Stories of Hope: A Stem Cell Therapy for Diabetes

Español

Peace of Mind and Body

The last thing **Maria Torres** expected was to be diagnosed with type 2 diabetes. She exercised, ate well and kept her weight under control. There had to be some mistake. Maria asked her doctor to repeat the tests, but the results were the same. At 43, for reasons no one could fully explain, she had diabetes, and her life was going to change dramatically.

“It really scared me,” says Maria. “I thought I was going to die soon.”

That Maria doubted her diagnosis is no surprise. Type 2 diabetes is often associated with obesity, and she didn’t fit the profile. Most likely, some undiscovered genetic component had made her susceptible to the disease.

Regardless, she now had to rework her life to manage the diabetes. Her cells had developed a condition called insulin resistance. Though her pancreas was producing insulin, which tells cells to take in blood sugar, the cells were not cooperating. As a result, glucose was accumulating in her blood, putting her at risk for heart disease, nerve damage, eye issues and a host of other problems.

To help her cells absorb glucose, she needs regular insulin injections. Maria injects the hormone five times a day and must often measure her blood sugar levels even more frequently.

Faithfully following this regimen has kept her alive for 20 years, but insulin is not a cure. Even with the regular injections, she faces dramatic mood swings and more serious complications as glucose levels rise and fall.

Working for a Cure

One of the most promising strategies to cure diabetes is to transplant beta cells, which sense blood sugar levels and produce insulin to reduce them. Patients with type 1 diabetes would benefit because new beta cells would replace the ones they’d lost to disease. Type 2 patients, like Maria, could increase their body’s ability to produce insulin, lowering blood sugar levels and alleviating the need for injections.

With more than $72 million in funding from CIRM, a San Diego-based company named ViaCyte is working on this solution. They have spent years developing new methods to turn human embryonic stem cells into insulin-producing beta cells. It hasn’t been easy. Stem cells are promising because they can form any tissue. However, to make a specific type of cell, researchers must replicate the exact signals that transform a stem cell into a beta cell, rather than a neuron or muscle cell.

In 2008, the company succeeded, but with a clever twist. They created progenitor cells, one step shy of mature beta cells, and allowed

them to finish developing in the body. In animal studies, the hardier progenitor cells survived the transplant process and, once mature, began producing insulin. The project has another innovation up its sleeve: these progenitor cells are first placed in a porous capsule, about the size of a credit card, before transplantation under the skin. This device allows transfer of blood sugar, insulin, oxygen, and other molecules but keeps cells out, thus avoiding the possible attack and rejection by the patient's own immune system.

ViaCyte is now running an FDA-approved clinical trial for type 1 diabetes out of the UC San Diego CIRM Alpha Stem Cell Clinic location. But the company eventually hopes to also help those with type 2. Maria Torres is eager for them to succeed, both for herself and her family.

"I have three kids, and I know they could have the same thing I have," says Maria. "If they find a cure, for me, that's peace of mind."

For more information about CIRM-funded diabetes research, visit our fact sheet.
