Diabetes Transplant Unit

2007 Annual Report

Prince of Wales Hospital
University of NSW

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Overview

The Diabetes Transplant Unit, originally called the Pancreas Transplant Unit, was established in 1991 when Dr Tuch re-located as a Research Scientist from the University of Sydney to become a Staff Specialist in Endocrinology at the Prince of Wales Hospital, a major teaching Hospital of the University of New South Wales.

Over the years, personnel in the Diabetes Transplant Unit have used their initiative to:

- Pioneer the field of embryonic stem cells at the Hospital & University. This has culminated in the University establishing a Neural Stem Cell Laboratory on campus in 2008.

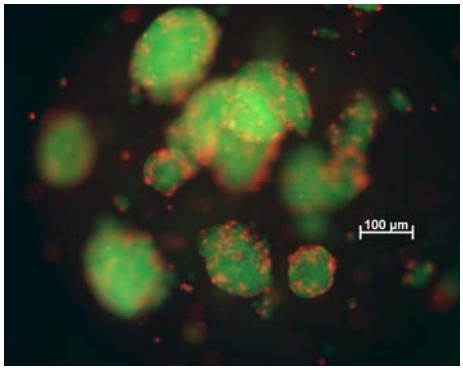
- Provide guidance to the NSW and Federal Governments on stem cells. In 2002, this culminated in the creation of the NSW Stem Cell Network, now funded by Government, and operating from the Unit.

- Champion the development of facilities within the Hospital / University for manufacturing emerging cell therapies to be used clinically.

- Pioneer the commercialisation of research outcomes within the Hospital, with the support of Biomed North.

- Attract undergraduate and postgraduate students of excellence, with 4 such students receiving University Medals.

- Consistently attract Research Funds both from peer reviewed and other sources, with $8 million being obtained at an average of half a million dollars per year.



Encapsulated human islets

Aims

The main aim of the Unit is to:

Replace the insulin-producing cells that have been destroyed in people with insulin-dependent diabetes. These cells are being derived from:

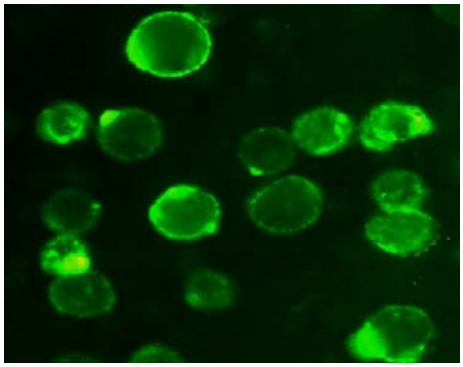
- The pancreases of humans who donate their pancreas after death
- Human embryonic stem cells
- Human stem cells derived from non-embryonic tissues, such as cord blood, and the fetal pancreas
- The pancreas of an animal, especially the pig
- Genetically modified non-pancreatic cell lines

The Unit also acts as a resource for others. Apart from its knowledge of developing insulin-producing cells, the DTU also acts as a resource for others by facilitating:

- The NSW Stem Cell Network
- The use of human embryonic stem cells for research
- The Human Fetal Tissue Distribution Centre

Creating human embryonic stem cells

Consistent with its goal of using human embryonic stem cell lines for therapeutic and other purposes, the Unit has created such cells using spare fertilised eggs, and is attempting to create such cells using more experimental techniques.



Human embryonic stem cells

DTU people

Back row (l to r):

Mandy Yim, Catalina Palma, Dr Kerstin Brands, Justin Lees, Khun Hong (Daniel) Lie, Steven Gao, Dr Murray Smith, Vijayaganapathy Vaithilingam, Dr Jayne Foster

Middle row (l to r):

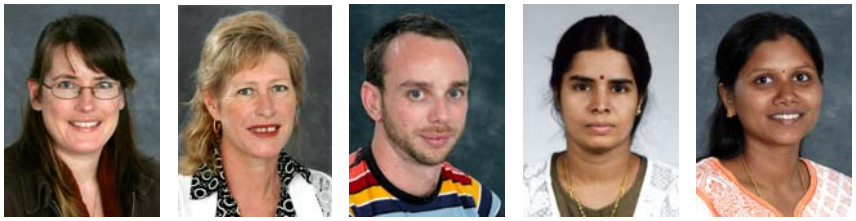
Inna Bolkovsky, Dr Wei Wu, Shiyang Wu, Kitty Nam, Dr Sophia Dean, Methichit Chayosumrit, Jinnuo Han, Jennifer Wong, Sarah Walke

Front row (l to r):

Dr Mathiyalagan Appavoo, Dr Jinlian Hua, Sylvia Lui, Prof Bernie Tuch, Jaemin Kim, A/Prof Kuldip Sidhu, Henry Chung, Sabina Ratnapala

Below (l to r):

Nola Camden, Lynda Gilmore, Leigh Matheison, Dr Bagyalakshmi Mathiyalagan, Gayathri Sundaram



"We've had some very bright people join the group in 2007"
-- Sarah Walke --

Director

Professor Bernie Tuch

Associate Director, Human Embryonic Stem Cells

A/Professor Kuldip Sidhu

Academic Associate

Dr Murray Smith
Anatomical Division, situated at School of Anatomy, University of New South Wales (UNSW)

Research Associates

Dr Bagyalakshmi Mathiyalagan, *Embryonic Stem Cells*

Postdoctoral Fellows

Dr Kerstin Brands
Gene Therapy and Human Fetal Pancreas

Dr Sophia Dean
Stem Cells

Dr Jayne Foster
Xenotransplantation & Encapsulation

Dr Mathiyalagan Appavoo
Stem Cells

Administrative Support

Sarah Walke
Laboratory Manager

Nola Camden
Community Relations Manager (part time, since September)

Lynda Gilmore
Community Relations Manager (part time, until June)

Alfredo Martinez–Coll
IP Commercialization Manager (part time) from BioMed North

Russell Carrington
IP Commercialization Manager (part time), from BioMed North

Inna Bolkovsky
Volunteer Administration Officer (part time)

Visiting Researchers

Dr Jinlian Hua
Research Associate, Stem Cells (until July)

Shiyan Wu
Masters Graduate, Human Islets (April - August)

Michelle Weiss
Medical Student, Embryonic Stem Cells

Technical Support

Sylvia Lui
Animal Technician and Tissue Preparation (until September)

Jane Chapman
Animal Technician & Tissue Preparation (September - November)

Leigh Mathieson
Animal Technician & Tissue Preparation (from December)

Kathryn Weir
Animal Attendant (part time)

Georgia Williams
Cell Preparation & Transplantation (casual)

Jaemin Kim
Volunteer Technical Assistant – Stem Cells

PhD Students

Methichit Chayosumrit
Embryonic Stem Cells

Henry Chung
Embryonic Stem Cells

Jayne Foster
Xenotransplantation (submitted)

Steven Gao
Embryonic Stem Cells

Jinnuo Han
Embryonic Stem Cells

Khun Hong (Daniel) Lie
Embryonic Stem Cells

Justin Lees
Embryonic Stem Cells

Mark Lutherborrow
Gene Therapy (submitted)

Mathiyalagan Appavoo
Gene Therapy (submitted)

Catalina Palma
Cord Blood Stem Cells

Gayathri Sundaram
Human Islets

Vijayaganapathy Vaithilingam
Human Islets

Anna Zinger
Embryonic Stem Cells

Honours Students

Kitty Nam
Stem Cells

James Sung
Human Fetal Pancreas

Sabina Ratnapala
Xenotransplantation

Jennifer Wong
Embryonic Stem Cells

Mandy Yim
Xenotransplantation

Independent Learning Project Students

Lyvia Khong
Embryonic Stem Cells

John Doan
Pancreatic Precursor Cells

Appointments at University of NSW (Faculty of Medicine)

Professor

Dr Bernie Tuch (conjoint)

Associate Professor (Faculty of Science)

Dr Kuldip Sidhu

Senior Lecturer

Dr Murray Smith

Lecturer (conjoint)

Dr Kerstin Brands

Dr Bagyalakshmi Mathiyalagan

Research Associate

Dr Jinlian Hua (visiting)

DTU PhD students in Cairns

Advisory board

Prof Terry Campbell

University of New South Wales
Representative of the Dean of the Faculty of Medicine

Dr Elizabeth Koff

Acting General Manager
Northern Hospital Network
Representative of the Chief Executive of the South Eastern Sydney and Illawarra Health

Mr Steven Nemes

A member of the legal profession with an interest in the Diabetes Transplant Unit

Ms Heather Schoenheimer

A member of industry with an interest in the Diabetes Transplant Unit

Senator Natasha Stott Despoja

A politician with an interest in stem cells

Prof Bernie Tuch

Director
Diabetes Transplant Unit

Prof John Turtle

Former Head of Medicine
University of Sydney

Advisory board members present at the annual meeting on Oct 30th (l to r):

John Turtle, Bernie Tuch, Sarah Walke, Steven Nemes, Elizabeth Koff,
(Natasha Stott Despoja attended the meeting by phone)

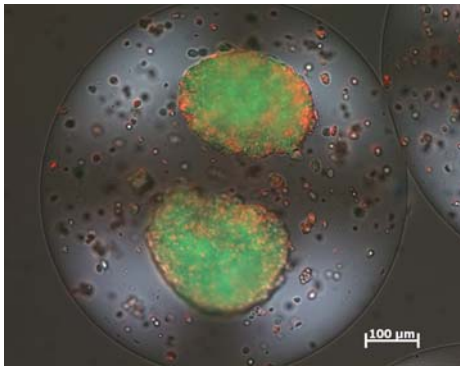
Research projects

CELL THERAPIES FOR DIABETES

A1. Encapsulated Human Islets: Clinical Use

The Unit continued a phase 1 pilot clinical trial commenced in 2006 transplanting clusters of insulin-producing cells, called islets, isolated from human pancreases donated after death. To prevent rejection of the cells, they were placed inside microcapsules made of alginate, a product produced from sea weed. The capsules have pores which are large enough to allow the passage of nutrients and hormones, but too small to allow entry of immune cells. Two transplants were carried out in two people with type 1 diabetes, using a protocol modified by the addition of an agent to enhance survival and function of the islets. Both recipients are alive and well. Evidence of transient graft function occurred in all recipients, but further optimisation of the protocol is required.

Investigators:
Professor Bernie Tuch, Dr Wei Wu, Mr Vijayaganapathy Vaithilingam, Ms Sylvia Lui, Dr Jayne Foster, in conjunction with Dr Jeremy Wong, Dr Ken Chen and Ms Charmaine de Blieck, Dept Endocrinology, Prince of Wales Hospital; Dr Greg Keogh, Dept Surgery, Prince of Wales Hospital; Drs Bob Philips & Michael Berger, Dept Medical Imaging, Prince of Wales Hospital; and Dr Debbie Verran, Liver Transplant Unit, Royal Prince Alfred Hospital



Encapsulated human islets

A2. Encapsulated Human Islets: Animal Studies
Mechanistic studies are required to optimize the function of encapsulated human islets. The minimum number of encapsulated human islets that will normalize blood sugar levels of recipient diabetic mice is 2,000. To improve the efficiency of the grafted cells, encapsulated islets were transplanted into a very vascular organ, the spleen, but this was not beneficial. An alternative approach being tried is to seed islets onto 3D scaffolds, and to coat the surface of the encapsulated islets with angiogenic factors. A second approach to improve survival of encapsulated islets is to introduce strategies to inhibit inflammation, which occurs when encapsulated islets are infused into diabetic recipients. The porosity of the capsules is important in such studies, and for this reason the size of the pores through which nutrients and hormones are passaged was measured.

Investigators:
Mr Vijayaganapathy Ganapathy, Ms Gayathri Sundaram, Ms Shiyang Wu, Ms Sylvia Lui, Dr Wei Wu, Dr Jayne Foster and Professor Bernie Tuch in conjunction with Dr Hala Zreiqat, Tissue Engineering & Biomaterials Research Unit, University of Sydney; Ass Professor Jose Oberholzer and Mr Travis Romagno, University of Chicago in Illinois; Dr Kurt Jansson, Corline Limited & Professor Olle Korsgren, Uppsala University Hospital, Sweden; Dr Igor Lacik, Slovak Academy of Sciences, Bratislava.

A3. Non-invasive Monitoring of Transplanted Cells
To be able to track insulin-producing cells after they are transplanted, experiments were commenced to discover agents of a small size that bind to the surface of the cells. Candidate proteins will be labeled with a radioactive tracer prior to being injected into the recipient. To detect the site where the transplanted cells have tracked will require imaging of the recipient with a camera that can detect gamma irradiation emitted by the labelled cells.

Investigators:
Mr Mathiyalagan Appavoo and Professor Bernie Tuch in conjunction with Dr Brad Walsh, Minomic Pty Ltd and Dr Andrew Katsifis, Australian Institute of Nuclear Science and Engineering, University of Queensland

"We've discovered the source of the inflammation associated with encapsulated islets. The next stage is to target it & overcome it"
-- Vijayaganapathy Vaithilingam --

Encapsulated islets showing inflammation

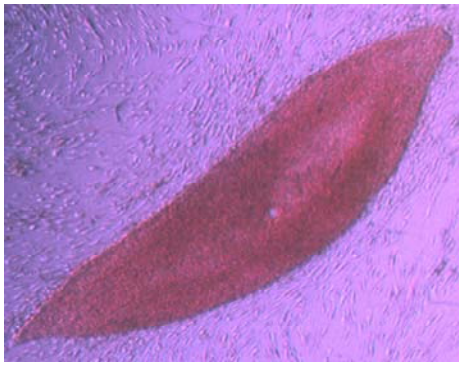
EMBRYONIC STEM CELLS

B1. Making New Human Stem Cell Lines

This year the Unit in conjunction with IVF Australia made its second human embryonic stem cell line, called Endeavour 2. It complements the Endeavour 1 line produced previously in the Unit and on which an international patent has been taken. The Stem Cell Bank in the United Kingdom has agreed to accept the Endeavour 1 line, and distribute it to those wishing access to it. The advantage of the line over many others is that it was produced using mostly animal-free products. This makes it more likely to be of use in a clinical situation.

The Unit has expanded the number of embryonic stem cell lines available by producing clones from the Endeavour line as well as lines obtained from Embryonic Stem Cell International in Singapore, and 3 lines obtained from the Harvard Medical School in the United States. The properties of the different clones were analysed both at a gene and protein level. A patent has been taken out on the novel methodology used to create the clones.

Investigators:
A/Professor Kuldip Sidhu, Professor Bernie Tuch, in conjunction with Dr John Ryan, Professor Douglas Saunders and Ms Sue Channon, IVF Australia; Professor Grant Morahan, Western Australia Institute of Medical Research; and Dr Jeremy Crisp from Medsaic Pty Ltd.



Human embryonic stem cells

"Keeping in view the number of debilitating diseases that people suffer from, as well as blood types and ethnicity, we need to produce more characterisable cell lines so that we are able to serve humanity at large. The more the better"

-- A/Prof Kuldip Sidhu --

B2. Differentiating Stem Cells into Insulin-Producing Cells

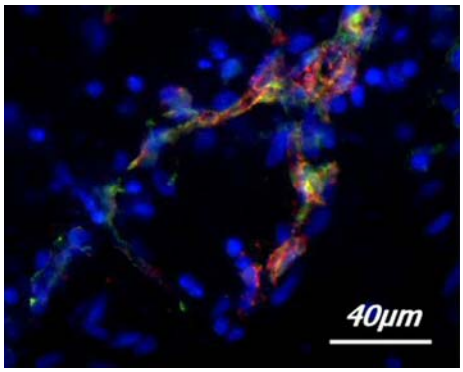
Conversion of human embryonic stem cells into insulin-producing cells would provide a large supply of cells potentially available as a therapy for people with insulin-dependent diabetes. The Unit pursued a number of strategies and now has optimised a means of converting the human embryonic stem cells into pancreatic progenitors using a two stage 8 day culture protocol. Attempts are now being made to convert the progenitors into glucose-responsive insulin-secreting cells.

Other strategies examined included:

- Optimising the appropriate extracellular matrix for the different stages of development
- Growing cells on 3D scaffolds
- Co-culturing with culture medium conditioned by human fetal pancreatic tissue
- Manipulating the cells to down-regulate the expression of certain genes
- Culturing cells inside a defined environment, within microcapsules
- Examining the maturity status of genes expressed

Investigators:

Mr Steven Gao, Mr Khun Hong (Daniel) Lie, Ms Methichit Chayosumrit, Mr Justin Lees, Ms Anna Zinger, Ms Jennifer Wong, Ms Kitty Nam Mr Henry Chung, A/Professor Kuldip Sidhu and Professor Bernie Tuch in conjunction with Associate Professor Justin Cooper-White, Australian Institute of Bioengineering & Nanotechnology, University of Queensland.



Human embryonic stem cells

"We have cells that appear to be heading down the pancreatic endoderm lineage"

-- Steven Gao --

B3. Reprogramming cells

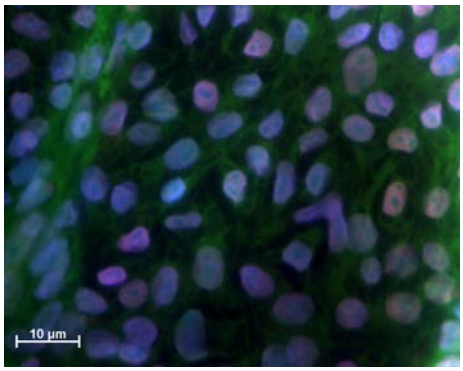
Last year a Federal law and this year a State law was passed to allow somatic cell nuclear transfer, also called therapeutic cloning, to be carried out. This technology should allow the creation of patient-specific and disease-specific cell lines. An application to commence trying out this technology was lodged with the Institute's Human Research Ethics Committee. A limiting factor for this technology is the supply of unfertilized human eggs. The Unit continued a study examining the possibility of converting human embryonic stem cells into ova, concluding this was a technically very demanding project. An alternative source of eggs examined was the ovary of women with a genetic risk of ovarian cancer, and who were considering prophylactic removal of their ovaries. A second cutting-edge project examined was the attempted fusion of a human embryonic stem cell with a normal body cell, with the aim of de-differentiating the body cell. It is hoped from this technically very challenging project that it will be possible to redifferentiate these cells towards other cell types that would be accepted if implanted in the donor.

Investigators:
Dr Jinlian Hua, Mr Henry Chung, Ms Jinnuo Han, Professor Bernie Tuch & A/ProfessorDr Kuldip Sidhu

B4. Feeder cells for human embryonic stem cells

To remain undifferentiated, it is usual to grow human embryonic stem cells on a feeder layer of cells, usually derived from skin. For some years, the Unit has been using human fetal tissue as a source of such cells. This year the Unit continued to modify these cells for use in selection of genetically engineered human embryonic stem cells. This has enabled the creation of embryonic stem cell lines which the Unit is modifying to permit their differentiation towards a pancreatic lineage.

Investigators:
Mr Khun Hong (Daniel) Lie, A/Professor Kuldip Sidhu & Professor Bernie Tuch



Nanog expressing human embryonic stem cells

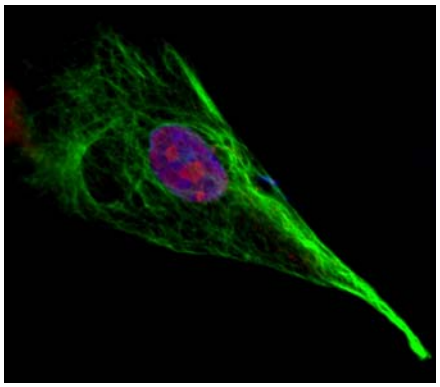
"We hope to unveil the recipes for converting stem cells into beta cells, which provide an alternative to transplanting islets into diabetic patients"

-- Daniel Lie --

ADULT STEM CELLS

C1. Cord Blood Cells

In parallel with attempts to create insulin-producing cells from human embryonic stem cells, the Unit is using adult stem cells for a similar purpose. Cord blood cells, which are obtained from the umbilical cord at the time of delivery of a baby, are a source of stem cells that can be converted into a variety of different cell types. The Unit is attempting to convert these stem cells into insulin-producing cells. Two sources are being used: the multi-lineage progenitor cells derived by the biotechnology company BioE in Minneapolis, and the unrestricted somatic stem cells derived from cord blood by the Unit. This year experiments were modified by attaching the stem cells to 3D scaffolds which it is hoped will encourage better differentiation of the cells.



Cord blood stem cells

"We are trying to grow cord blood stem cells on 3D scaffolds to potentially increase their differentiation ability"

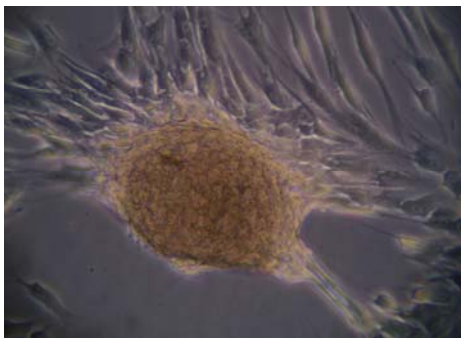
-- Catalina Palma --

Investigators:

Ms Catalina Palma, Dr Mathiyalagan Appavoo, Mr Justin Lees, Dr Sophia Dean, and Professor Bernie Tuch in conjunction with A/Professor Robert Lindeman, Department Haematology, Prince of Wales Hospital; Dr Dan Collins, BioE Inc; and Associate Professor Justin Cooper-White, Australian Institute of Bioengineering & Nanotechnology, University of Queensland.

C2. Olfactory Stem Cells
Olfactory stem cells have been shown previously to be able to be converted towards an endodermal lineage, from which the ß cell is eventually derived. The Unit commenced a project to determine if insulin-producing cells might be derived from olfactory stem cells. The initial protocol used was the 5 day cocktail that the Unit is using to convert human embryonic stem cells to definitive endoderm, a key step before pancreatic progenitors are created. Olfactory stem cells exposed to this cocktail failed to differentiate. Whilst it is possible that an alternative protocol might be beneficial in differentiating these stem cells towards a pancreatic phenotype and subsequently to insulin-secreting cells, the Unit is choosing to put any further such experiments on hold.

Investigators:
Kitty Nam, Ms Anna Zinger, A/Professor Kuldip Sidhu and Professor Bernie Tuch, in conjunction with A/Professor Carolyn Sue, Dept Neurogenetics, Royal North Shore Hospital and Professor Alan Mackay-Sim, National Adult Stem Cell Centre, Eskitis Institute for Cell & Molecular Therapies, Griffith University.



Olfactory neurospheres

C3. Human Fetal Pancreas
Previously the Unit has shown that human pancreatic tissue, obtained from the therapeutic termination of pregnancy, was able to develop and normalize blood sugar levels when transplanted into diabetic mice. These experiments were carried out with tissue obtained from the early 2nd trimester of pregnancy. Human trials ensued as a result of these pioneering experiments, but did not normalize blood sugar levels of the recipients because the tissue was rejected by the immune system of the recipient. Since these trials, it has come to light that fetal tissue in the 1st trimester of pregnancy, especially at 7-10 weeks, is sufficiently underdeveloped that it may not be rejected when transplanted. Experiments were carried out in the preclinical model of the humanised mouse confirming this finding. Preliminary experiments conducted seem to confirm that the tissue remains protected as it matures in the recipient.
All experiments are conducted with the approval of the Human Research Ethics Committees of the University of New South Wales and the South Eastern Sydney and Illawarra Area Health Service.

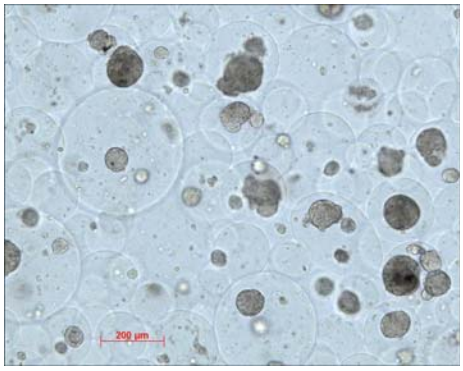
Investigators:
Dr Kerstin Brands, Mr James Sung, Dr Wei Wu and Professor Bernie Tuch, in conjunction with A/Professor Richard Lock and Ms Rachel Papa, Children's Cancer Institute Australia; A/Professor Rennian Wang, University of Western Ontario, Canada; Ms Leonie Gaudry, South Eastern Area Laboratory Service.

XENOTRANSPLANTATION

D1. Pig Insulin-Producing Cells

A promising alternative to human islets is the use of insulin-producing cells obtained from pigs. Previously, the Unit has shown ability of these pig cells to normalize blood sugar levels of the diabetic pig given anti-rejection drugs, and the diabetic mouse lacking an immune system. Subsequently, experiments were conducted with insulin-producing cells placed inside microcapsules to prevent their rejection when transplanted. Previously the Unit has shown that encapsulated insulin-producing cells from fetal pigs normalized blood sugar levels in diabetic mice that lack an immune system. When such encapsulated cells are transplanted into mice that possess a normal immune system, rejection of the cells occurred. This year studies were commenced to understand the immunobiology of this process, and what steps might be implemented to improve the outcome. When encapsulated insulin-producing cells are transplanted, they are normally injected directly into the peritoneal cavity. Where the capsules migrate to is uncertain. To investigate the trafficking of such capsules, cells were labeled with iron particles and introduced into mice, which were then scanned using magnetic resonance imaging. Unfortunately it was not possible to distinguish the labeled cells from residual air in the abdomen.

Investigators:
Dr Jayne Foster, Ms Sabina Ratnapala, Ms Mandy Yim, Ms Sylvia Lui and Professor Bernie Tuch, in conjunction with Dr Alex Sharland, Transplantation Laboratories, University of Sydney and Ms Kirsten Moffat, The Symbion Clinical Research Imaging Centre Prince of Wales Medical Research Institute



Pig insulin-producing cells

"Microencapsulated pig insulin producing cells can normalise blood-sugar levels for at least six months"

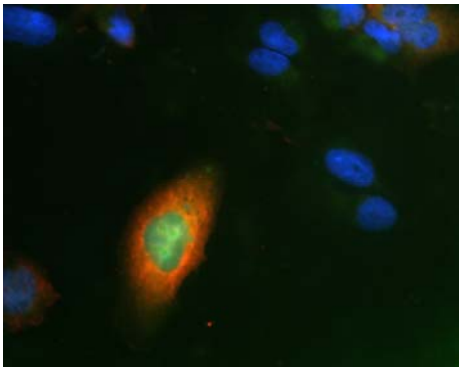
-- Dr Jayne Foster --

IMMORTALISED CELL LINES

E1. Immortalised Human Liver Cells

An alternative source of cells that might be used to make insulin-producing cells is the liver. Previously the Unit in collaboration with a colleague elsewhere in Sydney demonstrated it was possible to convert human tumour liver cell lines into insulin-producing cells. Because of difficulties in using such tumourogenic cells clinically, the Unit tried to convert an immortalised non-tumourigenic human liver cell line, obtained from a colleague at the University of Nebraska, into insulin-producing cells. Physical and virological attempts to permanently genetically modify such cells were unsuccessful.

Investigators:
Dr Kerstin Brands and Professor Bernie Tuch in conjunction with Professor Ira Fox, University of Nebraska, Medical Centre, USA



Immortalised human liver cells

E2. Immortalised Human Fetal Pancreatic Duct Cells

As an alternative to creating insulin-producing cells from immortalised human liver cells, the Unit commenced a project trying to immortalise human fetal pancreatic cells which are the precursors to insulin-secreting cells. Consent for this project was obtained from the Institution's Human Research Ethics Committee with mothers having terminations of pregnancy giving informed consent. Monolayers of the progenitor cells were grown without fibroblast contamination and experiments to infect the cells with lenti-viral constructs containing an immortalising gene were commenced. Eventually it is hoped to grow up large numbers of such immortalised precursor cells, remove the immortalising gene, and differentiate them into insulin-secreting cells, which can then be transplanted into diabetic recipients.

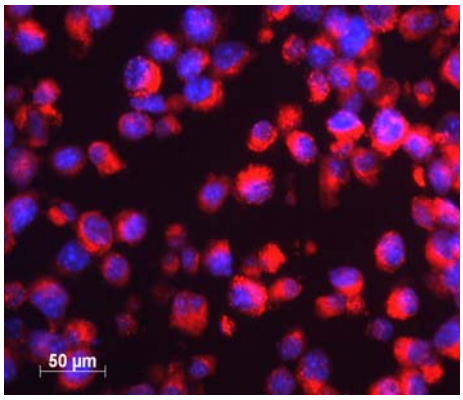
Investigators:
Dr Kerstin Brands and Professor Bernie Tuch in conjunction with Professor Ira Fox, University of Nebraska, Medical Centre, USA; Dr Karen MacKenzie, Stem Cell Biology Program, Children's Cancer Institute Australia

> **"Lineage-wise the liver is the closest organ to the pancreas & is an excellent candidate for generating beta cell surrogates"**
>
> -- Dr Kerstin Brands --

DEVELOPMENT OF INSULIN PRODUCING CELLS

F1. Induction of Glucose-Responsiveness

For an insulin-producing liver cell to be of benefit in treating diabetes, it must be able to release insulin rapidly when exposed to sugar. Experiments were conducted to achieve this goal both by genetic manipulation of a rat insulin-producing liver cell line and addition of different growth factors. Unfortunately, neither of these strategies was successful in making the cells responsive to sugar. Out of these studies, however, came an interesting finding about the mechanism of action of a substance called exenatide. This agent enhances insulin secretion from ß cells only when glucose levels are elevated. By contrast, exenatide enhances insulin secretion in liver cells when glucose levels are low. It seems that exenatide has greater functional ability in insulin-producing liver cells.



Insulin-expressing liver cells

"We are interested in why exenatide enhances insulin secretion when glucose levels are low"

-- Dr Mathiyalagan Appavoo --

Investigators:

Dr Mathiyalagan Appavoo and Professor Bernie Tuch in conjunction with Professor Nurit Kaiser, Dept Endocrinology & Metabolism, Hadassah-Hebrew University Medical Centre, Israel.

OTHER PROJECTS

A. Differentiating Stem Cells into Neuronal Cells

Embryonic stem cells have the potential to develop into cells of multiple lineages. Although the focus of the Unit is to create insulin-producing cells, it has had a policy of assisting others to use stem cells for their own purposes. Thus, it has assisted the Neuropsychiatric Institute of the Prince of Wales Hospital in the development of a cell therapy for Alzheimer's Disease. Skin cells are being converted into neuronal cells in these experiments. The comparative model being used here is the conversion of human embryonic stem cells into neuronal cells. The theoretical advantage of using the skin cells is that the donor and recipient are the same, and hence the cells should not be rejected when eventually they are implanted.

An outcome of this endeavour has been the successful application by the Neuropsychiatric Institute to establish a separate Neural Stem Cell Laboratory within the nearby University of New South Wales. The Associate Director of the Diabetes Transplant Unit, Ass Professor Kuldip Sidhu, will be leaving the Unit at the end of the year to direct this initiative.

Investigators:

A/Professor Kuldip Sidhu, Dr Sophia Dean and Professor Bernie Tuch in conjunction with Dr Michael Valenzuela, and Professor Perminder Sachdev, Neuropsychiatric Institute, Prince of Wales Hospital

B. Effect of lipids on insulin secretion

This project initiated by the Heart Research Institute examines the effect of different components of fats found in the blood on secretion of insulin. The Unit has provided its expertise with β cells as well as access to its human and mouse insulin-secreting cell lines for the experiments.

Investigators:

Dr Mathiyalagan Appavoo and Professor Bernie Tuch in conjunction with Ms Michelle Fryirs and A/Professor Kerry-Anne Rye, The Heart Research Institute

C. Prevention of immune recognition

This project, initiated by the Mothers and Babies Research Centre of the John Hunter Hospital, examines a novel methodology to prevent rejection of cells after they are transplanted, hopefully overcoming the need for anti-rejection drugs. The Unit is providing its expertise in gene manipulation and transplantation in a consultative capacity.

Investigators:

Dr Kerstin Brands and Professor Bernie Tuch in conjunction with Mr John Schjenken, Dr Jorge Gonzalez, and Professor Roger Smith, Mothers and Babies Research Centre, John Hunter Hospital, University of Newcastle

Collaborations

ACADEMIC

Collaborations are maintained with the following academic researchers located outside the Unit:

Locally

The Prince of Wales Hospital

Dr Greg Keogh
Department Surgery

A/Professor Robert Lindeman
Department Haematology

Dr Michael Berger &
Dr Bob Philips
Department Medical Imaging

Professor Perminder Sachdev &
Dr Michael Valenzuela
Neuropsychiatric Institute

The University of NSW

Professor Pauline Doran
School of Biotechnology & Biomolecular Sciences

Children's Cancer Institute Australia

A/Professor Richard Lock
Leukaemia Biology Program

Dr Karen MacKenzie
Stem Cell Biology Program

Prince of Wales Medical Research Institute

Ms Kirsten Moffat
Symbion Clinical Research Imaging Centre

Elsewhere in Sydney

The University of Sydney

Dr Alexander Sharland
Transplantation Laboratories

Dr Hala Zreiqat
Tissue Engineering & Biomaterials Research Unit

Australian Institute of Nuclear Science & Engineering

Dr Andrew Katsifis
Radiopharmaceuticals

Heart Research Institute

A/Professor Kerry-Anne Rye
Lipid Research

Royal North Shore Hospital

A/Professor Carolyn Sue
Department of Neurogenetics

Royal Prince Alfred Hospital

Dr Debbie Verran
Liver Transplant Unit

Elsewhere in Australia

University of Queensland (BNE)

A/Professor Justin Cooper-White
Australian Institute of Bioengineering & Nano-technology

A/Professor Brad Marsh
Institute for Molecular Bioscience

University of Newcastle

Professor Roger Smith
Mothers and Babies Research Centre

Western Australian Institute of Medical Research (Perth)

Professor Grant Morahan
Diabetes Research Foundation

Griffiths University (BNE)

Professor Alan Mackay-Sim
Institute for Cell & Molecular Therapy

Overseas

EUROPE

University of Würzburg, Germany

Professor Karin Ulrichs
Department of Experimental Transplantation

Uppsala University Hospital

Professor Ole Korsgren
Department of Clinical Immunology

Slovak Academy of Sciences

Dr Igor Lacik
Polymer Institute

Hadassah-Hebrew University Medical Centre

Professor Nurit Kaiser
Dept Endocrinology & Metabolism

NORTH AMERICA

University of Nebraska Medical Centre

Professor Ira Fox
Department of Surgery

University of Illinois (Chicago)

Professor Jose Oberholzer
Division of Transplantation

University of Western Ontario

A/Professor Rennian Wang
Dept Physiology & Pharmacology

ASIA

Singapore General Hospital

A/Professor Pierce Chow
Department Experimental Surgery

Commercial Collaborations

BioE Inc, Minneapolis, USA

Dr Dan Collins

Corline Systems AB

Mr Kurt Jansson

Minomic Pty Ltd

Dr Brad Walsh

IVF Australia

Dr John Ryan
Professor Doug Saunders
Professor Peter Illingworth
Ms Sue Channon

Medsaic Pty Ltd

Dr Jeremy Crisp

Synthecon Inc, USA

Dr Stephen Navran
Mr Bill Anderson

Patents

1. Method of prophylaxis and treatment of diabetes
Taken out by the South Eastern Sydney and Illawarra Area Health Service and University of Technology Sydney in April, 2000 was granted by the Australian Patent Office (Patent No. 36490/00) last year.

The patent describes the genetic manipulation of liver cells by introduction of the insulin gene, and the functioning of these cells when transplanted. A request has been made to the USA Patent Office to have a patent issued in that country (International Patent

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Inventors:
Bernard Tuch and Ann Simpson

Application No:
PCT /AU00/00318), with the outcome pending

2. International Patent: Method for establishing human embryonic stem cells by co-culturing with allogenic feeder cells in serum free medium.
Taken out by South Eastern Sydney and Illawarra Area Health Service. July 19, 2007.

The patent describes the creation of the Endeavour 1 human embryonic stem cell line.

Inventors:
Kuldip Sidhu and Bernard Tuch

Application No:
WO 2007/079533 A1

3. Provisional Patent: Human embryonic stem cell clones
Taken out by South Eastern Sydney and Illawarra Area Health Service. September 1, 2006. This claims Convention Priority from Australia (2006900111 on January 10, 2006) and the USA (11/474059 on June 22, 2006).

The patent describes the method used to create clones from human embryonic stem cells.

Inventors:
Kuldip Sidhu and Bernard Tuch

Application No:
2006213942

Research support

Juvenile Diabetes Research Foundation

Project Grant
Analysis of differences within and between human embryonic stem cell lines

A/Prof Sidhu & Prof Tuch
2005 - 2007

Travel Grants
Joint Meeting of the International Xenotransplant Association, the International Pancreas & Islet Transplant Association and the Cell Transplant Society, Minneapolis, USA

Dr Jayne Foster
September 15-20

6th International Islet Isolation Workshop organised by the Network of European Islet Centres, Palermo, Italy

Dr Wei Wu
October 8-10

National Health and Medical Research Council, Australia

Project Grant
Xenotransplantation of encapsulated insulin-producing pig cells

Prof Bernie Tuch, Dr Sharland & Dr Foster
2007 - 2009

Australian Research Council

Linkage Grant
Pancreatic differentiation of cord blood stem cells using smart surfaces

Dr Sophia Dean, Prof Bernie Tuch and A/Prof Rob Lindeman
2007-2010

Australian Stem Cell Centre

Travel Grants
Annual International Society for Stem Cell Research Meeting, Cairns

A/Professor Kuldip Sidhu
Dr Jinlian Hua
Mr Justin Lees
Ms May Chayosumrit
Mr Daniel Lie
Ms Catalina Palma
Mr Henry Chung
Mr Steven Gao
Ms Jinnuo Han
June 17-20

Australia India Workshop on Stem Cell Research, Melbourne

Prof Bernie Tuch
June 12-13

Rebecca L Cooper Medical Research Foundation

Equipment Grant
Prof Bernie Tuch
2006 – 2010

Dr Valenzuela & A/Prof. Sidhu
2007

NSW Government

Infrastructure support
Maintenance of New South Wales Stem Cell Network

Prof Tuch & Ms Nola Camden
2007 - 2010

Travel Grant
Society for Biomolecular Sciences Symposium, Back to Pharmacology: Stem Cells and Primary Cells in Drug Discovery, Anaheim, USA

A/Professor Kuldip Sidhu
November 7-8

International Consortium of Stem Cell Networks Intnerational Confrence on GMP Issues On Stem Cells, Newcastle, United Kingdom

A/Professor Kuldip Sidhu
November 15-16

BioE Inc.

Differentiation of cord blood progenitor cells into insulin-producing cells

Professor Tuch & Ms Palma
2006 - 2008

Prince of Wales Hospital

Neuropsychiatric Institute Maintenance for Alzheimer's project

Professor Sachdev, Dr Valenzuela, Dr Sidhu & Prof Tuch
2006 - 2007

Private Donations

Australian Foundation for Diabetes Research

Scholarship
2007 - 2009

Major Private Donors

Mr Ian Bersten
Mr Brian & Mrs Lorna Mellor
Pace Foundation
Mr Adrian Tidswell

A/Prof Kuldip Sidhu & Dr Lynn Healy at the UK Stem Cell Bank

Awards

Ms Methichit Chayosumrit

Travel award from the Australian Stem Cell Centre to attend the Annual International Society for Stem Cell Research Meeting in Cairns
June 17-20

Prince of Wales Clinical School Postgraduate Research Scholarship
2007

Best Poster Prize at the Inaugural Symposium on Stem Cells at the University of New South Wales,
August 6

Mr Henry Chung

Australian Postgraduate Award
2007 – 2010

Travel award from the Australian Stem Cell Centre to attend the Annual International Society for Stem Cell Research Meeting in Cairns
June 17-20

Dr Jayne Foster

Travel Award from the Juvenile Diabetes Research Foundation to attend the Joint Meeting of the International Xenotransplantation Association, the International Pancreas & Islet Transplant Association and the Cell Transplant Society, Minneapolis, USA
September 15-20

Mr Steven Gao

Travel award from the Australian Stem Cell Centre to attend the Annual International Society for Stem Cell Research Meeting in Cairns
June 17-20

Dr Jinlian Hua

Travel award from the Australian Stem Cell Centre to attend the Annual International Society for Stem Cell Research Meeting in Cairns
June 17-20

Ms Jinnuo Han

University International Postgraduate Award
2006 – 2009

Travel award from the Australian Stem Cell Centre to attend the Annual International Society for Stem Cell Research Meeting in Cairns
June 17-20

Mr Justin Lees

Travel award from the Australian Stem Cell Centre to attend the Annual International Society for Stem Cell Research Meeting in Cairns
June 17-20

DTU staff at the ISSCR meeting

Mr Daniel Lie

Prince of Wales Clinical School Postgraduate Research Scholarship 2007

Travel award from the Australian Stem Cell Centre to attend the Annual International Society for Stem Cell Research Meeting in Cairns
June 17-20

Ms Catalina Palma

University Postgraduate Award
2004 – 2007

Travel award from the Australian Stem Cell Centre to attend the Annual International Society for Stem Cell Research Meeting in Cairns
June 17-20

A/Prof Kuldip Sidhu

Travel award from the Australian Stem Cell Centre to attend the Annual International Society for Stem Cell Research Meeting in Cairns
June 17-20

Travel Award from the Office of Science and Medical Research to attend the Society for Biomolecular Sciences Symposium, Back to Pharmacology: Stem Cells and Primary Cells in Drug Discovery, Anaheim, USA
November 7-8

Travel Award from the Office of Science and Medical Research to attend the International Consortium of Stem Cell Networks International Conference on GMP Issues on Stem Cells, Newcastle, UK
November 15-16

A Top Invention Prize for Commercialization 2006, Biomed North

Runner-up, Eureka Awards

Dr Wei Wu

Travel Award from the Juvenile Diabetes Research Foundation (Australia) to attend the 6th International Islet Isolation Workshop organised by the Network of European Islet Centres in Palermo, Italy
October 8-10

Ms Anna Zinger

Australian Postgraduate Award
2006 – 2009

Rising Star Scholarship, UNSW
2006 – 2009

DTU staff at the ISSCR meeting

PhD & Honours

Jayne & Sophia on graduation day

PhD

Awarded

Sophia Dean

Faculty of Medicine, Prince of Wales Hospital Clinical School

Transplantation of fetal pig islet-like cell clusters as therapy for diabetes

Jayne Foster

Faculty of Medicine, Prince of Wales Hospital Clinical School

The Microencapsulation and Transplantation of Fetal Pig Islet-like Cell Clusters: A Potential Therapy for Type 1 Diabetes

Mathiyalagan Appavoo

Faculty of Medicine, Prince of Wales Hospital Clinical School

Liver-directed gene therapy for type 1 diabetes

Submitted

Mark Lutherborrow

Faculty of Medicine, Prince of Wales Hospital Clinical School

Molecular events surrounding secretory granule biogenesis in transgenic hormone producing liver cell lines

Justin Lees

Faculty of Medicine, Prince of Wales Hospital Clinical School

The differentiation of hESCs for the treatment of type 1 diabetes

HONOURS

Awarded

Jennifer Wong

1st class Honours

School of Biotechnology & Biomolecular Sciences, UNSW

The integrin expression profile of definitive endoderm derived from human embryonic stem cells

Mandy Yim

1st class Honours

School of Biotechnology & Biomolecular Sciences, UNSW

Magnetic resonance imaging of encapsulated insulin-producing cells labeled with iron nanoparticles

Sabina Ratnapala

2nd class Honours

School of Biotechnology & Biomolecular Sciences, UNSW

The xenogeneic immune response to transplanted encapsulated fetal pig ICCs in mice

Submitted

Kitty Nam

Faculty of Medicine, UNSW

Differentiation of human stem cells into pancreatic progenitor cells

NSW Stem Cell Network

The goal of the NSW Stem Cell Network is to create opportunities for information and skills sharing amongst its members. These are predominantly professionals working in stem cell related fields such as scientific research, medicine, ethics and the law; and also interested laypeople. In 2007, membership of the network grew to over 600.

Inaugural Stem Cell Symposium
The NSW Stem Cell Network partnered with the University of NSW in 2007 to set up the first *Annual Stem Cell Symposium*. Held at the University of NSW in August, this full day event was established to promote the exchange of ideas and expertise; and encourage cross-disciplinary collaboration between researchers in the Faculties of Science, Medicine, Engineering and Law. Laying lines of communication between faculties will assist in the development of a university-wide stem cell research strategy.

The success of this initiative has encouraged the NSW Stem Cell Network to partner with other universities interested in establishing stem cell symposiums in order to build their institutional strengths.

Stem Cell Workshop
Novel Clinical Trials with Stem Cells was the title of the 10th Stem Cell Workshop organised by the NSW Stem Cell Network.

This half day workshop saw seven speakers, representing major research institutions and industry from Australia and the United States. They each addressed a question of great interest to the stem cell community and the public at large: *to what extent has stem cell research achieved success in clinical application?* Held in October the workshop attracted 80 participants from NSW.

Education
A number of public talks furthering the understanding of stem cell science in the wider community were given by DTU staff in 2007. Highlights include *Understanding Stem Cells* by Professor Bernie Tuch and *Commercialisation of stem cells – the journey so far* by A/Professor Kuldip Sidhu.

Both Prof Tuch and A/Prof Sidhu were invited by the Office of Science and Medical Research to brief the NSW State Parliament on the state of stem cell science. This was in light of the impending passage of the Bill to Prevent Human Cloning.

Prof Phil Waite & Dr Albert Farrugia

10th Stem Cell Workshop

Human fetal tissue distribution centre

For the past two decades, the Unit has acted as a Centre to receive and distribute human fetal tissue. The tissue is obtained from therapeutic terminations of pregnancy, with the agreement of the Human Research Ethics Committee of both the Hospital and University, and in accordance with the guidelines of the National Health and Medical Research Council of Australia.

The Unit uses pancreas and spinal cord for its own projects, and distributes many other tissues to others. These tissues include the liver, brain, skin, eyes, bones and cartilage. Human fetal tissue is a scarce resource. Because of the centralization of distribution, it is possible to maximize the distribution of the tissue. Thus, an average of four research groups use tissue from each termination from which tissue is supplied.

The Unit runs the Centre on a cost recovery basis, a practice confirmed this year as being appropriate by the Human Research Ethics Committees of both the South Eastern Sydney Illawarra Health and the University of New South Wales. As such, researchers using fetal tissue pay an annual service fee. Attempts have been made to obtain alternative sources of support, but all attempts have been unsuccessful. Sources approached include the National Health and Medical Research Council of Australia, the NSW Department of Health and the Australian Stem Cell Centre.

The Unit has published the outcomes of using human fetal tissue over a ten year period. This was published in the Medical Journal of Australia 2003; 179: 547-50

Visits to other centres

Prof Bernie Tuch

Dept Physiology & Diabetes Research Laboratory, Christian Medical College, Vellore, India
Dr Gunasakaren
January 11

To discuss training of post-graduate fellows

Faculty of Medicine, INSERM, Paris
Prof Raphael Scharfmann
February 7

To discuss development of the immature human pancreas

Stem Cell Centre, University of Melbourne
Prof Bob Williamson
June 13

To discuss stem cell issues

Division of Organ Transplantation, University of Illinois, Chicago
A/Prof Jose Oberholzer
October 17

To visit the GMP islet manufacturing facility and discuss islet encapsulation

A/Prof Kuldip Sidhu

UK Stem Cell Bank, Hertforshire, Britain
Dr Glyn Stacy & Dr Lynn Healy
November 13

To discuss management of the DTU human embryonic stem cell line, Endeavour 1

IVF Clinic
Dr Alison Murdoch & Dr Mary Herbert
November 16

To view the GMP facilities and discuss becoming part of the DTU advisory committee on therapeutic cloning

Dr Sophia Dean

Neurology Unit, University of Queensland
Dr Brent Reynolds
March 14

To learn how to grow neural clusters

Dr Wei Wu

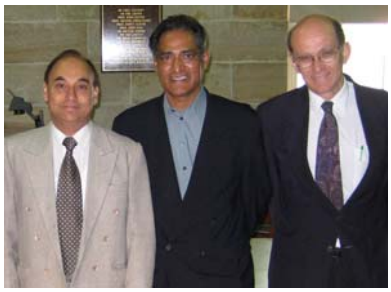
Mediterranean Institute for Transplantation and Specialized Therapies, Palermo, Italy
Prof Federico Bertuzzi
October 9

To view the GMP islet manufacturing facility

Jose Oberholzer, Bernie Tuch & Jan Jansen

In Chicago

Visits from other centres


Ramish Akkina (middle) visits the DTU

Senator Kay Patterson

January 16

For discussions on therapeutic cloning and diabetes/human embryonic stem cells

Dr Takasha Assada
Dr Hiroshi Hori
Dr David Campbell

Stem Cell Sciences
January 17

To discuss possible collaboration

Senator Kay Patterson
Ms Tracey Ah Hee

February 23

For discussions on cell therapies for diabetes

Dr Kate Le Strange
Dr Tulene McCabe

Biotechnology Industry Development, Dept Industry, Tourism & Resources
March 5

To discuss implementation of Australian policy regarding somatic cell nuclear transfer

A/Prof Brad Marsh

Beta Cell Structural Biology/Cellular Tomography Group, Institute for Molecular Bioscience, Queensland Bioscience Precinct, University of Queensland
March 7

To discuss collaboration regarding ultra-structural features of encapsulated ß cells

A/Prof Anand Hardikar

Stem Cells & Diabetes Section, National Centre for Cell Science, Pune, India
June 15

To discuss ways of collaborating with stem cells and diabetes

A/Prof Ramish Akkina

Department of Microbiology, Immunology and Pathology, Colorado State University
July 9

To discuss use of humanized mice in research

Prof Alan Mackay-Sim

Director, National Centre for Adult Stem Cell Research
August 1

For discussions on the uses of nasal stem cells

Prof Stephen Minger

Director, Stem Cell Biology Laboratory, King's College, London
November 6

For discussions on embryonic stem cells and somatic cell nuclear transfer

Prof Mark Dunne

Director, Faculty of Life Sciences, University of Manchester, England
November 12

For discussions on use of human fetal pancreatic progenitors

Presentations

Prof Bernie Tuch

Symposium on *Cell therapies for diabetes*

5th Winter Symposium, Christina Medical College, Vellore, India
January 13

Symposium on *Encapsulation as a platform technology for therapies with human islets, fetal pig beta cells and embryonic stem cells*

26th Workshop of the Artificial Insulin Delivery Pancreas and Islet Transplantation Group, Montpellier, France
February 5

Oral presentation on *Stem cells: the Jewish point of view*

Syd Einfeld Unit of Bnai Brith, Bnal Brith Lodge Home, Sydney
March 18

Lunchtime talk on *Stem Cells 2007*

Executive of the NSW Division of the Academy of Technological Sciences and Engineering, University of Sydney
March 21

Lecture on *Transplantation, tolerance and rejection*

3rd year Science students, School of Medical Science, UNSW
May 9

Briefing of parliamentarians as part of panel regarding impending passage of Bill to Prevent Human Cloning

NSW Parliament House
May 30

Oral presentation (by telephone) on a *Pilot clinical trial with encapsulated islets*

Chicago Project Encapsulation Team Meeting, Trondheim, Norway
May 30

Oral presentation on *Pilot clinical trial with encapsulated islets*

Adult/Paediatric endocrinology group at Prince of Wales Hospital/Sydney Children's Hospital
May 31

Briefing of parliamentarians as part of panel re impending passage of Bill to Prevent Human Cloning

NSW Parliament House
June 5

Prof Bernie Tuch

Oral presentation on *Jews in Medicine*

Limmud Oz: Festival of Jewish Learning and Culture, Sydney
June 10

Oral presentation on *Generating insulin-producing cells from embryonic and fetal stem cells*

Indian Australian Workshop on Stem Cell Research, Melbourne
June 12

Oral presentation on *Use of stem cells to develop novel therapies for type1 diabetes*

1st Stem Cell Symposium at the University of New South Wales
August 6

Oral presentation on *Use of human embryonic stem cells to develop novel therapies for type 1 diabetes* with Steven Gao

Weekly adult and paediatric endocrine groups, Randwick Hospital campus
September 20

Oral presentation on *Is religion the enemy of science?*

Council of Christians and Jews luncheon, Great Synagogue
October 11

Oral presentation on *Encapsulated human islets in Sydney: Clinical trial*

The Chicago Family, University of Illinois in Chicago, USA
October 15

Oral introduction on *Immunological graft loss – islet graft engineering*

3rd Annual Islet Workshop, Islet Cell Resource Center Consortium, Chicago, USA
October 18

Seminar on *Tissue therapies for diabetes*

Larry Hillblom Islet Research Center, University of California in Los Angeles
October 19

Oral presentation on *Understanding stem cells*

Catenian Society, Pittwater Branch, Sydney
November 14

Bernie Tuch with Millipore's Corina Radu

10th Stem Cell Workshop

A/Prof Kuldip Sidhu

Oral presentation on *Commercialisation of stem cells – the journey so far*

2007 Inaugural conference on Intellectual Property Management and Commercialisation in Hospitals, Royal North Shore Hospital
May 23

Lecture on *Stem cells and their applications*

Postgraduate students in the School of Biotechnology and Biomolecular Sciences, UNSW
April 26

Briefing of parliamentarians as part of panel re impending passage of Bill to Prevent Human Cloning

NSW Parliament House
May 31

Oral presentation on *RNA interference for developing definitive endoderm*

Indian Australian Workshop on Stem Cell Research, Melbourne
June 12

Poster presentation on *Directed differentiation of human embryonic stem cells to insulin producing cells by regulating GATA genes cascade*

5th International Society for Stem Cell Research, Cairns
June 18

Oral presentation on *Embryonic stem cells to beta cells or neurons and that is the question*

1st Stem Cell Symposium at the University of New South Wales
August 6

Poster presentation on *Analysis of variations in HESC clonal lines using immunophenotype and genomic microarrays*
5th International Society for Stem Cell Research, Cairns
June 19

Poster presentation on *Phenotyping and genotyping of human embryonic stem cell clonal lines: a potential model for drug discovery*

Symposium of the Society of Biomolecular Sciences on Back to pharmacology: stem cells & primary cells in drug discovery, Ananheim, USA
November 8

Dr Mathiyalagan Appavoo

Poster presentation on *Effect of overexpression of NeuroD in insulin-producing liver cells*

5th Winter Symposium, Christina Medical College, Vellore, India
January 12

Jinlian Hua with Kuldip Sidhu at the DTU

Methichit Chayosmrit

Poster presentation on *Encapsulation of hESC as 3D model to study their directed differentiation*

5th International Society for Stem Cell Research, Cairns
June 17

Poster presentation on *Encapsulation of hESC as a 3D model to study their directed differentiation*

1st Stem Cell Symposium at the University of New South Wales
August 6

Oral presentation on *Encapsulation of human embryonic stem cells*

Prince of Wales Clinical School
September 20

Poster presentation on *Establishment of an in vitro 3D culture system for hESC to study directed differentiation to insulin-producing cells*

Faculty of Medicine Research Day, University of New South Wales
October 10

Poster presentation on *Establishment of an in vitro 3D culture system for hESC to study directed differentiation to insulin-producing cells*

Annual Tow Research Day, Randwick campus
November 9

Henry Chung

Poster presentation on *DNA methylation status of some definitive endoderm-specific genes during directed differentiation of hESC clonal lines by activin A*

5th International Society for Stem Cell Research, Cairns
June 17

Poster presentation on *DNA methylation status of some definitive endoderm-specific genes during directed differentiation of hESC clonal lines by activin A*

1st Stem Cell Symposium at the University of New South Wales
August 6

Oral presentation on *Optimizing somatic cell nuclear transfer for deriving therapeutic embryonic stem cell lines*

Prince of Wales Clinical School
November 15

Dr Sophia Dean

Oral presentation on *Derivation and characterization of skin-derived neuroprecursor cells as an effective alternative for neurorestorative cell replacement therapy*

Open Senior Division of the annual Tow Research Day, Randwick campus
November 9

Dr Jayne Foster

Poster presentation on *Optimisation of xenografted encapsulated fetal pig islet-like cell clusters*

25th Annual Scientific Meeting of Transplantation Society of Australia and New Zealand, Canberra
March 29

Poster presentation on *Optimization of xenografted encapsulated fetal pig islet-like cell clusters*

Joint Meeting of the International Xenotransplant Association, the International Pancreas & Islet Transplant Association and the Cell Transplant Society, Minneapolis, USA
September 20

Steven Gao

Poster presentation on *Modeling the adhesion of human embryonic stem cells*

5th International Society for Stem Cell Research, Cairns
June 19

Poster presentation on *Modeling the adhesion of human embryonic stem cells*

1st Stem Cell Symposium at the University of New South Wales
August 6

Oral presentation on *Use of human embryonic stem cells to develop novel therapies for type 1 diabetes* with Prof Bernie Tuch

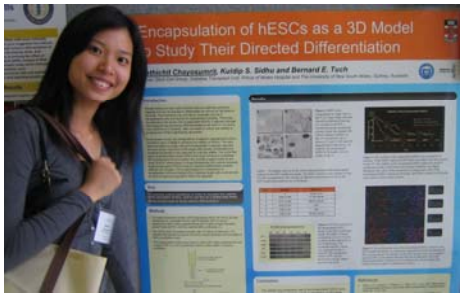
Weekly adult and paediatric endocrine groups, Randwick Hospital campus
September 20

Seminar on *In vitro differentiation of human embryonic stem cells (hESCs) into insulin producing structures on 3D biodegradable scaffolds*

School of Biotechnology & Biomolecular Sciences, Faculty of Science, University of New South Wales
November 8

Oral presentation on *Modeling the adhesion of human embryonic stem cells to Poly (lactic-co-glycolic acid) surfaces*

Open Junior Division of the annual Tow Research Day, Randwick campus
November 9



May at the ISSCR meeting in Cairns

Jinnuo Han

Poster presentation on *Reprogramming human fetal fibroblasts to pluripotent state after fusion with human embryonic stem cells*

5th International Society for Stem Cell Research, Cairns
June 18

Poster presentation on *Reprogramming human fetal fibroblasts to pluripotent state after fusion with hESC*
1st Stem Cell Symposium at the University of New South Wales
August 6

Jinlian Hua

Poster presentation on *Coaxing HESC to form oocyte-like structures after co-culture with human fetal testicular extracts and hormones: A preliminary study*

5th International Society for Stem Cell Research, Cairns
June 20

Justin Lees

PhD talk on *The quest for a ß-cell surrogate using tissue engineering and human embryonic stem cells*

The Clinical School, Prince of Wales Hospital
March 15

Poster presentation on *Comparison of extracellular matrix production by pluripotent and differentiated hESCs*

5th International Society for Stem Cell Research, Cairns
June 18

Daniel Lie

Poster presentation on *Directed differentiation of hESC to definitive endoderm population by stable downregulation of nanog*

5th International Society for Stem Cell Research, Cairns
June 19

Poster presentation on *Directed differentiation of hESC to pancreas duodenum homeobox-1 (PDX-1) positive population through knockdown of nanog*

Faculty of Medicine Research Day, University of New South Wales
October 10

Daniel & Steven preparing to present in Cairns

Catalina Palma

Poster presentation on *Impact of pancreatic transcription factor neurogenin-3 transduction on the phenotype of haemopoietic stem cells*

Annual Meeting of the International Society for Cellular Therapy, Berlin, Germany
May 5

Poster presentation on *Endodermal traits induced in human cord blood stem cells following PDX-1 and Neurogenin-3 transduction*

5th International Society for Stem Cell Research, Cairns
June 20

Poster presentation on *Endodermal traits induced in human cord blood stem cells following PDX-1 and Neurogenin 3 transduction*

Faculty of Medicine Research Day, University of New South Wales
October 10

Oral presentation on *Conversion of cord blood stem cells into insulin-producing cells*

Prince of Wales Clinical School
November 1

Bernie's Angels (aka DTU staff) in Cairns

Sabina Ratnapala

Poster presentation on *The xenogeneic immune response to encapsulated fetal pig ICCs in mice*

Annual Tow Research Day, Randwick campus
November 9

Vijayaganapathy Vaithinlingam

Poster presentation on *Function of encapsulated human islets transplanted into diabetic mice*

25th Annual Scientific Meeting of Transplantation Society of Australia and New Zealand, Canberra
March 29

Postgraduate Research Seminar on *Preclinical transplantation of encapsulated human islets*

Prince of Wales Clinical School
May 17

Jennifer Wong

Poster presentation on *The integrin expression profile of definitive endoderm derived from human embryonic stem cells*

Annual Tow Research Day, Randwick campus
November 9

Mandy Yim

Poster presentation on *Magnetic resonance imaging of insulin-producing cells labelled with iron nanoparticles*

Annual Tow Research Day, Randwick campus
November 9

Publications

REFEREED JOURNALS

- Foster JL, Williams G, Williams LW, Tuch BE
Differentiation of transplanted microencapsulated fetal pancreatic cells
Transplantation 2007; 83: 1440-8

- Lees JG, Lim SA, Croll T, Williams G, Cooper-White J, McQuade LR, Mathiyalagan B, Tuch BE
Transplantation of 3D scaffolds seeded with human embryonic stem cells: biological features of surrogate tissue and teratoma forming potential
Regenerative Medicine 2007; 2: 289-300

- Tuch BE
Cancer stem cells in 2007
ANZ J Surg 2007; 77: 409

- Sidhu KS, Ryan JP, Tuch BE
Derivation of a new hESC line, Endeavour 1, and its clonal propagation
Stem Cells and Development, accepted 25.6.07

- Brands K, Colvin E, Williams LJ, Wang R, Lock RB, Tuch BE
Reduced immunogenicity of first trimester human fetal pancreas
Diabetes 2007; Dec 7 [Epub ahead of print]

- Palma C, Lindeman R, Tuch BE
Blood into β-cells: Can adult stem cells be used as a therapy for type 1 diabetes
Regenerative Medicine, accepted 16.11.07

- Valenzuela M, Sidhu K, Dean S, Sachdev P
Neural stem cell therapy for neuropsychiatric disorders
Acta Neuropsychiatrica 2007; 19: 11-26

- Han J, Sidhu KS
Current concepts in reprogramming somatic cells to pluripotent state
Current Stem Cell Research & Therapy 2008; 3: 66-74, accepted 12.12.07

STATE OF THE ART PUBLICATIONS

- Tuch B
Banning stem cell research prolongs the suffering for many
Sydney Morning Herald 7.5.07, Opinion editorial

- Gao SY, Tuch BE
Stem cell review
Shatayushi, annual Marathi publication, 2007

ABSTRACTS & PROCEEDINGS

International

- Tuch B
Cell therapies for diabetes
5th Winter symposium, Endocrinology, Diabetes and Metabolism – from bench to bedside 2007; 116

- Appavoo M, Tuch BE
Effect of overexpression of NeuroD in insulin-producing liver cells
5th Winter symposium, Endocrinology, Diabetes and Metabolism – from bench to bedside 2007; 182

- Chung H, Sidhu KS, Tuch BE
DNA methylation status of some definitive endoderm-specific genes during directed differentiation of hESC clonal lines by activin A
International Society for Stem Cell Research 2007; 5: 23 (No 183)

- Gilbert T, Williams G, Gardiner B, Grimmond S, Tuch B, Little M
Early stages of human kidney development: Characterisation of nephron progenitor cells
International Society for Stem Cell Research 2007; 5: 27 (No 195)

- Han J, Sidhu KS
Reprogramming human fetal fibroblasts to pluripotent state after fusion with human embryonic stem cells
International Society for Stem Cell Research 2007; 5: 36 (No 227)

- Chayosumrit M, Sidhu KS, Tuch BE
Encapsulation of hESC as 3D model to study their directed differentiation
International Society for Stem Cell Research 2007; 5: 57 (No 299)

- Khong L, Sidhu KS, Tuch BE
Directed differentiation of human embryonic stem cells to insulin producing cells by regulating GATA genes cascade
International Society for Stem Cell Research 2007; 5: 112 (No 189)

- Lees J, Gao S, Tuch B
Comparison of extracellular matrix production by pluripotent and differentiated hESCs
International Society for Stem Cell Research 2007; 5: 142 (No 291)

- Lie KH, Sidhu KS, Tuch BE
Directed differentiation of hESC to definitive endoderm population by stable downregulation of nanog
International Society for Stem Cell Research 2007; 5: 201 (No 185)

ABSTRACTS & PROCEEDINGS

International

- Sidhu KS, Belov L, Peeva V, Morahan G
Analysis of variations in HESC clonal lines using immunophenotype and genomic microarrays
International Society for Stem Cell Research 2007; 5: 211 (No 221)

- Gao S, Lees JG, Croll T, Cooper-White J, Tuch BE
Modeling the adhesion of human embryonic stem cells
International Society for Stem Cell Research 2007; 5: 247 (No 328)

- Palma CA, Sanchez-Guerrero E, Wong RYL, Lindeman R, Tuch BE
Endodermal traits induced in human cord blood stem cells following PDX-1 and Neurogenin-3 transduction
International Society for Stem Cell Research 2007; 5: 293 (No 184)

- Hua J, Sidhu K, Tuch B
Coaxing HESC to form oocyte-like structures after co-culture with human fetal testicular extracts and hormones: A preliminary study
International Society for Stem Cell Research 2007; 5: 302 (No 212)

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DTU staff celebrate the end of a productive year with champagne at Quay Bar, Circular Quay

Look out 2008!