



An e-Bulletin of KDF April 2012

Updates from the NUS Research Team

Contributed by Professor Lee K O & the Research Team, National University of Singapore

It's a small team with a big dream - to find a cell or gene therapy for diabetes, which affects over 10 percent of the adult population in Singapore, and is a key cause of severe kidney disease requiring dialysis.



But the team of two NUS researchers - Dr Gan Shu Uin and Professor Lee K O - has, under the leadership of Sir Roy Calne, a pioneer in organ transplantation, and supported by a gift from the Kidney Dialysis Foundation (KDF), recently had some surprising success with their collaborators in Egypt: using human cells to cure diabetes in mice. Professor M Ghoneim's team in Egypt is the first to demonstrate this important finding.

"This is an important step" says Sir Roy. "This is the only case of human bone marrow being used to cure diabetes in mice. I don't think there have been any other reports of that." The NUS team has been collaborating with Professor M Ghoneim from the University of Mansoura in Egypt and Professor Kon Oi Lian from the National Cancer Centre at the Singapore General Hospital.

The procedure involves extracting mesenchymal stromal cells from human bone marrow, and growing 'daughter' cells that are taught to produce insulin. These can cure a diabetic mouse. One of the characteristics of these cells is that they not only produce insulin, they release insulin according to the requirements of the body.

The team is now keen to move a step forward from "the little mouse" says Sir Roy, and try treating dogs as dogs naturally get diabetes like humans. This procedure will involve the use of the human insulin gene in dog bone marrow cells. These insulin producing bone marrow cells will then be used to treat the diabetic dog.

So what does this mean for people suffering from diabetes? Is help at hand?

Sir Roy says, "If we can cure a diabetic dog, I think, though some people may disagree, that the argument for moving to clinical trials for people would be very strong. I would say, we should be trying the treatment on dogs within 18 months and if that works, we will look into the initiation and preparation of clinical trials."

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Facts about KDF Research Fund

- A collaboration with National University of Singapore, Yong Loo Lin School of Medicine
- Annual pledge of \$350,000 for 5 years (2011-2015)
- Research on gene therapy and cell therapy on diabetes mellitus

The mood is one of cautious optimism, the team agrees. As Sir Roy says, "In science one trips up. You think you know where you are going, but there is a brick on the road." There are many unknowns, he says. "We don't know if it will work in man as a dog eats once a day while man eats three meals, and are we going to produce enough insulin at the right time to stop the secondary complications like blindness, heart failure, kidney failure..." These are just some of many concerns.

This work involving dogs will be carried out in collaboration with veterinarian Dr Robert Foale, who is an expert in diabetes in dogs, and Professor Andrew Lever from University of Cambridge making this a three-continent collaboration - Singapore (Asia), Cambridge (Europe) and Egypt (Africa).

"This would have been impossible without Sir Roy," says Prof Lee. "Through his connections, his friendships he was able to bring us all together and get this done."

Dr Gan adds, "Scientists often work in their own little niche, but with Sir Roy's help, our little group has the advantage of collaborative work - with scientists, clinicians, veterinarians. We learn from each other's experience. Each collaborator brings their unique perspective and this enables us to see the problem in a holistic manner rather than just at the cellular level."

The breakthrough in this research locally would not have been made possible without KDF donors. Both KDF and NUS would like to thank all supporters that have played the vital role in this project, and have helped to keep this dream of preventing kidney failure alive.

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