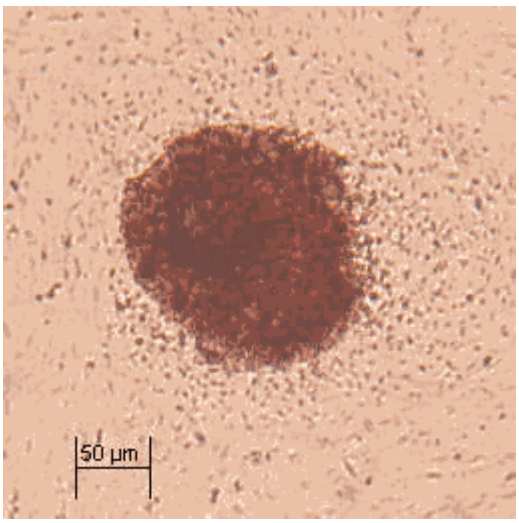

The NSW Stem Cell Network
presents the

4th Stem Cell Workshop

Tues 16th March, 2004
12:30 am to 6:00 pm
Lecture Theatre & Functions Room
Edmund Blacket Building
Prince of Wales Hospital, Randwick

Thanks to out Major Sponsor

SpinalCure AUSTRALIA

Welcome to the 4th Stem Cell Workshop in NSW

This afternoon you will hear from five of Australia's leading scientists in stem cell research, followed by leading professionals presenting the latest issues in stem cell policy and bioethics. Finally, you will hear from a person who hopes to benefit from the stem cell therapy soon.

The scientific focus for this 4th Workshop is the use of stem cells in spinal cord injuries and neurological disorders. This was an obvious choice with the NSW government strongly supporting this area of stem cell research. As all Network members would be aware from our latest e-newsletter, the NSW Premier, Bob Carr launched the Spinal Cord Injury & Other Neurological Conditions Research Grants Program in January 2003 and the closing date for applications was 23 Feb 2004. Today, there will be ample opportunity to find out "The Latest Research" in this stem cell area through presentations and Networking.

In session I, you will hear from leading neural stem cell researchers from around Australia. Our local talent includes Professors, Bruce Brew and Anne Cunningham are talking about neural spheres and adult stem cells. Monash Medical Centre's, Professor Malcolm Horne is revealing the latest stem cell research into Parkinsons disease. Next, Prof Alan Mackay-Sim from Queensland's Griffith University will expose the therapeutic potential of picking stem cells from your nose. Finally, Dr Rod Rietze from The Institute for Brain Research in Queensland, will complete this scientific session, chaired by Prof Simon Gandevia from Prince of Wales Medical Research Institute

In session II, chaired by Sydney University's Dr Roseanne Taylor, you will hear from Ms Kerry Doyle from the Ministry for Science and Medical Research presenting the latest developments in policy. Next UNSW's Dr Adrienne Torda will discuss the ethical dilemmas. This session will close with a unique personal perspective about the potential therapeutic benefits of stem cells. Dr Paul Brock, NSW Department of Education and Training, is confined to a wheelchair and he tells his own story.

In NSW, the Stem Cell Network has grown from 120 to over 320 members since it began in Nov 2002. This year, the NSW Minister for Science and Medical Research, Frank Sartor, has committed to ongoing support for the NSW Stem Cell Network until 2006. With this in place, the Network will be able to do more for its members including events, a professional website and regular e-newsletters to keep members updated with the latest in stem cell science, ethics and policy.

The next Stem Cell Workshop is coming up in July and together with the NSCC the NSW Stem Cell Network will be organising the2nd National Stem Cell Conference to be held in Sydney November 2004.

Knowing that this Network is growing and has the potential to provide a wide range of services to its members, we invited AusBiotech's Director, Dr Tony Coulepis, to open the 4th Stem Cell Workshop. AusBiotech is a Network that represents the biotechnology sector in Australia. It started off as regional groups and successfully developed into a national Network that today provides services on a regional and national level including, events, news, directories and more. The Stem Cell Network has common interests with AusBiotech and this year we will be expanding our horizons to include them into our stem cell community.

Finally, we'd like to thank our major sponsor for this Workshop, The Australasian Spinal Research Trust and other sponsors including Invitrogen, Lecia, Sigma Aldridge and BioScientific.

Enjoy this Workshop and we look forward to maintaining contact with you through the Network

Dr Daniella Goldberg *Prof Bernie Tuch* *Ms Sarah Walke*
Convenors of the NSW Stem Cell Network

The 4th Stem Cell Workshop

Spinal Cord and Neurological Disorders. The science, politics and ethics..

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presented by

The NSW Stem Cell Network

12:30 pm	REGISTRATION
1:00 p.m	**Welcome** Dr Tony Coulepis, Executive Director, AusBiotech
Session 1: THE LATEST RESEARCH. Chaired by Prof. Simon Gandevia, Prince of Wales Medical Research Institute.	
1:10 p.m	**"Neural stem cells - a new 'spin' on early neurosphere development."** Prof. Anne Cunningham, School of Women's and Children's Health, UNSW
1:35 p.m	**"Neural Potential of Adult Stem Cells."** Prof. Bruce Brew, St. Vincent's Clinical School
2:00 p.m	**"Repairing the Parkinsonian brain"** Prof. Malcolm Horne, Dept. of Medicine, Monash Medical Centre
2:25 pm	**"Adult stem cells from the olfactory epithelium; a potential source for autologous therapies"** Prof. Alan Mackay-Sim, Griffith University in Brisbane.
2:50 p.m	**"Harnessing the endogenous regenerative capacity of the adult brain"** Dr. Rod Rietze, Institute for Brain Research, University of QLD
3:15 p.m	AFTERNOON TEA BREAK
Session 2: WHAT'S HAPPENING IN AUSTRALIA? Chaired by Dr. Rosanne Taylor, Sydney University.	
3:40 p.m	**"Ethical issues and stem cell research."** Dr Adrienne Torda, University of New South Wales
4:05 p.m	**"The NSW Government perspective."** Ms. Kerry Doyle, Director, Ministry of Science and Medical Research
4:30 p.m	**"A personal perspective."** Dr. Paul Brock, NSW Department of Education and Training
5.00 p.m	**COCKTAILS and ANOUNCEMENTS**

Neural stem cells: a new “spin” on early neurosphere Development

Neural stem cells have potential as therapeutic tools for the repair of a number of CNS disorders. Understanding and controlling mechanisms of neural stem cell (NSC) differentiation will be critical to achieving such new therapeutic strategies. NSCs can either be isolated from embryonic and adult brain or spinal cord or produced from mouse or human ES cells. NSCs proliferate *in vitro* into massive clonal spheres of cells, called ‘neurospheres,’ which can be passaged without losing their multipotentiality.

In many ways, each neurosphere represents a microsystem of stem cell proliferation, commitment and cellular differentation but how development occurs within neurospheres from the original sphere-forming cell is not defined. In order to better understand such mechanisms, we have been studying olfactory NSCs derived from olfactory neuroepithelium. We developed a neurosphere culture system and have studied the earliest stages of olfactory stem cell proliferation and differentiation using time-lapse videomicroscopy and immunocytochemistry. Clonal neurospheres were shown to form from individual motile cells creating a spinning colony, capable of making progeny of neuronal and non-neuronal classes. Double-labeling immunocytochemistry of young spheres revealed surprising intrasphere cellular heterogeneity, consistent with lineage specification occurring very early in their development, and providing evidence that neurospheres are not homogenous structures. Our system of neurosphere culture provides a valuable model with which to further explore neural stem cell development.

Prof. Anne Cunningham,

School of Women's and Children's Health and UNSW

Anne Cunningham is Professor of Paediatrics at the University of New South Wales and Director of Research and Head of the Developmental Neurosciences Program at Sydney Children’s Hospital. She is a practising Consultant Neurologist, at Sydney Children’s Hospital. She trained in medicine and Paediatric Neurology at the University of Sydney and the Royal Alexandra Hospital for Children. Her PhD was undertaken in developmental neuroscience in the area of synaptogenesis at the Children’s Medical Research Foundation and subsequently she was a Research Associate at the Howard Hughes Medical Institute, Johns Hopkins University in Baltimore, MD, USA. She joined the Faculty at Johns Hopkins in the Department of Molecular Biology and Genetics and was appointed Assistant Professor of Neurology. On return to Australia, she spent six years as Head of the Sensory Neurobiology Group at the Garvan She has a longstanding interest in neuronal growth factors and development of the olfactory sensory system and is President of AACSS, the Australasian Association of ChemoSensory Sciences. Her current research interests include central nervous system development and plasticity; neural stem cells; role of trophic factors in CNS development; neurogenic mechanisms; axonal outgrowth and synaptogenesis; therapeutic modalities of neuroprotection; cell-based therapies for brain and spinal cord insult and degenerative conditions.

NEURAL POTENTIAL OF ADULT STEM CELLS

Adult stem cells have recently been found to be pluripotential for most organs. However, there is still controversy over the extent to which such cells may differentiate into neural cells. Moreover, there are difficulties regarding their use in disease states such as multiple sclerosis. Issues such as the identification of a subset of stem cells that are neurally fated, methods of expansion of cell numbers, optimal stage of differentiation for transplantation, and the effects of multiple sclerosis and its therapy on the transplanted cells remain poorly understood. Using C57BL6 and twitcher mice we have tried to address some of these problems. Marrow stem cells were cultured in vitro, and at day 14 multiple haematological/immunological markers as well as a lineage depletion kit designed for embryonic stem cell differentiation were utilized. We found that approximately 15% of the population was not haematologically/immunologically fated and that these were likely neural progenitors. We then examined the kinetics of neural marker expression in this subset of cells versuhaematologically / immunologically fated cells versus unsorted cells. The culture conditions did not include any differentiation signals. We found that the probable neurally fated cells more readily expressed neural markers suggesting that these are a distinct subset of marrow stem cells. Moreover, during the 21 days of culture there was varying expression of several markers (Oct4, Nestin, A2B5, O1 and CNPase) even at day 1. These results highlight the importance of using several markers especially those that are minimally expressed in vitro in order to demonstrate differentiation of transplanted cells. Finally, using a variety of immunohistochemical markers, we observed neuronal, astrocytic and oligodendroglial differentiation with NT2 and human marrow stem cells transplanted into twitcher mice and to a lesser extent in normal mice. These results provide cautious optimism for the therapeutic use of adult stem cells.

Prof Bruce Brew

Head of Neurosciences, St Vincent's Hospital

Professor Bruce James Brew is head of Neurosciences and Neurology at St Vincent's Hospital, Sydney. He has over 160 publications in the neurological aspects of HIV disease and the kynurenine pathway. He has been working in the area of adult stem cells for the last few years. He has developed collaborative links with Associate Professor R Taylor at Sydney University and Professor D Prockop, New Orleans. He holds grants from NHMRC, Wadsworth Foundation and Hunters Hope.

Repairing the Parkinsonian Brain

Recently we showed that cells in the region of the adult brain injured in Parkinson's Disease and known as dopamine cells are capable of recovering from injury and making new connections. Furthermore, the regulation of these connections appears to be occurring routinely within the normal adult brain. It also seems likely that there is a normal low level of replacement of dopamine cells by newly made nerve cells, known as neurogenesis from stem cells that are intrinsic to the adult brain. Thus the adult brain is making the chemical signals that are required to make stem cells turn into dopamine cells and to regulate how dopamine cells make connections and become functionally integrated into the nervous system. This research is directed at understanding the nature of these signals and examining how implanted stem cells respond to these signals.

Prof Malcolme Horne

Monash Medical Centre

Professor Horne is Deputy Director of the Howard Florey Institute and a consultant Neurologist specialising in Parkinson's Disease at the St. Vincent's Hospital in Melbourne. He joined the Howard Florey Institute last year and heads a team funded by the NHMRC to study Brain Injury and Repair.

Professor Horne's Research interest surrounds various facets of Parkinson's Disease and related disorders. These interests include the use of stem cells for the amelioration of Parkinson's Disease and studies into the basic biochemical mechanism that underlie Parkinson's Disease. He is also interested in the role of DA in mechanisms of addiction as well as developing tests for Parkinson's Disease.

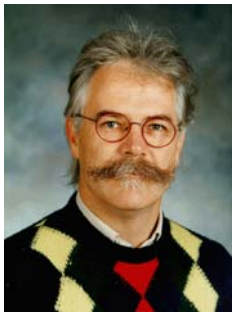
Prior to joining the Howard Florey Institute, Professor Horne was leader of the neurosciences program at Monash University and director of the clinical program in Neurology and Neurosurgery at Monash Medical Centre with a chair in the Department of Medicine. He was at Monash for 14 years. His currently Chairman of Neurosciences Victoria's Scientific Advisory Committee as well as a Member of the Australian Association of Neurologists' Scientific Advisory Committee, which he chaired until recently.

Adult stem cells from the olfactory epithelium: a potential source for autologous therapies

Observations of multipotent cells in adult tissues, including bone marrow and brain, are provocative because they suggest that stem cells in adult organs have the developmental potential of embryonic stem cells. We investigated the hypothesis that adult olfactory mucosa contains stem cells. Vigorous neurogenesis continues in this tissue throughout human adult life. A stem cell is suggested by the presence of nestin in the rodent olfactory mucosa. Nestin is an intermediate filament protein expressed in neural stem cells in the brain.

We show here that: 1) cells from adult rat olfactory mucosa can generate leukocytes when transplanted into bone-marrow irradiated hosts, 2) cells from adult mouse olfactory epithelium can generate numerous cell types when transplanted into the chicken embryo, 3) cells from adult human olfactory mucosa can generate multiple cell types *in vitro* and in the chicken embryo, and can be purified and grown in large numbers.

We conclude that a multipotent stem cell population exists in adult human nose. Given the accessibility of the olfactory mucosa and the ability to grow stem cells from adult humans, these results suggest an abundant and benign source of multipotent, stem-like cells for autologous transplantation therapies. Furthermore, olfactory stem cells can be grown from patients with a variety of disorders and diseases providing an accessible source of many cell types for cellular and molecular analysis.



Prof. Alan Mackay-Sim

Institute of Molecular and Cellular Therapies, Griffith University, Brisbane.

Alan Mackay-Sim is a sensory neuroscientist, a specialist in olfaction, with a broad experience in behavioural biology, neuroanatomy, electrophysiology, developmental biology, and cell biology. His current research is focused on the cell and molecular biology of the growth factors that regulate neurogenesis in the adult olfactory mucosa. Professor Mackay-Sim's lab has developed new techniques for culturing neurons from biopsies of adult human olfactory mucosa. These cultures provide a unique "window" into neurons and neuronal development in human diseases such as schizophrenia. The Mackay-Sim lab has also developed new techniques for culturing olfactory ensheathing cells from olfactory mucosa in rat and human. Professor Mackay-Sim is the Scientific Director of a current Phase I clinical trial for autologous transplantation of olfactory ensheathing cells in human paraplegia. He and his colleagues have now isolated the stem cell responsible for generating new nerve cells in the nose and are exploring their potential to develop into other cell types, with a view to using them in future stem cell therapies. In 2003 Professor Mackay-Sim was named Queenslander of the Year.

Harnessing the endogenous regenerative capacity of the adult brain

It is now clear that new neurons continue to be generated in the adult brain, and that a resident stem cell population provides the basis for replacing those neurons lost due to normal processes, such as ageing, or in response to pathological insults, such as spinal cord injury, neurodegenerative disease or stroke. Although clearly a highly significant finding, with considerable implications for the treatment of a number of pathological conditions, we still know surprisingly little about the nature of the adult stem cell population, and even less about its regulation. As a critical first step, we have recently identify the unique cell surface markers of the endogenous brain stem cell, which has allowed for its purification by flow cytometry. We are now comparing the properties of homogenous populations of stem and more restricted progenitor cells using Affymetrix gene array technology, in an effort to uncover the intrinsic and extrinsic factors that regulate the activity of the endogenous stem cell. The results of these experiments - which are vital to identify candidate molecules for the development of successful targeted therapeutics with the potential to treat a wide range of brain and spinal cord related conditions, will be discussed here.

Dr. Rod Rietze

Institute for Brain Research, University of Queensland

Dr. Rod Rietze began his research career at the University of Calgary, Canada, where he trained in the lab of Dr. Sam Weiss, a pioneer in the new field of brain stem cell biology. After completing a Masters' Degree in Developmental Neurobiology, studying the role stem cells played in generating new nerve cells in the adult brain, he was recruited by Neurospheres Ltd., a biotech company that focused on using brain stem cells to alleviate neurodegenerative disease and trauma. As a result of his discoveries at Neurospheres which demonstrated that adult stem cells were pluripotent, he was awarded *Science* magazine's prestigious "Discovery of the Year for 1999". To progress this work further, he moved to Melbourne, to complete his PhD with Dr. Perry Bartlett (also a pioneer in brain stem cell biology) at the prestigious Walter and Eliza Hall Institute of Medical Research. As a result of this work, we now know the identity of the brain stem cell, and can for the first time, investigate this rare population of cells, which make up less than 1 in 100,000 cells in the brain.

Dr Rietze is currently a University of Queensland Senior Research Fellow within the Queensland Brain Institute, where he heads the Neural Stem Cell Research Laboratory. The main focus of the lab is understanding how resident stem cells in the adult mouse and human central nervous system are regulated, with the ultimate goal being to develop successful strategies to treat a wide range of debilitative neurodegenerative diseases and injuries, whose conditions extract an enormous economic and social cost of sufferers, carers and governments alike.

Ethical Issues and Stem Cell Research

As technology advances rapidly, many people become excited whereas some become anxious about the limitless possibilities for research using stem cells that are on the horizon. Governments struggle to legislate and develop appropriate and acceptable guidelines for this research as technology opens up more and more possibilities in this field.

At a personal level, people struggle to understand and develop an opinion about stem cell research. Yet it is an area about which many people feel strongly. Most people in our community have an opinion about the use of stem cells for research. These opinions often reflect the values and morals brought to them as a result of their culture, religion and education. Many people feel that decisions regarding what is acceptable and what is not in this area, reflect on what is the very core of our 'personhood' and when human life begins to have 'moral status'. Others feel that it is ironic to worry about the 'status' of single cells, while so many millions of people in this world live in sickness and poverty.

Some people argue against stem cell research for other reasons, such as neglect of more simple but less fashionable research into fields such as water purification or infections such as malaria, tuberculosis and AIDS.

This talk will hope to facilitate discussion about some of the ethical issues surrounding the use of stem cells for research.

Dr Adrienne Torda

MBBS (hons), FRACP, PhD, Grad Dip Bioethics.
Senior Lecturer in Medical Ethics, University of New Wales

Adrienne Torda is a physician at Prince of Wales hospital where she is a specialist in infectious diseases. Following the completion of her specialist training she went on to do a PhD in immunpathology and then study medical ethics at Monash university. She has also been involved in teaching clinical and communication skills to medical students for many years and is now a Senior Lecturer in medical ethics at the University of New South Wales. She is the convenor of phase 1 of the ethics program for the new medical curriculum at the University of New South Wales and is involved in teaching bioethics to students from a whole range of faculties including bioinformatics. Her research interests include clinical ethics, ethical issues in biotechnology and infectious diseases.

The NSW Government Perspective on the Regulation of Research involving Human Embryos and the Prohibition of Human Cloning

The NSW Government has a longstanding commitment to understanding the issues surrounding embryonic stem cell research and to carefully consider its position in relation to this area of research. The NSW Government position on research involving human embryos and cloning will be discussed, in the context of the intergovernmental debate that led to the development of the national scheme to regulate research and prohibit human cloning. The current status of the Federal and State laws that together form the national scheme will be explained, as will the framework within which licences may be granted, leading ultimately to discussion about the scheduled review of the national scheme.

Kerry Doyle

NSW Ministry for Science and Medical Research

Kerry Doyle is the Director, Biotechnology and Government Programs, of the NSW Ministry for Science and Medical Research. Ms Doyle previously held the position of Director of the BioUnit, NSW Cabinet Office, until 1 December 2003, when the BioUnit became the core of the newly established Ministry. Responsibilities of the BioUnit included providing key support to the NSW Government during the debate at the Council of Australian Governments (COAG), which resulted in an agreement to implement a nationally consistent scheme to prohibit human cloning and certain other practices and regulate research involving human embryos.

Since 1994, Ms Doyle has worked in various positions in NSW Government, in areas including education, health, treasury, environmental policy and industrial relations. Prior to entering Government, Ms Doyle lectured and tutored at the University of Wollongong and was an educator in the school and theatre sectors in country NSW.

Ms Doyle's current role in the Ministry for Science and Medical Research involves mobilising and directing programs and resources across Government to ensure the effective implementation of NSW Government's science and medical research strategy, creating new programs and extending and enhancing the current policy framework

Advocacy; past, present and future. a personal perspective

This paper explores the author's involvement in advocacy both for the embryonic stem cell Federal Parliamentary Legislation that was eventually passed by the Senate in December 2002, and for the enhancement of research as a fundamental objective of the NSW Motor Neurone Disease Association. In particular, the paper reiterates and draws upon personal experience to demonstrate the central importance of Christopher Reeve's injunction that there must be genuine interfacing between researchers seeking to find cures or to improve treatments for people with currently incurable diseases, and those who continue to suffer from such diseases.

Dr Paul Brock

Director, Professional Practice, NSW Department of Education and Training
Member, Board of Management, NSW Motor Neurone Disease Association

Dr Paul Brock was recently appointed to the position of Director of Professional Practice in the NSW Department of Education and Training. For four years prior to that he was Director of Strategic Research in that Department. He was diagnosed with Motor Neurone Disease over seven years ago.

Originally he was a secondary school English and History teacher and head of department as well as a deputy Principal over a period of 13 years. For 15 years he was a member of the Marist Brothers, an international Roman Catholic Religious Teaching Order.

An academic at the University of New England (1979-1990), he was Senior Lecturer in English and Chair of the University's Teacher Education Program. He has taught and undertaken research as a Visiting Fellow in British and North American universities. He has written over 200 scholarly publications and academic papers for presentation to international and Australian conferences.

From 1990-1992 he was Consultant Adviser on the personal staff of the Commonwealth Minister for Employment, Education and Training. He was Special Adviser to the Australian Language and Literacy Council of Australia's National Board of Employment, Education and Training, 1992-1996.

He is a Fellow of the Australian College of Educators; a Director of the Board of Management, NSW Motor Neurone Disease Association; and a Research Fellow of the University of New England. In 2002 Dr Brock was awarded the Australian College of Educators' Sir Harold Wyndham Medal for his career-long contribution to education.

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