DIABETES – SA RESEARCH 'CUTTING EDGE'

Professor Don Du Toit heads South Africa's only biotech laboratory (Stellenbosch University).

The fight against diabetes mellitus, the third highest non-infectious killer disease in South Africa (behind ischaemic heart disease and cancer), will be bolstered in December 2006 when Cape Town hosts the World Diabetes Congress.

Rated the biggest conference ever to hit the Mother City, the 19th World Diabetes Congress could attract as many as 14 000 delegates and generate R80 million for the local economy. More importantly, it will enable collaboration among the creators of the latest cutting edge technology and procedures in diabetes mellitus — and bring the resource-rich organisations that back them into our back yard.

Cure in sight?

This in a year in which the scientific community is abuzz with news that a multidisciplinary team at King's College Hospital has successfully achieved a breakthrough in islet cell transplantation in a type 1 diabetes patient.

The breakthrough involved three transplants of islet cells isolated from cadaveric donor pancreases into a 61-year-old patient — resulting in him no longer needing insulin injections and being completely free of hypoglycaemia.

A South African at the forefront of pancreas transplantation and stem cell research at Stellenbosch University, Professor Don du Toit, affirmed the British work as a breakthrough – adding that local work held the potential to expand therapy even further.

Professor Stephanie Amiel, a consultant in diabetes at King's College, described the UK achievement as 'hugely exciting. The implications are enormous. Eventually, this could mean the end of insulin dependence for all type 1 diabetes sufferers.'

Transplantation drawbacks

In its current state of technology, however, islet transplantation is imperfect.

Amiel said the ultimate aim was for all people with type 1 diabetes to become eligible for islet transplantation and free from insulin dependence.

Says Amiel 'We do not have enough organ donors, therefore we cannot extract enough islets to help all type 1 patients. More research needs to be done to perfect the islet isolation procedures and the drugs we use to prevent rejection of the islets and recurrence of the diabetes.'

The King's College team can only offer this treatment to patients in whom conventional treatments are failing in a major way. Amiel said the ultimate aim was for all people with type 1 diabetes to become eligible for islet transplantation and free from insulin dependence.

Professor Du Toit, who heads South Africa's only biotech laboratory (at Stellenbosch University), said he suspected that behind the King's Cross breakthrough was a new ability to refine the yield per pancreas per gram of wet tissue. 'The problem was always to isolate the 1% of islet cells from the 2% of ductal tissue and 97% of acinar cells in the pancreas – you need about 600 000 islet cells to reverse diabetes — and then you still need immunosuppression.'

Leap frog in the offing?

He believes that his current work on progenitor stem cells regenerating the pancreas holds the potential to 'overtake' the islet cell research. 'Already others have shown that by using the patient's own bone marrow progenitor cells, within a week patients' insulin requirements have dropped by 90% and they can go on antidiabetogenic tablets.'

Du Toit explained that a group in the USA had grown beta progenitor cells by expanding them in tissue culture for 3 - 6 weeks and then injected them into the pancreas tail via the splenic artery and a catheter 'basically converting a type 1 diabetes patient into a type 2 diabetic'.

Historically, islet transplants have only been partially successful, reducing the amount of insulin required, but still requiring regular injections.

Background

Five years ago surgeons at the University of Alberta in Edmonton, Canada, adjusted the combination of immunosuppressive drugs used to prevent rejection of the new cells and achieved successful transplants in 8 patients. Since then, the Edmonton Protocol, as it came to be known, has been used, with some variations, on about 500 patients worldwide. Most patients, however, are using insulin again, although not as much as they needed before their transplants.