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Stem cell treatment for juvenile diabetes

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Juvenile diabetes is a chronic condition that has affected many young people over the past few years. Type 1 diabetes is a condition in which one’s immune system destroys the beta cells (insulin-producing cells) in the pancreas. Insulin is a hormone that helps one’s body in allowing the glucose present in the blood into the cells. Since this process is in total disarray in type 1 diabetic patients, there is no insulin to move the glucose from the blood to the cells, thus leading to hyperglycemia.

As recent studies show, with the help of stem cell therapy, there is a potential cure for type 1 diabetes. Stem cells are unspecialised cells that can differentiate into any specialised cell type. This unique ability of these cells has been exploited by stem cell technology to isolate and use them in replacing cells or tissues that have been damaged due to some disease.

Pluripotent stem cells like human embryonic stem cells can be manipulated to produce glucose-responding cells, like beta cells, that release insulin thus enabling the cure of diabetes. Other main sources of stem cells for the generation of beta cells include haematopoietic stem cells and multipotent mesenchymal stromal cells derived from the bone marrow, umbilical cord blood and adipose tissue.

This treatment involves the isolation of a maximum number of viable stem cells, either from one’s own body or from a suitable donor. Then the viable cells are reinfused through local administration, that is, directly infused at the site of damage. Once infused into the body, they colonise the damaged part of the pancreas and adapt to the properties of the residual stem cells, hence allowing the lost beta cells to regain their ability to produce insulin.

Besides healing the damaged tissue, stem cells can modulate the immune system so that they can shut off any pathological responses. Stem cells home the inflamed tissues and start producing anti-inflammatory agents. These mediators act locally and do not suppress the immune response of the patient’s whole body. Additionally, mesenchymal stem cells induce the production of T regulatory cells, a type of immune cell whose function is to protect the body against immunological self-attack. This process aids in counteracting the autoimmunity of the individual.

Stem cell therapy provides a great chance of recovery for patients with type 1 diabetes. Although it does not provide a permanent cure, it reduces symptoms and other severe complications. Some patients are known to have gone many years without taking insulin injections. However, there are a few issues that have to be dealt with and resolved through thorough research, before the therapy becomes clinically feasible for all juvenile diabetes patients.

Keywords: Type 1 diabetes, Insulin, Glucose, Stem cells, Differentiation, Infusion, Beta cells, Autoimmunity

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