

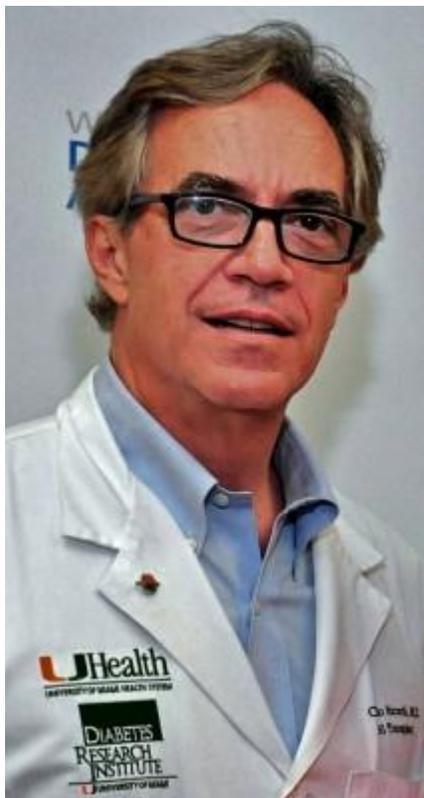
Diabetes Awareness Month Practical Cure Interview Series: BioHub

The next interview in our Practical Cure series is the BioHub, an initiative of the Diabetes Research Institute at the University of Miami. The DRI, represented by Dr. Camillo Ricordi, the Director and Chief Academic Officer of the University of Miami Diabetes Research Institute, shares details about the progress of this project.

In the recent [State of the Cure 2014](#) report, this project was identified as one of the six emerging Practical Cure solutions on the verge of entering human clinical trials.

The BioHub is a multi-platform initiative working toward a bioengineered “mini organ” designed to mimic normal pancreas activities. They are now beginning Phase I human trial testing of one aspect of the BioHub, a biodegradable scaffold. There are a number of other aspects that are in testing, but none of them are advanced as the scaffold.

The following interview with Dr. Ricordi shares the details.



Dr. Camillo Ricordi

Stacy Joy Goodman Professor of Surgery, Distinguished Professor of Medicine, Professor of Biomedical Engineering, and Microbiology and Immunology, and serves as Director and Chief Academic Officer of the University of Miami Diabetes Research Institute

Cara Murphy: Why did the University of Miami and the DRI get involved in T1D research?

Dr. Camillo Ricordi: A number of unique circumstances led to the creation of the Diabetes Research Institute, as well as to the ability for our organization to maintain its sole focus on finding a cure. The early beginnings of the DRI date back to 1971, when a group of parents of children with type 1 diabetes created a foundation committed to funding research to cure “juvenile diabetes.” Those parents were not satisfied with simply managing the disease. They wanted a cure.

At the time, cure-focused research was practically non-existent. So they banded together to support research aimed at curing those living with diabetes. In fact, the group was one of the first two chapters of the-then JDF. As the JDF organization expanded with chapters in other cities, the Miami group opted out in order to put their support behind a promising research program at the University of Miami that was focused on curing the disease. The Diabetes Research Institute name was adopted as the new facility at UM’s School of Medicine was being designed and constructed in the 1980s. This DRI building, where our research program is now housed, was built and paid for by North America’s Building Trades (formerly the Building and Construction Trades Department of the AFL-CIO). That was an incredible gift and their support continues today.

During the organization’s development, the DRI Foundation’s lay leadership had the vision and determination to create a formal agreement with the University of Miami, ensuring the DRI’s continuity, and giving the Institute a level of independence from the usual academic-driven agenda. To this day, that agreement ensures that the DRI’s research can remain focused on the original mission – to cure diabetes, while collaborating worldwide to synergize cure-focused efforts through an unprecedented network of scientists and institutions comprising the DRI Federation.

CM: How long have you been at it and what keeps everyone going?

CR: From the start, the Diabetes Research Institute and Foundation represented a unique coalition of families living with T1D together with researchers, clinicians, and business and political leaders. The unifying goal was clear and has never wavered: finding a cure for diabetes. What keeps us going is the amazing research progress we have made, along with the strong belief that we are making a difference. The shared enthusiasm that comes from seeing islet transplant recipients discontinue insulin therapy and maintain normal blood sugars – some for more than ten years – is inspiring to all. And, building on this progress, our research is now

focused on developing a "mini-organ" to mimic the native pancreas and provide an environment that will sustain the life and function of the transplanted insulin-producing islets, without the need for life-long treatment of the recipients with anti-rejection drugs.

CM: Please describe to us non-scientists the BioHub approach. What makes your work unique?

CR: The BioHub is a bioengineered mini-organ that mimics the insulin-secreting function of the pancreas, while allowing integration of synergistic technologies to eliminate the need for anti-rejection drugs. This approach builds upon decades of progress in clinical islet transplantation and addresses three major challenges that have limited the procedure to the most severe cases of diabetes – the site of transplantation, the sustainability of the insulin-producing cells without chronic immunosuppression, and the supply of those cells. What makes the BioHub unique is that it is a more natural, holistic approach to mimicking the native organ by using islet cells (or other insulin-producing cells) and other naturally-occurring cells and components to create an optimal environment for keeping the cells healthy and able to function long term. The DRI is also focused on the omentum as a transplant site for implantation of the BioHub, to more closely replicate the physiological drainage of insulin from the pancreas. We believe the omentum also has other beneficial properties, as it is highly vascularized and has historically demonstrated the ability to aid in tissue repair.

CM: If successful, how will this change the day-to-day lives of people living with t1d?

CR: Ultimately, the goal is to achieve normalized blood glucose levels without the need for immunosuppression. The ability to restore natural insulin production will allow for the appropriate response to blood sugar fluctuations, both highs and lows, eliminating the need for insulin therapy and glucose monitoring, and eliminating the risk of acute and long-term complications.

CM: A few weeks ago there was a big announcement from Doug Melton's lab at Harvard that they have found 'fully functioning beta cells'. How does this work impact the BioHub, if at all?

CR: All progress in the development of stem cells into insulin-producing cells is welcome, as the BioHub will represent a platform technology to optimize survival and long-term function of any insulin producing cell, whether adult islets or insulin producing cells derived from stem cells. In fact, we just had a meeting at Harvard with Doug Melton and other collaborators as part of the inception meeting of a new major NIH Consortium effort, under the newly formed Human Islet Research Network.

The work of Dr. Melton's group, as well as other leading groups in the stem cell field, such as the Betalogs and ViaCyte teams, have shown significant progress in the generation of human insulin producing cells from stem cells – and, in California, the first patient recently received human stem cell-derived insulin producing cells transplanted within their macro-encapsulation device. The ability of these cells to reverse diabetes and avoid immune destruction following transplantation remains an important issue, but we are happy to see these translational efforts finally beginning or approaching pilot clinical testing. The area of cell supply is critical and is a direction that we at the DRI are also working on. The BioHub is a platform that can house viable insulin-producing cells, independently from their source.

CM: At what stage of human trials are the main BioHub projects? When do you expect results to be published?

CR: We are at the beginning of the human trials, with the first IND approved by the FDA. IRB (Institutional Review Board) and Consent Form approved by the university. The contract has been finalized with the hospital and the last simulation “test transplant” to test the technical aspect of the minimally-invasive surgery equipment will be completed in the next two weeks. The first human subject could be transplanted before the end of the year and we are planning to perform two other transplants in the first half of 2015. Also in 2015, we are planning parallel clinical trials at the DRI in Miami as well as at other centers of the DRI Federation and The Cure Alliance to address reversal of autoimmunity and tolerance induction with transient immunomodulation. Also in 2015, we'll participate in collaborative clinical trials of the transplantation of human stem cell-derived insulin producing cells and expanded regulatory T cells for reversal of T1 diabetes and restoration of self-tolerance. Publications will follow completion of each pilot clinical trial.

CM: Are you still recruiting for clinical trials? If so, who should one contact?

CR: Yes, the DRI's Clinical Cell Transplant Program is still recruiting candidates for this clinical trial, and continues to screen patients for clinical trials that may occur in the future. The more candidates the DRI has on the active waiting list, the better the chance for a suitable “match” when a donor organ becomes available. Those interested in learning more or participating in our clinical trials should contact 305-243-5321 or send an e-mail to: islet@med.miami.edu. The islet transplantation application can also be downloaded at www.DiabetesResearch.org/PilotTrial