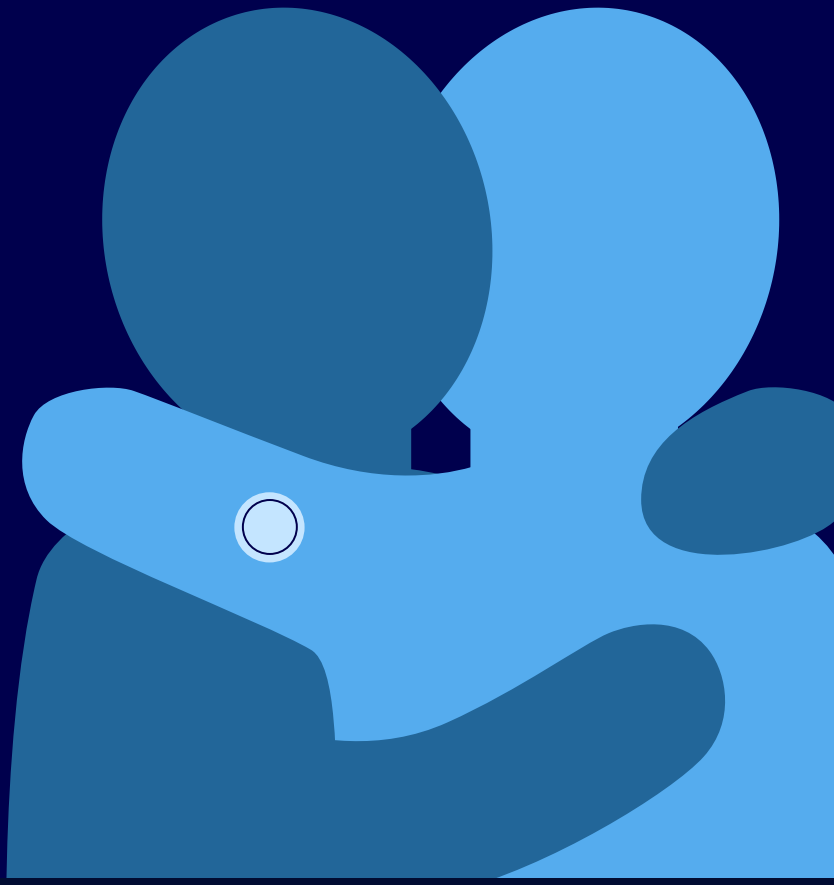
ISLET

A European project innovating advanced cell-therapy for Diabetes

International Diabetes Federation Europe

Connecting young people with Type 1 Diabetes through science

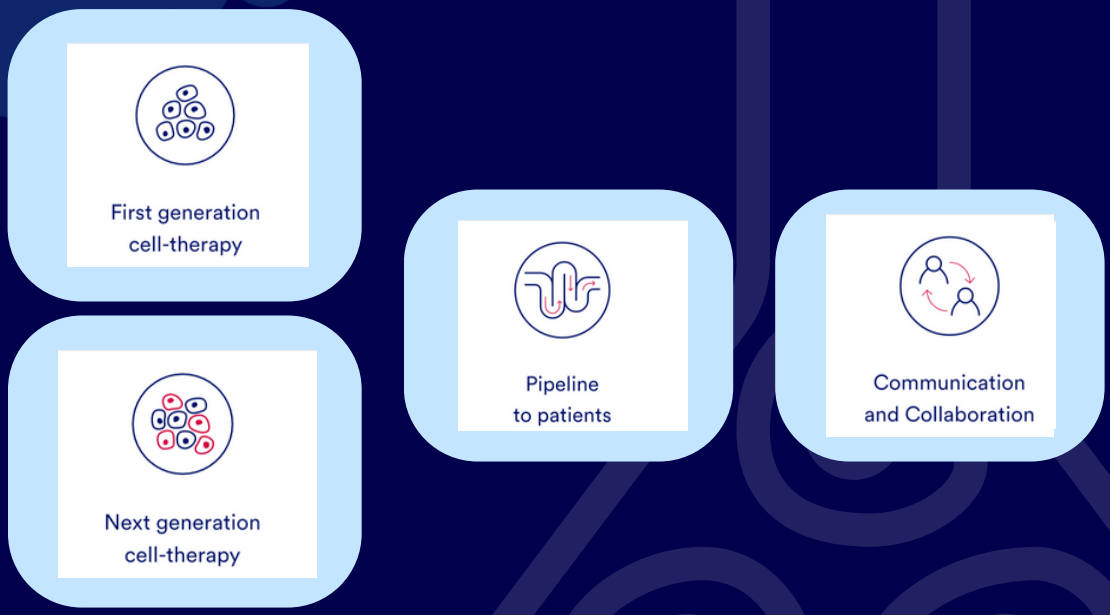


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 874839 ISLET

What is ISLET and what are ISLET's goals?

ISLET is an EU-funded Horizon 2020 project that aims to make advanced stem cell therapy for Type 1 Diabetes (T1D) available in everyday practice. Partners collaborating in this project include various universities, research centres and a patient organisation. It is led by a team of scientists who bring together broad-ranging expertise, including clinicians who specialise in diabetes and islet transplantation, stem cell scientists and cell manufacturing experts.

At the end of the project in 2025, ISLET aims to be ready to trial stem cell therapy in humans, taking into account that insulin producing cells have already been developed at a laboratory level.



What are stem cells and could they be a possible therapy for diabetes?

Tissue stem cells that are found in our bodies are the starter cells that make other cells that we need. There are many different types, for example, blood stem cells, skin stem cells, pancreatic stem cells. Each is able to make the other types of cells found in that organ or tissue and also copy themselves so they do not run out, which is unique to stem cells. Stem cells replace cells lost to damage, disease or natural turnover.

A second type of stem cells, **embryonic stem cells**, are able to make all of the cell types needed to make our bodies. These stem cells are not found in our bodies, but are grown in the lab from blastocyst cells, which are the cells found in the very early embryo. Scientists can use these cells to make different cells in the lab and keep stocks of them rather than use new blastocyst cells each time.

T1D is an autoimmune disease where the body's own immune system destroys the beta cells in the pancreas. As beta cells produce insulin, the hormone which lowers blood glucose levels, their destruction leads to high glucose levels, and therefore means that people living with T1D require daily insulin injections.

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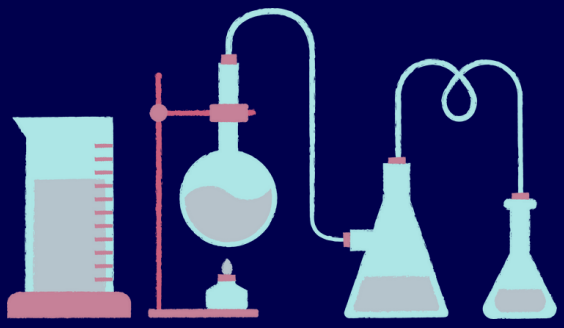

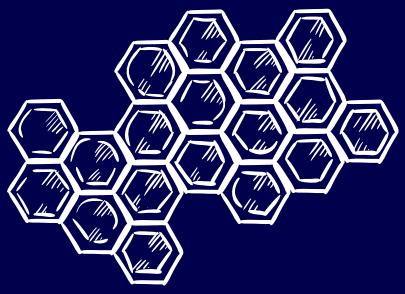

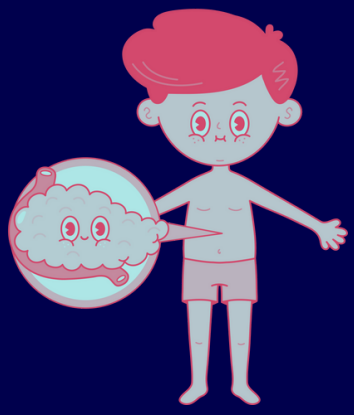

ISLET's mission is to replace these diseased beta cells by making replacement insulin-secreting beta cells, from stem cells in the lab. ISLET scientists are able to guide stem cells to become beta cells by providing cells with the messages required for them to develop into the desired cell type. In other words, those messages tell the genes to decrypt and translate the encrypted information, so that it can be used to form, for example, proteins that the cells need at that point. If these lab-grown beta cells are then implanted into people with T1D, the hope is that they will replace the destroyed beta cells and the need for insulin injections may stop; this is a possible treatment for T1D.

Taking this a step further, ISLET aims to make islet-like clusters of cells for transplantation rather than just beta cells alone. The idea is based on the knowledge that beta cells do not act on their own, and superior glucose sensitivity and the body's response depends on a mix of cells found in pancreatic islets.

There is a good scientific rationale for this approach as people living with T1D who have received transplants from deceased donors display better blood glucose regulation compared with any other treatment available.

Why does this study matter for the diabetes community?

(IDF Europe Atlas) 10th Edition, 2021

In 2021, globally it was estimated that:

- more than 1.2 million children and adolescents (0-19 years) are living with type 1 diabetes
- there were 149,500 new cases of T1D per year
- there were 8.75 million people living with T1D in the world

An effective islet transplant needs cells from 2-3 donors to work effectively and as they are obtained from deceased donors, supply is limited. On the other hand, stem cell-derived beta cells which can be grown in large numbers in the lab, offer a reliable, alternative source to donors.

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Will the solution proposed by ISLET be a "one time" therapy or will it need to be repeated after a certain time frame?

Currently, the available treatments with donor islets are not a one-time replacement, lasting around 6-10 years, although this is dependent on the individual. Over time, glucose sensitivity decreases and on dependence on external insulin delivery returns.

At this point, we do not yet know how the body will react to the islet cells made from stem cells over time and so, there is no guarantee that it will be a 'one time' therapy.

Nevertheless, using stem cells produces enough beta cells for several transplants if needed. ISLET's work goes hand in hand with the scientific work that is looking at how to control the body's immune response to the cells.

Has the project faced any challenges to date and do you expect any challenges in the future?

There are always challenges! No one has ever done this before in the way that the ISLET project is doing it, so it is a constant problem-solving exercise. That is why it is so important to have the right team. It is like pioneering a mountain like Everest - we have the right people with the right skills; some parts are straightforward and other parts are more difficult. There may also be unforeseen challenges, or things that go more smoothly than expected.

Bringing cell therapy for diabetes to the clinic needs several things to come together to work. Firstly, there is working out how to make the right cells from stem cells.

Then, there is refining the method for making the cells to be used for transplantation; this process needs to be reproducible and reliable. The produced cells also need to be shown to have efficacy and to be safe before they can be used in clinical trials with people. Cell manufacturing is a complex process that is strictly controlled and regulated as the cells are to be used in people.
The full video is available on our website: https://isletproject.eu/discover-islet/

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ISLET is pioneering a cell therapy manufacturing process, and aims to create a way of 'profiling cells' at the end of the process to assess their quality before a transplant is carried out—again, another step towards refining cell therapy. As well as creating the 'gold standard' cells, there is consideration and development of the best way to administer the cells to the person, for example, whether to place the cells in a device that is transplanted or administer them directly to the body.

All of these stages consist of intricate steps that need to be solved, tested, evaluated and refined. For example, cells might not behave as expected; there might be challenges with making the exact cell types needed to be effective. This is the job of the ISLET consortium—to bring the very best people together who can surmount these challenges and bring cell therapy for diabetes closer to the clinic.

What is your motivation to change the lives of People Living with Diabetes (PwD)?

Interview with Willem: a scientist working on this project

First of all, I think that each scientist's motivation varies a lot. Some people are so passionate about how stem cells work and doing scientific research that this is enough motivation or inspiration to continue improving diabetes treatment without really having a patient focus. Other scientists working may have clinical experience with treating PwD in diabetes clinics and they see the burden and challenges that people are facing as their reasoning behind finding a cure/treatment for diabetes.

Therefore, it is nice to work on the project with IDF Europe as it gives you the bigger picture of living with diabetes. The motivation of the young people working with us on this project is also very valuable to keep going. Sometimes the motivation also depends on whether you have friends or relatives who live with diabetes and how it affects you as a person.

But to be honest, does it really matter as a scientist to have a huge patient focus or in-depth knowledge about diabetes itself to be committed to the job/project? Does it affect the research?

Generally, the motivation and dedication of a scientist is to try to solve a problem or defect. It is important to solve a problem that serves a need, a real problem, so someone needs to understand both what the issue is and why it is relevant to do something about it.

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Scientists & people living with diabetes - how can they help each other?

PwD can help scientists better understand the their needs of PwD so that new therapies are practical for them and represent an improvement compared with other treatments. PwD are experts in bringing better therapies to diabetes clinics.

PwD can advocate and fundraise for research and nudge policymakers to put diabetes on the political agenda.

PwD can help scientists better communicate about the project's aims to the diabetes community, so that awareness is raised. It also helps the scientists to know who they are helping and why.

Scientists living with diabetes in the research/biology or medical field can help solve problems related to diabetes by using their own lived experience.

PwD as volunteers can take part in clinical trials / patient registries https://www.ema.europa.eu/en/human-regulatory/post-authorisation/patient-registries

PwD or anyone can help raise awareness of clinical trials to reduce fears and increase trust.

Patient forums and committees can act as feedback mechanisms.

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At what point will ISLET know the treatment is ready for PwD? What still needs to be proven before we know it is successful?

ISLET's work is at the 'basic science' and 'pre-clinical stage', which are the steps before a clinical trial can be approved. To date, ISLET has shown that stem cell-grown beta cells restore insulin independence in animal models, showing its promise as a therapy for people living with diabetes. At the end of the ISLET project, the goal is to be at the point when clinical trials can begin.

How close is this project to be actually implemented for PwD? How promising are the results?

At the end of the project in 2025, ISLET aims to be ready to trial the therapy in humans. Read more about a standard research study (so called trial) process below.

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How did this blog come about?

As part of the project, a dialogue was initiated in 2022 between scientists and IDF Europe's YOURAH group of young PwD to explore the best ways of broadening understanding of scientific research and ISLET, among both people living with diabetes and the general public, and to provide insights of living with diabetes to ISLET young scientists to make the research more relevant to them.

During several virtual calls, young PwD started asking young scientists questions about the project's scientific process and objectives, and shared their experience of living with diabetes as well as their hopes and expectations for the future.

This post reflects some of the main areas of discussion which took place during these meetings, and is the first in a series, with more blog posts expected to be released in 2023.

Young scientists:

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Rosalia Fernandez-Alonso
Willem Staels

YOURAH members:

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Konstantina Boumaki
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Rebecca Barlow-Noone

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