

# Stem Cells For Diabetes

*Stem cell research on finding a 'cure' for diabetes is still in its early stages of development and some study results are already starting to show glimmers of hope. Dr Warren Lee, consultant paediatric endocrinologist of Dr Warren Lee's Paediatrics, Growth & Diabetes Centre, talks about what's new in this area of research.*

According to a 2009 report published in the Journal of the American Medical Association (JAMA. 2009;301:1573–1579), a group of scientists from Brazil took stem cells harvested from a patient to help patients achieve good diabetes control without insulin injections or having only to take much smaller doses of insulin than previously.

## Research background

Carlos E.B. Couri, MD, PhD, from School of Medicine of Ribeirão Preto, University of São Paulo, Ribeirão Preto, Brazil, and colleagues first reported a series of 15 patients in 2007 who were able to become free of insulin injections over a mean 18.8 month follow up period with normal levels of HbA1c.

## What was the study about?

The 2009 article reported on a total of 23 patients who had received stem cell treatment to treat new onset cases of Type 1 diabetes.

They were treated between November 2003 and April 2008 and followed up until December 2008 at the Bone Marrow Transplantation Unit of the School of Medicine of Ribeirão Preto in Brazil.

The researchers were interested in the effects of a kind of stem cell transplant called 'autologous nonmyeloablative

hematopoietic stem cell transplantation' (HSCT), where stem cells derived from the patient's own bone marrow are collected from the blood.

## Study outcomes

In this group, 20 out of the 23 patients were insulin-free for at least a short time. Of these 20, 12 were able to remain free for an average of 31 months (ranging from 14 to 52 months).

The eight patients who needed to be on insulin again only needed small amounts, 0.1-0.3 units/kg/day but were still able to maintain their HbA1c below 7%. Most people with Type 1 diabetes mellitus will require about 0.5 -1.0 units/kg/day.

In the patients who were able to be insulin free for at least a short time, laboratory studies showed that the level of c-peptide and insulin produced by the patients' own bodies had increased significantly.

## Key points to note

Overall, this approach to treating early onset of Type 1 diabetes may sound promising. However, we must temper our enthusiasm with the following key points from their report:

- 1 This study was carried out in Brazil and, so far, no one else has been able to report similar results.

- 2 Treatment was carried out only soon after the diagnosis of Type 1 diabetes mellitus (less than six weeks after diagnosis).
- 3 The study group consisted of people 13 to 31 years old who had positive GAD antibodies and they were treated from November 2003 to April 2008.
- 4 Of the total of 23 people who were treated, 20 were insulin independent for a short while.
- 5 Only about 1 in 3 (8/23) remained insulin free after 30 months or 2.5 years.
- 6 One in 8 patients had other hormone problems after the treatment.
- 7 Nine out of 23 people had oligospermia (lack of sperm production) after 30 months.

Due to the small numbers reported even in this Brazilian study and the lack of a control group (similar patients who did not receive this treatment) to compare with, we will have to wait for further studies to confirm if this approach will work for most people with Type 1 Diabetes Mellitus.

### Other promising strategies

There are currently other centres who claim to have successfully reinfused autologous stem cells. However, up to now, no other centre has been able to show results that can stand up to scrutiny by the scientific community.

At this time, there are also other research teams which have come up with other promising strategies. According to a report

published in the Proceedings of the National Academy of Sciences in September 2009, scientists at the Harvard Stem Cell Institute (HSCI) managed to get skin cells from patients with Type 1 diabetes mellitus to grow into insulin secreting cells in the laboratory.

Another group from Korea was able to grow insulin secreting cells from eyelid fat tissue obtained from double eyelid plastic surgery operations. There is certainly no lack of research in the area of trying to find non-embryo derived stem cells to get them to produce insulin in response to high glucose levels. Most groups, however, have only been able to use laboratory or animal models and none have yet been able to report good results in humans.

### Conclusion

In the meantime, good glycaemic control and careful attention to prevent and treat diabetes complications will remain a cornerstone of care, so that when stem cell therapy or another new therapy becomes feasible as a standard treatment of diabetes, patients with Type 1 diabetes will be in the best position to take advantage of them.

