studies demonstrate safety and effectiveness of pilot encapsulated cells
No human stem cell lines suitable for human use and limited insight on how to produce beta cells from human stem cells	Human stem cell lines established and embryonic stem (ES) cells differentiated into pancreatic progenitor cells
Early testing of pig islets as potential cell source for transplantation (for use with immunosuppression therapy)	LCT pig islet encapsulation completes 1st human study. Two companies start human stem cell encapsulation programs (ViaCyte & Betalogics)

JDRF Beta Cell Biomarkers Program – Tools to Accelerate Progress Towards A Cure

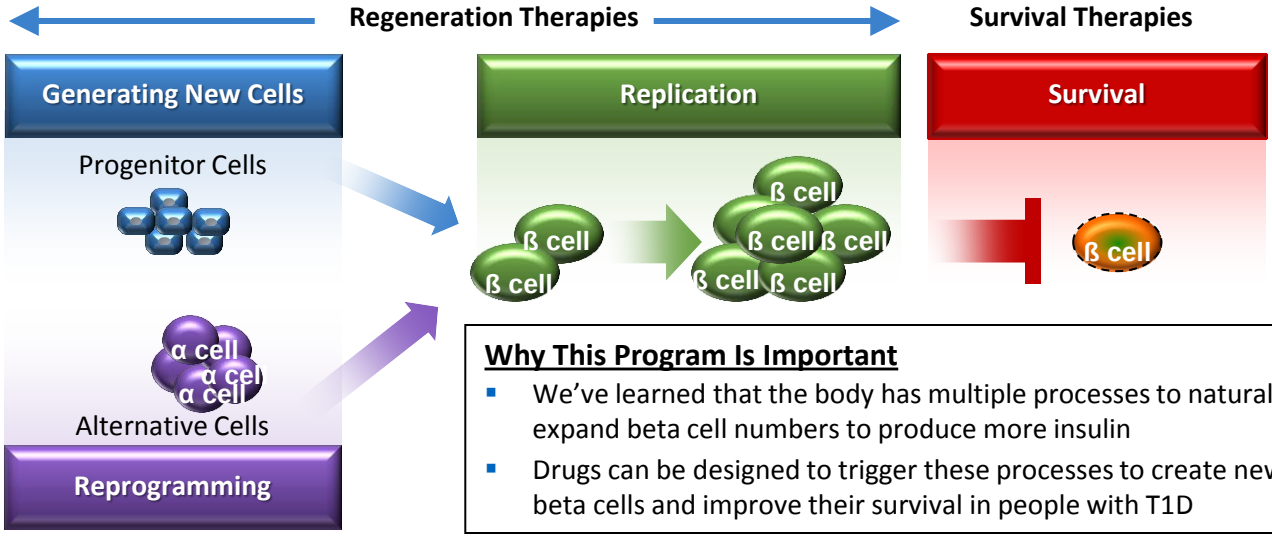


Why This Program Is Important

- Monitoring beta cells is difficult given their diffuse locations in the pancreas
- Detecting beta cell stress and death will allow more specific staging of people with the disease and targeting of new therapies to subgroups
- Detecting changes in beta cell numbers will more quickly reveal benefits of new therapies in clinical trials, speeding development.

2005 Biomarkers Status	Key Advances Since 2005
Beta cell status can not be directly measured – only inferred indirectly from loss of blood glucose control and measurement of residual beta cell function (C-peptide)	Discovered several markers of beta cell death in lab studies – potential blood test and licensed to a company to develop further
	Discovered potential beta cell imaging concepts and tested in animals

JDRF Beta Cell Regeneration and Survival Program – Insulin Independence via Restored Native Beta Cells

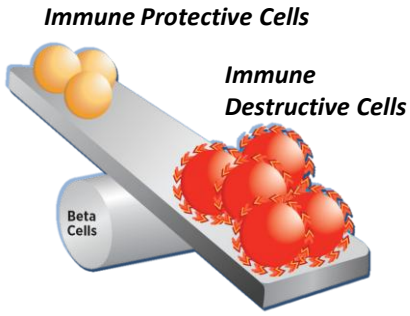


Why This Program Is Important

- We've learned that the body has multiple processes to naturally expand beta cell numbers to produce more insulin
- Drugs can be designed to trigger these processes to create new beta cells and improve their survival in people with T1D

2005 Regeneration Status	Key Advances Since 2005
Beta cell replication concept still only a theoretical possibility	Replication pathways identified & successfully tested in animals; Industry partner interest
Cell reprogramming to beta cells concept did not exist	Discovered that alpha and other cell types can be converted to beta cells; Industry partners
No beta cell survival strategies existed	Discovered the role of beta cell stress in dying beta cells and launched first clinical study to improve beta cell survival and/or replication

JDRF Antigen-Specific Immune Therapies Program – Restoring Normal Balance to the Immune System



Why This Program Is Important

- T1D is an autoimmune disease so fixing the misdirected immune system is key to a cure
- Broad immunosuppression therapy shown not adequate alone for most people with T1D
- Targeted immune therapies will focus on the specific problems associated with the immune system in people with T1D

2005 Immune Therapies Status	Key Advances Since 2005
Clinical focus on therapies providing a broad suppression of the immune system (anti-CD3)	Broad immunosuppression therapy shown to preserve beta cell function in recent onset setting - but only transiently
Lacked an understanding of the difference between the healthy and T1D immune system	Discovered the role of specific components in balancing the immune system. Animal studies proved the potential for antigen-specific tolerance-inducing therapies
	Multiple industry partners launch unique R&D programs towards antigen-specific therapies