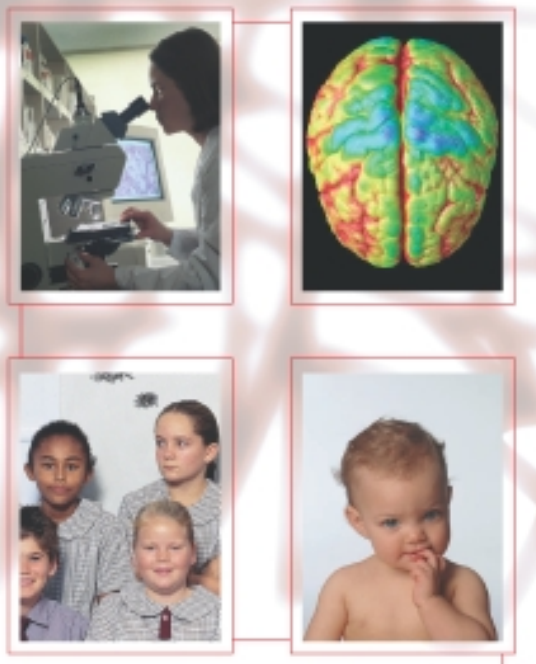

ANNUAL REPORT 2002

NISAD

Schizophrenia Research

SPARE A THOUGHT. FIND A CURE.

CONTENTS

MULTIDISCIPLINARY SCHIZOPHRENIA RESEARCH: THE NISAD MODEL

Schizophrenia is a chronic, severe and disabling brain disease. It is extremely complex and there is no known single cause of the disorder. Many diseases, such as heart disease, result from an interplay of genetic, behavioural and environmental conditions. This may be the case for schizophrenia as well.

NISAD facilitates multidisciplinary research that mobilises the whole range of modern biomedical techniques to investigate schizophrenia. The mystery will be solved only by using all available tools to search for genetic differences, changes in the structure and function of the brain, critical moments in brain development, and other factors.

An example of the NISAD multidisciplinary method is the Institute's support for a program of neurobiological research investigating deficits in auditory processing in schizophrenia. This investigation orchestrates collaborating scientists from the Neurobiology, Neuroimaging, and Clinical Measurement Panels, and also the Tissue Resource Centre.

NISAD affiliated scientists have begun utilising the latest neuroimaging and cognitive neuroscience techniques to investigate auditory processing in schizophrenia patients, first-degree relatives and controls recruited from the NISAD Research Register. Neurobiology researchers will then use microarray techniques to investigate changes in gene expression profiles obtained from the same participants. Gene expression profiles from regions of the brain believed to be involved in auditory processing will also be investigated using tissue from the NSW Tissue Resource Centre.

This diverse program of research has the potential to identify genes involved in causing schizophrenia or predisposing an individual to develop the illness. In the future it may be possible to compare the data obtained from these studies to identify individuals at risk.

NISAD's support for this line of research was a critical element in the recent award of a National Health & Medical Research Council Project Grant. The $360,000 grant will allow NISAD affiliated scientists at the University of Newcastle, in collaboration with the University of New South Wales, and the University of California, to conduct the study "Functional and structural imaging of auditory information processing deficits in recent-onset and chronic schizophrenia."

BACKGROUND

NISAD Schizophrenia Research is an innovative Australian medical research organisation undertaking world class studies to understand the causes of the debilitating brain disease, schizophrenia.

Formed in 1996 and funded by Government, corporate and private donations, it is an "institute without walls" which utilises research and infrastructure facilities located in teaching hospitals, universities and research institutes throughout NSW, as well as domestic and international collaborations, in driving its proactive research agenda.

This means that rather than investing valuable funds in bricks and mortar, efforts are directed at research initiatives to improve the lives of those affected by the disease.

From its central management office in Sydney, NISAD manages and coordinates a multi-disciplinary research program led by scientists of world standing in their fields, harnessing cutting-edge technology and state-of-the-science techniques.

Activities include investigating the functional disorders causing the symptoms of schizophrenia, the effects of the disease on brain cells, the genes expressed when it develops and how schizophrenia affects the brain's processing of thoughts and feelings.

NISAD plays a key role in creating an environment where families living with the disease do not have to suffer in silence but instead receive the acceptance and help they need. It also fuels support for more intensive research as the only long-term solution.

NISAD's ambitious research agenda can only progress with the combined support of Government and the private sector. To enable this, the Institute undertakes fund-raising and public education activities to increase awareness of the impact of schizophrenia on families and in the community. In particular, these educational programs aim at increasing awareness of schizophrenia as a major cause of permanent disability and suicide in young people.

SCIENTIFIC HIGHLIGHTS

CLINICAL

• Significant expansion of the NISAD Schizophrenia Research Register that now lists over 800 volunteers. This includes recruitment of family members of schizophrenia patients, an important new group of research volunteers.

• Development of a DNA Bank for schizophrenia research based on the Register. This will be a critical research infrastructure facility to support genetics research in schizophrenia.

• Demonstration that visual scanpath dysfunction may be a trait marker for the genetic transmission of schizophrenia.

• Commission of an extensive review of the neurobiology of substance use in schizophrenia. This will help to develop a major new direction for NISAD research in 2002-2003.

NEUROBIOLOGY

• Initiation of NISAD's first genetic schizophrenia research studies at the Newcastle Centre for Collaborative Human Brain Research. Using DNA microarray techniques, the research aims to investigate changes in gene expression in psychosis.

• Demonstration of a greater density of GABAergic interneurons in the mamillary bodies region of schizophrenia-affected brains. As GABAergic interneurons exert an inhibitory effect on brain activity, these findings may be significant in regards to the memory dysfunctions often seen in schizophrenia.

• Demonstration that ionotropic glutamate receptors are differentially altered in the anterior cingulate cortex in schizophrenia. This adds to the growing body of research that supports dysfunction of excitatory activity in schizophrenia.

• Development of various animal models that display schizophrenia-like behaviours and pathologies. The resultant behavioural and genetic information obtained could provide substantial benefits to sufferers of schizophrenia through the development of better diagnosis, new treatments and preventative strategies.

NEUROIMAGING

• Continued development of the NISAD Brain Atlasing initiative. This collaborative study will use MRI to compare structural and functional differences in first episode schizophrenia cases and controls. This will be the first time this type of comparison will be made.

• Initiation of neuroimaging research investigating attention, a function known to be affected in schizophrenia. This study will combine eye movement and fMRI research for the first time in Australia. Pilot data has been collected and the study will be expanded to examine schizophrenia subjects in 2002-2003.

• Demonstration of a trend for decreased cerebellar volumes in the brains of cannabis users compared to controls. Future studies will examine people with schizophrenia who use cannabis.

• Evidence from a small pilot study that fatty acid supplementation increases the level of fatty acids in the brain and improves schizophrenia symptoms and medications side effects.

TISSUE RESOURCE

• Continued development and growth of the NSW Tissue Resource Centre, a key infrastructure facility to support neurobiological schizophrenia research.

• First collection of brain tissue for the NISAD 'Gift of Hope' Tissue Donor Program.

• Demonstration of significant decrease in the volume of the frontal cortical gray matter in schizophrenia cases compared to controls. This supports the hypothesis that regional structural changes in the brains of schizophrenia patients may contribute to cognitive clinical deficits.

RESEARCH OUTPUTS

• Twelve publications of NISAD schizophrenia research in peer-reviewed scientific journals with an average impact factor of 3.321. A further five manuscripts were submitted.

• Thirty nine presentations (including six invited) of NISAD schizophrenia research at scientific conferences held in Australia, Japan, Denmark, Germany, France, New Zealand, Canada, UK and USA.

• Twenty grants to the value of over $430,000 were awarded to NISAD and/or NISAD-affiliated scientists to support schizophrenia research initiatives, equipment or travel costs.

OTHER HIGHLIGHTS

• External review panel of internationally recognised experts in schizophrenia research endorsed NISAD's work and innovative structure.

• Baulderstone Hornibrook's M5 East Tunnel dinner raised almost $400,000.

• The NISAD/NSW Health Partnership Project raised $350,000 for the Institute.

• New sponsors joined NISAD's quest for a cure, including St. George Foundation and Deutsche Bank.

• The Mineworkers Trust of the CFMEU contributed $50,000 towards a phosphoimaging machine for NISAD researchers at the University of Wollongong.

• The position of Executive Director was created to capitalise on NISAD's strong growth.

• 'Spare A Thought, Find A Cure' campaign was launched to build awareness and raise funds for NISAD research.

CHAIRMAN'S REPORT

From small acorns, oak trees grow.

What started as the seed of an idea in the minds of a few concerned parents and scientists passionate about the need to spare Australian children the trauma of schizophrenia has now grown into an internationally recognised institute with a number of world-first scientific findings.

With generous support from the community and the fervent efforts of NISAD's Board, management team and staff, annual funding has grown from $200,000 in 1996 to $1.65 million in the 2002 financial year. This represents a leap of 50% on the previous year and takes us just over halfway towards our goal of $3 million per annum.

Employees, primarily scientists, now number 17, and were aided during the year by 12 university students as part of a program to develop those who will provide the discoveries of the future. All are committed to achieving the Institute's goal of beating schizophrenia. Together they made excellent progress in the quest for a cure with a range of exciting new developments.

Following the reconstitution of NISAD's Board with influential leaders from the corporate and scientific community last year, the Institute undertook a number of fundamental initiatives to build on the organisation's sound foundations and achieve long-term incremental growth allowing further acceleration of scientific efforts.

In October 2001, the Board commissioned an external review to provide an objective assessment of the direction and focus of the Institute and its efficiency and effectiveness in carrying out its mission. Two internationally recognised schizophrenia research experts conducted a thorough evaluation of NISAD – Professor Assen Jablenksy (University of WA) and Professor John McGrath (Queensland Centre for Schizophrenia Research).

NISAD is pleased to announce their findings confirm the organisation's excellent operational score-card, a testimony to the skills of the scientific team and the work of Scientific Director, Professor Philip Ward, and Research Manager, Daren Draganic. Recommendations arising from the review will be a critical component in the future strategic research plan for the Institute and will set the blueprint for its swiftly expanding scientific program.

NISAD's Board generously lent their expertise to a strategic planning workshop in November 2001 to determine, in concert with the management team, how best to capitalise on the Institute's exceptional success during its establishment phase. A key outcome was the decision to create the position of Executive Director to lead the organisation's business operations, complementing the efforts of Professor Ward, who continues to manage the research agenda, and Don McDonald, Director of the NISAD/NSW Health Partnership Project which raises awareness and funds to support the scientific activities.

Jackie Crossman was appointed NISAD's Executive Director in late January 2002. With a highly successful international track record in business management, marketing and strategic communications, she worked closely with the Board and Professor Ward to develop a three-year strategic plan aimed at ensuring NISAD's place as an important contributor to global schizophrenia research outcomes. Implementation, review and refinement will continue over the coming exciting period. The 2002 financial year also saw the first application of NSW Health's significantly increased support of NISAD following the announcement in April 2001 by the Minister of Health, the Hon. Craig Knowles, that the Institute would receive $1 million per annum recurrent funding. This crucial development has facilitated greater scientific discovery and provided the secure foundation to build increased community support for NISAD's efforts. The Government's continuing endorsement of NISAD's work continues to be gratefully acknowledged.

The tenacious efforts of Don McDonald have proven invaluable in broadening NISAD's funding base by securing vital support from Government, corporate, union, philanthropic and community organisations.

NISAD is delighted to welcome all our new three-year sponsors, including St. George Foundation and Deutsche Bank, and wholeheartedly thanks those groups and individuals who continue to be steadfast in their support. Of note is the outstanding contribution of management and staff at BT Financial Group who this year donated around $55,000 to NISAD as part of their matching gifts community partnership program.

One of the greatest highlights of the period was the enormously successful fundraising dinner staged by developer Baulderstone Hornibrook in Sydney's M5 East Tunnel prior to its official opening in November. Tribute must be paid to CEO and NISAD Director, Peter Dempsey, who dedicated the evening to the Institute, and to all those who generously gave their time and donations, ultimately raising nearly $400,000 for further urgent research.

Perhaps the most significant event came not from within NISAD, but from Hollywood. Oscar-winning film, A Beautiful Mind, featuring Australasian acting legend, Russell Crowe, in the role of Nobel prize-winner, John Nash, captured the public's attention sparking new interest in and greater understanding of schizophrenia.

Spearheaded by Jackie Crossman, with expert assistance from leading agencies Clemenger Proximity and Porter Novelli, NISAD's new integrated communications campaign was quick to capitalise on a more welcoming environment, building appreciation for the Institute's work and attracting new supporters to the cause.

It is only through such a comprehensive approach – world-class research, effective management, a growing funding base and creative communications to share the vision – that the organisation can deliver against its objectives. NISAD is committed to not just providing hope, but also a real solution to all those who must live with schizophrenia.

Finally, I thank our management team, employees, scientific affiliates, my fellow board members, NSW Health, our valued sponsors and donors and our research participants who made this a truly memorable and outstanding year. In particular I would like to acknowledge the contribution of two Board members who resigned during the year, Tom Rosser and John Fraser. We wish John well in his new position of Global Chairman of UBS Asset Management based in London and hope he will continue to be associated with the efforts of NISAD.

Ian Harrison SC
Chairman

EXECUTIVE DIRECTOR'S REPORT

Where there is ignorance, let there be understanding. Where there is despair, let there be a cure.

NISAD has embarked on a challenging journey to unravel the mysteries of the mind and I am excited at the opportunity to make a contribution in such a vital area of human endeavour.

So much has been achieved in such a short time by all those involved in NISAD's creation that it is critical we build upon our past successes and put in place fundamental strategies for long-term growth and optimum research outcomes which will ultimately translate into a better future for those living with schizophrenia.

Since joining the Institute in January 2002, I have met with many of our stakeholders – people with schizophrenia, parents and carers, scientists, sponsors and Board members – to fully understand their views and expectations of NISAD.

Everyone agreed that the single biggest issue was lack of awareness and understanding of schizophrenia and therefore the role that NISAD plays in finding a cure. The prevailing opinion was that stigma was not merely affecting those living with the illness but also shackling fundraising and scientific efforts.

As a result NISAD embarked upon a multi-faceted long-term strategic plan to build the organisation as a charity of choice, commencing with news media activity surrounding the launch of box office smash, A Beautiful Mind.

Public relations consultancy, Porter Novelli, and direct marketing and advertising agency, Clemenger Proximity, both part of the Clemenger Group, generously gave their expertise to develop and launch NISAD's first major integrated communications program. Under the banner "Spare a Thought, Find a Cure", the campaign comprised radio, television and railway station community service announcements, newspaper and magazine advertisements, direct mail, website banners, news media coverage and street collections.

At least $100,000 worth of free advertising was donated to NISAD with the Clemenger Group giving professional time worth in excess of $100,000 – for this we are most grateful. The Institute also thanks St.George Bank for acting as a vehicle for donations and for displaying posters.

The campaign, a finalist in two categories of the 2002 Australian Direct Marketing Awards, resulted in a major increase in web site hits and information requests. Furthermore, response on the street and in workplaces points to substantially increased support of NISAD as it progressively taps into the public's consciousness.

As part of this effort the organisation worked closely with the Schizophrenia Fellowship of NSW to develop a talent bank of young people with the illness to show the human face of schizophrenia. James, John and Lauren, whose stories are outlined on the inside cover, undertook communications training sessions and subsequently a range of speaking assignments with bravery and professionalism.

Continuing assistance to carer organisations, the Institute also helped ARAFMI NSW to develop a fresh new image and communications material. NISAD Marketing and Publications Director, Alan Tunbridge, worked with great passion and dedication to create a new logo, brochure, community service announcement and newsletter for implementation in the second half of 2002.

NISAD too went through a complete makeover as featured in this publication. At the request of the Board, NISAD's communications team developed a simplified new brand name – NISAD Schizophrenia Research – and a compelling new logo. This will play an integral role in clearly communicating what is for many a complex concept.

Behind the scenes, there have also been changes. In April, NISAD sadly said goodbye to former Director Jim Breene who retired to the Gold Coast. He has toiled long and hard to provide an accounting system of high integrity. Following a transition period, Genevieve Hemsley-Wilken joined as Accountant in the new financial year to handle the increasing workload resulting from NISAD's critical mass.

Let me take this opportunity to commend the Institute's staff for their commitment to their work and thank our Board members for providing their wisdom, time and resources to guide it to greater heights. I look forward to helping NISAD take further enormous strides as it works to ensure that in future young Australians will not be plagued by schizophrenia.

Jackie Crossman
Executive Director

NISAD / NSW HEALTH PARTNERSHIP PROJECT DIRECTOR'S REPORT

In September, the Hon. Craig Knowles MP, Minister for Health advised that he had decided to extend funding for the NISAD / NSW Health Partnership Project for a further 3-years to take it to the end of 2006.

This follows the Minister's decision to grant NISAD $1,000,000 per annum recurrent funding from 1 July 2001.

The Minister's letter confirming the extension of the Partnership Project stated that the achievements in the first 15 months were impressive. He stated that he particularly appreciated the successful program of community presentations that have increased the awareness and understanding of schizophrenia in our society.

Major outcomes of the Partnership Project over the last 12 months include:

• Over 100 workplace and community presentations involving over 7,000 people face to face. This has often included the showing of the NISAD video, 'The Quest for a Cure', which was funded by the Partnership Project.

• Over $350,000 raised to support NISAD research. This has ranged from workplace bucket collections to 3-year corporate sponsorships. Support has come from unions and business as well as philanthropic trusts, Rotary and Lions clubs and community clubs.

• The biggest donation received during the year was $50,000 from the 'Mineworkers Trust'.

• The Partnership Project was also able to play a significant role in the success of the Baulderstone Hornibrook's tunnel event in November 2001, which raised a further $400,000 for NISAD research.

• A widespread campaign on the south coast of NSW with a target of $200,000 to purchase a Betaimager for NISAD researchers who are based at the University of Wollongong. This campaign has linked the university, the union movement, business, workplaces, rotary and lions clubs, the carer's organisations and the media.

• An expansion of submissions to various corporate and philanthropic trusts which has resulted in increasing recognition and success.

• The launch of NISAD's Sponsors and Major Supporters Relationship Program with a presentation by NISAD scientists at a lunch sponsored by NISAD Director, Mr Peter Young of ABN AMRO Australia, held in October last year.

• Continued building of support for the development of Australia's first National Strategic Plan for Psychotic Research.

• An expansion of media coverage, in all its forms, of both schizophrenia and the work of NISAD, which has resulted in increasing community awareness and support.

The Partnership Project intends to continue to build on this success and hopes to considerably expand the outcomes, which have been made possible by the support of NISAD employees and its Directors as well as our growing number of supporters in the community.

Those who suffer from this dreadful illness together with their families are entitled to expect the most urgent attention to find more effective treatments with less side effects as well as hope for the means to prevent and cure schizophrenia. This can only be done by scientific research.

Don McDonald
Project Director

SCIENTIFIC DIRECTOR'S REPORT

The past year has seen substantial progress in the development of NISAD's scientific program. Our success has flowed from enhanced research activity across the spectrum, from clinical studies through to bench-top neuroscience, in collaboration with our university and health service partners.

The External Review conducted by Professors Assen Jablensky and John McGrath was an important milestone for the Institute. It provided the opportunity for all involved to reflect on our past successes and to identify strategic objectives for the future. Whilst highlighting our rapid development since our inception in 1996, the review report identified some important priorities as we move forward. NISAD's senior scientists have undertaken development of a strategic research plan, with the goal of enhancing our collective contribution to schizophrenia research. Multidisciplinary research efforts, building on the successful outcomes that have been achieved within individual programs, will be a key focus. Several new areas have been identified that lend themselves to such an approach.

Acknowledging the contribution of substance use and abuse to the disability associated with schizophrenia and allied disorders, we will implement a systematic research program utilising a range of methodologies. For example, novel receptor ligands will enable the identification and distribution of cannabinoid receptors to be mapped in post-mortem brain tissue from patients with schizophrenia and matched volunteers. These findings will be correlated with functional and structural brain imaging results obtained from patients with schizophrenia and related psychoses, stratified according to their history of substance use and misuse. The results of such neurobiological approaches will be used to inform clinical research projects, such as an analysis of how families and sufferers access dedicated early psychosis treatment programs.

NISAD will also capitalise on new knowledge arising from the Human Genome Project and developments in molecular genetics. Plans are currently underway to develop a DNA Bank, using blood samples obtained from participants in our volunteer schizophrenia research register. This large cohort, most of whom have already been screened using validated diagnostic instruments, will enable us to efficiently acquire a large dataset. NISAD scientists will apply the latest microarray or 'gene-chip' technology to simultaneously screen thousands of genes, to identify those linked to schizophrenia. Interpretation of results obtained from these human studies will be greatly facilitated by research in animals administered anti-psychotic drugs using the same microarray methods. This will help us to distinguish changes in gene expression resulting from treatment with antipsychotic medication from those that may reflect aetiological factors. Such corroborative data will be essential in distinguishing 'signal' from 'noise' in the vast quanta of data generated using these new genetic research methods.

NISAD's decision to support development of a transgenic mouse model, with a regionally selective 'knockdown' of the NMDA NR1 glutamatergic receptor, is on track to deliver the first genetically modified animals for testing in early 2003. Developed in collaboration with the Garvan Institute and the John Curtin School of Medical Research, these animals offer the opportunity for a wide variety of experimental studies to be undertaken, and the potential for new research collaborations to be developed with recent appointees at the Garvan (Dr Bryce Vissell) and the University of Sydney (Dr Jasmine Henderson). Results from these studies will be able to be linked with those obtained in studies of the effects of chronic PCP administration in rats, and modulation of these effects by typical and atypical antipsychotic drugs. These studies are being conducted by Kelly Newell, a NISAD PhD student at the University of Wollongong whose work is supported by the St.George Foundation.

NISAD is also committed to building on the important research infrastructure resources developed over the past five years – the volunteer schizophrenia research register, and the post-mortem tissue resource centre and associated tissue donor program. We plan to actively work towards integration of the databases associated with the register and tissue donor program, and to promote the opportunity for participants in one program to also enroll in the companion program. This will ensure maximum use of clinical and diagnostic information across both programs.

As the above examples illustrate, NISAD is working towards maximising the value-added opportunities of bringing together scientists from diverse backgrounds and their clinical colleagues in pursuit of common goals. We believe such integrative research programs offer the best opportunities for delivering research outcomes, in terms of a better understanding of the causes of the schizophrenia, and the development of new and improved treatment.

The research highlights outlined in this report, and in the following pages, would not be possible without the creativity, dedication, and enthusiasm of NISAD scientific participants, including our staff, scientific affiliates and the growing numbers of postgraduate students. Their work extends well beyond the boundaries of traditional scientific endeavours, to encompass the crucial task of communicating our work to key stakeholders, including those directly affected by schizophrenia and allied disorders, and those in the wider community who support our work via sponsorship or donation. The broad-based support that flows from an understanding of the impact of schizophrenia on society, and the role of research in reducing schizophrenia-related disability, has been an essential component of our success to date, and maintaining and building on this support will be a major goal over the forthcoming year.

Associate Professor Philip B. Ward
Scientific Director

CLINICAL MEASUREMENT PANEL REPORT

Clinical Measurement Panel

Scientists/Centres

Professor Vaughan Carr (Convenor), University of Newcastle
Professor Stanley Catts, University of New South Wales
Associate Professor Scott Clark, South Western Sydney Area Health Service
Mr Daren Draganic, NISAD Research Manager
Ms Joanne Gorrell, Royal North Shore Hospital
Dr Anthony Harris, Greater Parramatta Mental Health Service
Dr Carmel Loughland, NISAD Clinical Measurement Coordinator
Dr Louise Nash, North Shore Health Service (from October, 2001)
Mr Jim Sheedy, NISAD Research Officer
Dr Nadia Solowij, University of Wollongong (from May, 2002)
Associate Professor Philip Ward, NISAD Scientific Director

Aim

The Clinical Measurement Panel coordinates the recruitment and diagnostic assessment of NISAD Schizophrenia Research Register participants, promotes the Register to clinicians and researchers, provides training in clinical assessment techniques and undertakes clinical research initiatives using NISAD collaborative links.

NISAD Schizophrenia Research Register

The NISAD Schizophrenia Research Register, a volunteer research database for people with schizophrenia, their family members and people with affective disorder, has grown significantly over the past year. More than 800 people are now enrolled on the Register with an additional 300 joining during the past year. The major reasons for this growth included the development and broadcast of a new television community service announcement and presentations at consumer group and scientific meetings. A large percentage of the new volunteers are family members of schizophrenia patients, which provides NISAD with large numbers of an important new group of research subjects.

To date 40% of volunteers have been clinically assessed and approximately 330 Register volunteers have participated in a schizophrenia research study. In the past year the Register has supported eleven schizophrenia research studies in Sydney and Newcastle. Importantly, 80% of Register volunteers agree to participate in research when contacted.

The success of the NISAD Schizophrenia Register has led to other national (Hunter Medical Research Institute, Newcastle) and international (Centre for Addiction and Mental Health, Toronto, Canada) groups contacting NISAD for assistance in the development of similar facilities.

In the coming year NISAD intends to initiate a DNA Bank for schizophrenia research building on the success of the Register in collaboration with the Hunter Medical Research Institute and the Centre for Mental Health Studies, University of Newcastle. Volunteers from the Schizophrenia Research Register will be invited to donate a blood sample from which DNA, RNA and lymphocytes will be extracted and stored in Newcastle. Researchers will be able to apply for access to this material for research projects investigating the genetics of schizophrenia using procedures similar to those currently in place for the NISAD Register. In the future samples from other mental disorders and healthy controls will also be included in the DNA Bank.

Visual scanpath research in schizophrenia

NISAD has continued to support postgraduate clinical research initiatives. Dr Carmel Loughland recently completed investigating visual scanpaths in response to facial emotions in people with schizophrenia, first-degree relatives and healthy control subjects. This research provides evidence of 'restricted' visual scanning and a reduced attention to salient facial features (eyes, nose, mouth) in schizophrenia subjects, and an attenuated form of this scanning pattern in the first-degree relatives of the schizophrenia probands. These results offer first evidence that visual scanpath dysfunction may be a trait marker in schizophrenia psychosis. In the past year, Dr Loughland was successful in obtaining grant funding to purchase a ViewPoint eye tracking system and will initiate further research in 2002-2003 to examine scanpath abnormalities in other "at risk" populations.

The NISAD Schizophrenia Research Register has also provided volunteers for a program of research investigating the perception of facial threat in schizophrenia by NISAD-affiliated scientist Dr Melissa Green at the University of Sydney. These studies recorded visual scanpaths for threat-related and non-threatening facial expressions in relation to the specific symptom of delusions. The most severe scanpath disturbances were found for threat-related faces (anger, fear) in clinically deluded schizophrenia participants and in psychiatrically healthy, yet delusion-prone individuals, suggesting that aberrant attention to threat-related faces may be involved in the development of delusions. In addition, a case study of one schizophrenia patient showed that severe scanpath disturbances were apparent during the acute phase of psychosis, characterised by minimal fixations and the tendency to avoid gazing at facial features. However, when the same participant was tested during remission of delusions, the scanpath abnormalities were less dramatic, with a more 'normalised' pattern of viewing facial features. The case study findings suggest that scanpath abnormalities in schizophrenia may be modulated by changes in delusional severity.

The impact of differences in sampling sources on schizophrenia research

Dr Carmel Loughland, Prof. Vaughan Carr and colleagues undertook a program of research examining sampling bias and recruitment source impacts on schizophrenia research. This initiative examined differences in demographic, psychosocial, clinical and service use profiles between groups of people with schizophrenia recruited from the Schizophrenia Research Register, family practitioners, community mental health and psychiatric inpatient services. The study concluded that subjects recruited from community mental health and inpatient units may not be representative of the larger population of people with schizophrenia, and that primary care agencies and volunteer research registers may provide valuable, complementary recruitment sources for researchers who tend to rely largely on samples drawn from mental health service contexts.

Australian schizophrenia norms for RBANS

Dr Carmel Loughland and Mr Jim Sheedy have continued a study examining the performance of Register volunteers on the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS). The RBANS is an assessment instrument that is used to determine a person's current neuropsychological status and is part of a clinical assessment battery undertaken by the Schizophrenia Research Register. To date, there have been no RBANS data published on Australian schizophrenia sample, and the only available data is that collected using a small schizophrenia sample in the USA. This study will report on a sample of more than two hundred Australian Register volunteers. This research has already drawn interest from psychologists at the South Australian Mental Health Services who routinely collect RBANS data as part of their assessment protocol and collaboration with this group is currently being explored.

The neurobiology of substance use and psychosis

Numerous studies have demonstrated high rates of lifetime substance abuse in people with schizophrenia that significantly worsens the outcomes for these individuals. However, it is not known to what extent these effects are a consequence of substance use, non-compliance with treatment, or some combination of the two since substance abuse and non-compliance frequently occur together. Similarly, it is not known how best to treat persons with schizophrenia and substance abuse co-morbidity. The causal role of substance abuse in relation to psychotic disorders is also not known.

The Clinical Measurement Panel therefore commissioned Dr Nadia Solowij to review the current literature on the neurobiology of substance use co-morbidity in schizophrenia. The aim of the review is to determine the gaps in the knowledge base in this area in order for NISAD to initiate a focused program of research in 2002-2003.

Dr Carmel Loughland has also continued a collaboration with researchers from the Centre for Mental Health Studies (CMHS), University of Newcastle on an initiative investigating substance abuse and crime profiles across three populations of people with psychiatric disorder. Data from five databases housed at the CMHS (including the Register) has been drawn on for this research initiative.

Medication adherence: developing clinical strategies

Mr Jim Sheedy commenced a collaboration with mental health nurses at the Cumberland Centre that aims to review the issue of medication compliance for schizophrenia patients and the development of clinical strategies to encourage compliance. The review focuses on issues thought to be salient in the development of clinical measurement tools and educational programs that may enhance medication adherence in people with a mental illness as well as considerations for nursing interventions regarding patient education.

Clinical assessment training

In the past year the following training courses in aspects of schizophrenia research have been facilitated by NISAD:

• A workshop the National Adult Reading Test (NART) and Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) held at the Cumberland Centre in October 2001.

• A Scales for the Assessment of Positive and Negative Symptoms (SAPS/SANS) training course held at the Centre for Mental Health Studies, Newcastle in February 2002.

• A Diagnostic Interview for Psychosis (DIP) workshop for clinicians held at the Centre for Mental Health Studies, Newcastle in February 2002.

• A workshop on OH&S issues in regards to research in people with schizophrenia for Psychology staff at University of Newcastle in April 2002

NEUROBIOLOGY PANEL REPORT

Neurobiology Panel

Scientists/Centres

Associate Professor Loris Chahl, University of Newcastle
Dr Mary Collins, University of Sydney
Dr Gavin Dixon, NISAD Research Officer
Mr Daren Draganic, NISAD Research Manager
Professor Peter Dunkley, University of Newcastle
Professor Clive Harper, University of Sydney
Ms Tina Hinton, NISAD/Rebecca Cooper Scholar
Associate Professor Xu-Feng Huang, University of Wollongong
Professor Graham Johnston (Co-Convenor), University of Sydney
Professor George Paxinos, University of New South Wales
Professor Peter Schofield (Co-Convenor), The Garvan Institute of Medical Research
Professor Rodney Scott, University of Newcastle
Dr Paul Tooney, NISAD Senior Research Officer
Associate Professor Philip Ward, NISAD Scientific Director
Dr Katerina Zavitsanou, NISAD Senior Research Officer

Aim

The Neurobiology Panel targets specific brain systems to identify the abnormally functioning neurons and neurotransmitters that could be responsible for the hallucinations, delusions, thought disorders and other symptoms of schizophrenia as well as isolating the defects in gene action which may be the cause of the disease. The Panel has developed four Centres for Collaborative Human Brain Research in NSW that conduct neurobiological schizophrenia research and promote interest in neuroscience research in schizophrenia to University students.

The role of tachykinin NK1 and NK3 receptors in schizophrenia

Research into the role of the tachykinin system in schizophrenia has continued at the BT Financial Group Centre for Collaborative Human Brain Research, University of Newcastle. Preclinical models suggest a role for antagonists to the tachykinin NK1 receptor in the treatment of schizophrenia. Dr Paul Tooney has previously demonstrated significant differences in the distribution of NK1 receptors between cases of schizophrenia and normal controls in the prefrontal cortex of the human brain. In the past year investigation of tachykinin NK3 receptors in this region has continued. Dr Tooney also continued a further study that aims to determine whether the distribution of tachykinin receptors is altered by anti-psychotic drug treatment. This initiative will provide information on whether the finding of an altered distribution of NK1 receptors in human brain was due to schizophrenia or antipsychotic medication.

Dr Tooney has also continued examining the distribution of tachykinin receptors in the amygdala of normals and cases of schizophrenia. Results from the analysis of normal controls showed positive staining for NK1 and NK3 receptors in the amygdala, which has not been demonstrated previously. Investigation of the schizophrenia cases has commenced.

Investigating changes in gene expression in psychosis using genetic technology

Dr Paul Tooney, Prof. Rodney Scott, Prof. Vaughan Carr and Assoc. Prof. Loris Chahl were successful in obtaining a major grant from the Hunter Medical Research Institute's Clinical Neuroscience Program to initiate a program of research that aims to investigate changes in gene expression in psychosis using microarray technology. The research will compare gene expression in control subjects to that of subjects with schizophrenia using human brain

tissue, peripheral blood lymphocytes and fibroblasts. Two PhD students have been appointed to take forward this research program. Dr Tooney and Prof. Scott were also awarded additional grant funding to purchase computers and software needed to analyse the microarray data.

Cortico-thalamic dysfunction in schizophrenia

A group of researchers at the NISAD Collaborative Centre for Human Brain Research, University of Sydney have continued to develop an integrated program of research investigating the role of the Papez circuit in schizophrenia. Led by Dr Gavin Dixon, the research program is investigating a circuit of interconnected brain regions that includes the anterior thalamus, posterior cingulate cortex, mamillary bodies and subiculum. Papez circuit neuropathology has been associated with conditions such as Alzheimer's disease and alcohol related brain damage. Specific deficits in the encoding and retrieval of episodic memory have also been correlated with Papez circuit damage. Numerous other reports highlight the presence of episodic memory dysfunction in schizophrenia.

Previous research undertaken by Dr Dixon has demonstrated no significant difference in thalamic interneurons displaying the GAD phenotype between the schizophrenia and control groups. This finding suggests that previously reported neuronal loss within the anterior thalamus of individuals diagnosed with schizophrenia is not selective for neuronal phenotype and supports the hypothesis of a neurodevelopmental basis for schizophrenia.

Two studies are investigating the posterior cingulate cortex (PCCx), a brain region that is reciprocally connected to the anterior thalamus. The first initiative has focused on characterising local circuit neurons of this region. Preliminary results have demonstrated a trend of fewer parvalbumin positive neurons in the PCCx of schizophrenia cases, a finding that may be related to reduced afferent input from the anterior thalamus. Further research is examining the interstitial cells in the PCCx, neurons that play a role in cortical development and which persist in the adult. Several previous studies have found altered patterns of interstitial cell distribution in the subcortical white matter in the brains of individuals diagnosed with schizophrenia.

Previous research by NISAD-affiliated scientist Ms Therese Garrick found no reduction in total neuron numbers in the mamillary region of schizophrenia-affected brains. The mamillary region plays an important role in memory processing and learning and as these functions are often seriously affected in schizophrenia, the collaborative group at the University of Sydney Centre commenced a study aiming to characterise a sub-population of neurons (GABAergic interneurons) in mamillary bodies in schizophrenia and control cases. These interneurons were selected for investigation because they are known to play an important role in the regulation of complex behaviours. The research team found a greater density of GABAergic interneurons in the schizophrenia group compared to controls. Similar NISAD findings have been reported in other key brain regions such as the thalamus and frontal cortex, which are also involved in memory function. As GABAergic interneurons exert an inhibitory effect on brain activity, these findings may offer a new clue to the puzzle of memory dysfunction in schizophrenia.

The role of the anterior cingulate cortex in schizophrenia

Building upon previous research conducted at the NISAD Centre for Collaborative Human Brain Research, University of Wollongong, Dr Katerina Zavitsanou has continued to investigate the anterior cingulate cortex (ACC), a brain area that plays an important role in normal cognition, particularly in relation to attention and motivation. Since these functions are altered in schizophrenia it has been suggested that the ACC might be a site of primary pathological change. Previously, Dr Zavitsanou discovered a reduction of antipsychotic-sensitive binding sites in the ACC of patients with schizophrenia, which could lead to an imbalance in neurotransmitter regulation in this region and contribute to the emergence of some symptoms of schizophrenia.

Based on these results Dr Zavitsanou performed a study that examined receptors of the excitatory neurotransmitter glutamate, in the ACC in schizophrenia. Excitatory synaptic activity conveyed by glutamate is mediated by three pharmacologically defined subtypes of ionotropic receptors; NMDA, AMPA and kainate. Results demonstrated significantly increased AMPA and NMDA receptors in the upper layers of the ACC in schizophrenia cases with no change observed with kainate. These results suggest that ionotropic glutamate receptors are differentially altered in the ACC in schizophrenia and add to a growing body of literature that supports a dysfunction of excitatory activity in the ACC in schizophrenia.

Dr Katerina Zavitsanou also secured a grant from the Australian Institute of Nuclear Science and Engineering to commence a collaborative study with scientists from ANSTO that aims to examine changes in the muscarinic receptor system in the ACC. This receptor system has been implicated in the pathophysiology of schizophrenia. Tissue was obtained from the Stanley Foundation Neuropathology Consortium for this study that will commence in 2002-2003.

Animal models of schizophrenia-like behaviour

Understanding of many human diseases has been advanced through the use of experimental animal models. Although schizophrenia is a uniquely human disease, NISAD scientists have commenced the development of various animal models that display schizophrenia-like behaviours and pathologies. The data obtained from studies in these animals can be translated to the understanding of the behaviour of schizophrenia in humans. The resultant behavioural and genetic information obtained from these models could provide substantial benefits to sufferers of schizophrenia through the development of better diagnosis, new treatments and preventative strategies.

The development of an NMDA receptor gene knock down mouse model of schizophrenia has continued under the direction of Prof. Peter Schofield at the NISAD Centre for Molecular Brain Research. The development of these genetically modified mice is a collaboration between NISAD, the Garvan Institute and the John Curtain School of Medical Research. This model is of considerable interest as these mice show a number of behavioural alterations that are ameliorated by anti-psychotics. The Centre aims to produce the mice in early 2003 for NISAD researchers to utilise in schizophrenia studies thereafter.

Assoc. Prof. Xu-Feng Huang, Dr Katerina Zavitsanou and Assoc. Prof. Philip Ward were successful in obtaining funding to develop an animal model that could be used to investigate schizophrenia medication induced obesity and related metabolic disorders. The model will be used to design better treatment regimes for schizophrenia patients that limit the side effects caused by atypical antipsychotic drugs.

Neurobiology research students

NISAD has recognised the need to develop young schizophrenia researchers, as they are the scientists who will provide the discoveries of the future. Therefore in the past year the Institute has supported thirteen students undertaking neurobiological schizophrenia research studies at NISAD's Collaborative Centres for Human Brain Research at the Universities of Sydney, Newcastle and Wollongong. This has included six PhD students, four honours students and three Summer Student Scholars.

A good example of the value of this support has been the career of current PhD scholar Ms Kelly Newell. Kelly initially received a NISAD Summer Student Scholarship in 2000. Subsequently she completed her Science Honours degree at the NISAD Wollongong Centre in 2001 and has now commenced her PhD in schizophrenia research.

Research equipment support

NISAD has continued to provide funding for the purchase of vital equipment needed to support the Institute's neurobiological research programs. This has included a digital

camera and computing equipment to create and manipulate images of post mortem tissue used in neurobiological studies at the NISAD Newcastle Centre and refrigerators for storage of neurobiological consumables at the Wollongong and Sydney Centres. Facilitated by Don McDonald, NISAD initiated a campaign to raise $200,000 to purchase a betaimager for neurobiological studies. Thus far over $75,000 has been raised. The campaign will continue in the 2002-2003 period.

NEUROIMAGING PANEL REPORT

Neuroimaging Panel

Scientists/Centres
Mr Daren Draganic, NISAD Research Manager
Dr Allison Fox, University of Western Australia
Mr Patrick Johnston, University of Newcastle
Dr Frini Karayanidis, University of Newcastle
Dr Jim Lagopoulos, NISAD Research Officer
Professor Pat Michie, University of Newcastle
Mr Paul Rasser, NISAD Research Officer
Dr Ulrich Schall, University of Newcastle
Assistant Professor Paul Thompson, University of California Los Angeles
Associate Professor Philip Ward, University of New South Wales
Dr Leanne Williams (Convenor), University of Sydney

Aim

The Neuroimaging Panel utilises state-of-the-art neuroimaging techniques to identify the brain systems responsible for the functional disorders observed in schizophrenia. The Panel provides technical support and assistance for the implementation of neuroimaging research, develops and implements stimulus delivery hardware and analysis software and undertakes original neuroimaging schizophrenia research.

Functional magnetic resonance imaging (fMRI) research in schizophrenia

The Neuroimaging Panel has continued to support fMRI research in schizophrenia conducted by NISAD imaging groups located in Sydney and Newcastle. FMRI is a non-invasive method of examining brain activation accompanying performance of cognitive tasks. Covert orientation of attention occurs when shifts in attention are made without the subject moving their gaze to look directly at an image. Several brain areas have been implicated in directing attention, a function that is known to be affected in schizophrenia. However, the full extent of the networks involved requires further elucidation. Dr Jim Lagopoulos therefore commenced a study examining the link between eye movement abnormalities and functional brain activity via fMRI. Pilot scanning was undertaken in normal controls using a covert orientation of attention paradigm and preliminary analyses indicated activations in distributed networks including superior and middle frontal gyri, cingulate gyrus, inferior parietal lobule and precuneus. Sub-cortical activations were seen in dorsal and anterior thalamic regions and other activations of significance included the insula, lingual and parahippocampal gyri. In the coming year the study will be extended to examine people with schizophrenia.

Deficits in auditory sensory memory in patients with schizophrenia, indicated by reduced mismatch negativity (MMN) amplitude, has become one of the most consistent findings in event-related potential research. NISAD has continued to provide infrastructure support for Mr Craig Little's PhD study (supervised by Assoc. Prof. Philip Ward) that is examining MMN in schizophrenia using ERPs and fMRI. In the past year this study has used fMRI to successfully identify functional neural networks activated by auditory sensory memory processing in healthy volunteers. Future research will combine a similar fMRI paradigm with event related potential indices of pre-attentive processing to further explore the nature of early information processing deficits in patients with schizophrenia and early psychosis.

Previous research by Dr Lea Williams, Dr Jim Lagopoulos and collaborators utilised fMRI to demonstrate reduced limbic system activity in patients with schizophrenia compared to controls in response to threat-related expressions (via a 'facial perception paradigm'). These results suggested that schizophrenia subjects may inhibit the normal limbic response to threat. The experience and appraisal of threat is essential to human survival. Lesion

evidence suggests that the subjective experience of fear relies upon amygdala-medial frontal activity (as well as autonomic arousal), whereas the factual context of threat stimuli depends upon hippocampal-lateral frontal activity. This amygdala-hippocampus dissociation has not previously been demonstrated in vivo. To explore this differentiation, Dr Williams, Dr Lagopoulos and collaborators employed functional magnetic resonance imaging (fMRI) and simultaneous skin conductance response (SCR) measures of arousal, while subjects viewed fearful versus neutral faces. The fMRI-with arousal and fMRI-without arousal data provided a distinct differentiation of amygdala and hippocampal networks. Amygdala-medial frontal activity was observed only with SCRs, whereas hippocampus-lateral frontal activity occurred only in the absence of SCRs. The findings provide direct evidence for a dissociation between human amygdala and hippocampus networks in the visceral 'experience' versus declarative 'fact' processing of fear.

Structural magnetic resonance imaging (sMRI) research in schizophrenia

Cannabis has proven to be one of the most commonly abused drugs by schizophrenia patients. However, the causal role of cannabis in relation to psychotic disorders has not been confirmed. Whilst structural brain changes have been reported in people with schizophrenia and often in those with a history of alcohol abuse, there has been little evidence for similar effects among long-term cannabis users. Prof. Philip Ward and collaborators have utilised volumetric MRI scans to examine volunteers with a history of regular cannabis use (several times/week) for greater than five years, in comparison to a group of age- and sex-matched healthy volunteers. Results demonstrated a trend for left and right cerebellar volume estimates to be smaller in cannabis users compared to healthy volunteers. However, cerebellar subregions were not significantly different for cannabis users and healthy volunteers. Future studies aim to examine people with schizophrenia who use cannabis.

NISAD Brain Atlasing Initiative

This collaborative initiative between NISAD, UCLA and the University of Essen aims to collect and compare structural and functional MRI data (using the 'Tower of London' paradigm) from first-episode schizophrenia patients and controls. This will be the first time this type of comparison has been made.

Mr Paul Rasser returned to Australia from UCLA in January 2002 having spent approximately nine months receiving training in the LONI analysis techniques from Prof. Paul Thompson. In the past year sMRI data from 38 subjects (including 21 first episode patients) was acquired by NISAD neuroimaging groups located in Sydney and Newcastle and affiliated researchers in Germany. The analysis of the structural data using the LONI technique is ongoing. Preliminary results from an initial analysis of the functional data in ten first episode patients versus ten controls demonstrated activation in the right cerebellar, bilateral occipito-parietal and right dorsolateral prefrontal regions of both groups during task performance, with greater intensity of activation in the control group. This is consistent with previous research. In the coming year the fMRI and sMRI data will be brought together and an analysis of structure and function will be undertaken.

Magnetic resonance spectroscopy (MRS) research in schizophrenia

NISAD has supported a new line of research involving a scanning technique called Magnetic Resonance Spectroscopy (MRS), which can identify the types and amounts of chemicals in specific brain areas. Following previous NISAD research that demonstrated decreased fatty acid levels in schizophrenia brains the Neuroimaging Panel provided infrastructure support to a collaborative research team led by Ms Sue Ellen Holmes and Assoc. Prof. Philip Ward. This pilot longitudinal study investigated the impact polyunsaturated fatty acid supplementation (fish oil) had on brain phospholipid membranes (using MRS) and clinical measures, including the positive and negative symptoms and medication side-effects, in schizophrenia. Results from this small 12-week pilot study indicated that the fish oil supplement increased the levels of fatty acids in the brain, and improved both schizophrenia symptoms and medication side effects.

NISAD also supported a pilot study at Westmead Hospital examining the feasibility of using MRS to investigate the neurochemistry of first episode psychosis. Previous research has noted that levels of N-Acetyl Aspartate (NAA) relative to Creatine (Cr) in the temporal and frontal lobes could be used to detect any abnormalities in neuronal membranes where neurotransmitter receptors are located. Dr. Lavier Gomes and NISAD-affiliated scientist Dr. Anthony Harris have studied the frontal lobes and basal ganglia in a group of healthy volunteers. The Westmead team will now apply the MRS methodology to subjects with first episode psychosis.

Neuroimaging research in bipolar depression – an allied disorder of schizophrenia

Prof. Philip Ward and Dr Jim Lagopoulos have collaborated with Dr Gin Malhi and other researchers from the Mood Disorders Unit, University of NSW in a study that investigated the cognitive generation of affect in patients with bipolar depression using fMRI. Limbic-cortical dysregulation in depression has been investigated using a variety of methodologies including functional imaging. However, the neural basis of abnormal affect modulation is still poorly understood and is likely to be different across unipolar and bipolar depression. The study demonstrated a different pattern of activation in bipolar depressed patients to that found in healthy subjects and that reported in unipolar depressed patients, therefore suggesting that differential patterns of activation across phenotypes may be useful in their clinical/neuro-biological distinction and treatment.

Neuroimaging research students

NISAD has continued to provide support for a PhD scholar undertaking a neuroimaging research study in the Departments of Psychology and Psychiatry, University of Western Australia. The aim of Mr Aaron Kent's project is to utilise event-related potentials and functional MRI to investigate patients with schizophrenia, family members and controls, using tasks that assess the role of inhibitory processing in relation to sustained attention and working memory.

Neuroimaging analysis techniques training

In the past year NISAD supported the attendance of Prof. Philip Ward and Dr Jim Lagopoulos at a training course statistical parametric mapping (SPM), a neuroimaging analysis program in Sendai, Japan.

Research equipment support

NISAD has continued to provide funding for the purchase of vital equipment needed to support the Institute's neuroimaging research programs. This has included an SGI workstation and notebook computer required for analysis of MRI data and other computing requirements of the Brain Atlasing Initiative. NISAD also funded a server located at the Central Office. The server is available for all NISAD-affiliated scientists to store data from their schizophrenia research initiatives and will be of particular use to the Neuroimaging Panel.

TISSUE RESOURCE CENTRE COMMITTEE REPORT

Tissue Resource Centre Committee

Scientists/Centres

Ms Lisa Azizi, NISAD Research Assistant
Ms Margaret Boyes, NISAD Tissue Donor Program Coordinator
Associate Professor Scott Clark, South Western Sydney Area Health Service
Dr Gavin Dixon, NISAD Research Officer
Mr Daren Draganic, NISAD Research Manager
Mr Andrew Fortis, National Institute on Alcohol Abuse and Alcoholism
Ms Therese Garrick, National Institute on Alcohol Abuse and Alcoholism
Professor Clive Harper (Convenor), University of Sydney
Associate Professor John Hilton, Department of Forensic Medicine
Professor Graham Johnston, University of Sydney
Dr Maria Sarris, NISAD Tissue Resource Centre Coordinator
Associate Professor Philip Ward, NISAD Scientific Director

Aim

The aim of the NSW Tissue Resource Centre is to collect, store and distribute fixed and frozen brain tissue that is well characterised both clinically and pathologically for neuropsychiatric research projects. The focus for the collection is cases with schizophrenia, other major psychiatric disorders and normal control cases that provide an important comparative group. To help facilitate this collection, the Committee has also developed a Tissue Donor Program with pre-mortem diagnosis and assessment.

NSW Tissue Resource Centre

The NSW Tissue Resource Centre (TRC), a facility for the collection, storage and distribution of well characterised fixed and frozen human brain tissue for neuropsychiatric research, has continued to grow during the past year. Following renewed ethics committee approval in October (which includes next of kin verbal consent for donation on the day of autopsy) approximately thirty new collections have occurred. In the past year tissue has been requested and supplied for seven schizophrenia research studies in New South Wales, Queensland and Western Australia.

A review of the development of the NSW TRC by Dr Maria Sarris and colleagues was published in *Pathology*. This paper outlined the protocols that are in place for the NSW TRC and provided an indication of the past, present and future directions of research, highlighting the breadth of scientific techniques that can be applied to this material. Dr Gavin Dixon and Prof. Clive Harper were also invited to present on the TRC at the Second Asia Pacific Forum on Brain Banking held in Fukushima, Japan in 2001.

The NISAD 'Gift of Hope' Tissue Donor Program

The NISAD Tissue Donor Program (TDP) enables individuals with schizophrenia and those without a mental illness to indicate their willingness to donate their brain for research studies in schizophrenia after death. The benefit of this program is that donors are tested on a range of clinical and neuroimaging investigations once enrolled and the results of such studies are available for later correlation with post-mortem findings.

In the past year an additional thirty volunteers have indicated their interest in joining the TDP, taking the total number of donors to over one hundred. Thirty donors have now been clinically assessed and consented. NISAD's decision to seek consent from the next of kin, as well as the donor, together with the extensive assessment procedures has meant the process of enrolling donors is an intensive and time consuming process. The first collection of brain tissue for the TDP occurred in January 2002.

In January 2002 NISAD employed Ms Lisa Azizi as a Research Assistant to focus on supporting enrolments in the TDP and procedures of the TRC. Mr Jim Sheedy and Ms Therese Garrick provided additional support for TDP enrolments. A paper by Ms Magaret Boyes and TDP Patron Ms Marilyn Mitchell describing researcher and consumer viewpoints on the TDP and ethical issues involved in brain donation was published in the Proceedings of the Australian Institute of Health Law and Ethics Conference.

Sub-regional quantitative analysis of brain volumes in schizophrenia

Previous research by Dr Maria Sarris has demonstrated regional structural changes in the brains of schizophrenia patients. Specifically, decreased cortical gray matter volumes and increased white matter volumes in the cerebral hemispheres of the schizophrenia group were shown, in comparison to normal controls. In the past year this study was expanded to delineate and quantitate regional volumes of cerebral hemispheres to further characterise these documented volumetric changes in schizophrenia. Results demonstrated a significant decrease in the volume of the frontal cortical gray matter in the schizophrenia group. This data support the hypothesis that there are regional structural changes in the brain in schizophrenia patients and these changes may contribute towards cognitive clinical deficits.

The diagnostic accuracy of the modified Composite International Diagnostic Instrument (CIDI) in a clinical sample of psychotic disorders

The CIDI is a structured diagnostic instrument that can be administered by a lay-interviewer. Recently, the CIDI psychosis module was modified in an effort to improve diagnostic accuracy. Ms Lisa Azizi, Prof. Stan Catts and collaborators conducted a study where patients with a history of psychotic disorder, were independently interviewed, using the modified CIDI and the Schedule for Clinical Assessment in Neuropsychiatry (SCAN) - a semi-structured interview with comprehensive coverage of the symptoms of psychotic disorder, that is administered by a clinician. Diagnostic accuracy was measured by comparing the diagnoses the CIDI generated, against the diagnoses generated by the SCAN. Results suggest that the original CIDI psychosis instrument does tap into psychosis but its diagnostic accuracy for schizophrenia in clinical samples is unsatisfactory. This suggests the CIDI does have utility as a screener for psychotic symptoms.

Using our Brains Tissue Donor Program

Initiated by NISAD-affiliated scientist Prof. Clive Harper, the "Using our Brains" program encourages people without a mental illness to donate their brain for research following death. The NISAD "Gift of Hope" program's background materials contributed substantially to the development of this program and the two will work in tandem. The "Using our Brains" program was launched at NSW Parliament House in April and over 1,500 donors have expressed interest in joining the program from around Australia.

PUBLICATIONS

Journal Articles

NISAD support played a vital role in the development of the schizophrenia research initiatives that led to the submission and publication of the following manuscripts in peer-reviewed journals.

PUBLISHED

Loughland C, Carr V, Lewin T. The NISAD Schizophrenia Research Register: Why do we need a database of schizophrenia volunteers? *Australian and New Zealand Journal of Psychiatry* 2001; 35: 660-667.

Williams LM, Phillips ML, Brammer MJ, Skerrett D, **Lagopoulos J**, Rennie C, Bahramali H, Olivieri G, David AS, Peduto A, Gordon E. Arousal dissociates amygdala and hippocampal fear responses: Evidence from simultaneous fMRI and skin conductance recording. *NeuroImage* 2001; 14: 1070-1079.

Johnston P, Katsikitis M, **Carr V**. A generalised deficit can account for problems in facial emotion recognition in schizophrenia. *Biological Psychology* 2001; 58: 203-227.

Dixon G, Harper C. An analysis of GAD immunoreactivity elements in the anterior thalamus of the human brain. *Brain Research* 2001; 923: 39-44.

Boyes M, Mitchell M. Volunteer brain donation after death for schizophrenia research: consumer and researcher viewpoints. Published on line in *Proceedings of the Australian Institute of Health, Law and Ethics 6th Annual Conference*, Melbourne, Australia, July 2001 (http://www.law.unimelb.edu.au/aihle/proceedings.html#sixth)

Loughland C, Williams L, Gordon E. Visual scanpaths to positive and negative facial emotions in an outpatient schizophrenia sample. *Schizophrenia Research* 2002; 55: 159-170.

Carr V, Lewin T, Barnard R, Walten J, Allen J, Constable P, Chapman J. Comparisons between schizophrenia patients recruited from Australian general practices and public mental health services. *Acta Psychiatrica Scandinavica* 2002; 105: 346-355.

Zavitsanou K, Huang XF. Decreased [3H] spiperone binding in the anterior cingulate cortex in schizophrenia: an autoradiographic study. *Neuroscience* 2002; 109: 709-716.

Sarris M, Garrick T, Harper C. An Australian Experience in Brain Banking: the New South Wales Tissue Resource Centre. *Pathology* 2002; 34: 225-229.

IN PRESS

Loughland C, Williams L, Gordon E. Schizophrenia and affective psychosis show different visual scanning behaviour for faces: A trait verses state-based distinction. *Biological Psychiatry* (in press).

Loughland C, Williams L, Gordon E. Visual scanpath dysfunction in first-degree relatives of schizophrenia probands: evidence for a vulnerability marker. *Schizophrenia Research* (in press).

Zavitsanou K, Huang XF. Selective alterations of iontropic glutamate receptors in anterior cingulate cortex in schizophrenia. *Neuropsychopharmacology* (in press). Published online http://www.acnp.org/citations/Npp040502279.

SUBMITTED

Johnston P, Katsikitis M, Lewin T. Assessing the validity of the FACEM facial affect parameterisation scheme through neural network analysis. *Behaviour Research Methods, Instruments and Computers* (submitted).

Lagopoulos J. A system for recording artifact-free conductance responses in the MRI scanner. IEEE *Transactions on Biomedical Engineering* (submitted).

Lagopoulos J, Gordon E, **Ward PB**. Delineating novelty from target detection networks: a simultaneous event-related fMRI and skin conductance study. *Neuroimage* (submitted).

Williams L, Loughland C, Green M, **Harris A**, Gordon E. Improved emotion perception in schizophrenia: An eye movement study comparing treatment with risperidone versus haloperidol. *Schizophrenia Research* (submitted).

Loughland C, Carr V, Lewin T. The potential impact of differences in sampling sources on schizophrenia research. *Psychiatry Research* (submitted).

Green M, Williams L. Visual scanpaths to threat-related faces in deluded schizophrenia. *Psychiatry Research* (submitted).

Green M. Causal attribution biases for emotional states in schizophrenia and delusion-prone individuals. *Journal of Social and Clinical Psychology* (submitted).

PUBLISHED ABSTRACTS

NISAD support played a vital role in the development of the schizophrenia research initiatives that led to the publication of the following abstracts in peer-reviewed journals.

Ward PB, Schall U, Lagopoulos J, Bender S, **Little C.** Functional brain imaging of increasing task difficulty in the Tower of London in patients with schizophrenia and healthy volunteers. *World Journal of Biological Psychiatry* 2001; 2 (Sup.1): 91.

Johnston P, Katsikitis M, **Carr V.** Modelling facial emotion recognition in schizophrenia. *World Journal of Biological Psychiatry* 2001; 2 (Sup.1) : 233.

Dixon G, Harper C. Neuron ratios in the anterior thalamus in schizophrenia. *World Journal of Biological Psychiatry* 2001; 2 (Sup.1): 284.

Ward PB, Schall U, Lagopoulos J, Bender S, **Little C**. Functional brain imaging of increasing task difficulty in the Tower of London in patients with schizophrenia and healthy volunteers. *International Journal of Psychophysiology* 2001; 41: 223.

Ward PB, Schall U, Lagopoulos J, Bender S, **Little C**. Functional brain imaging of increasing task difficulty in the Tower of London in patients with schizophrenia and healthy volunteers. *Society for Neuroscience Abstracts* 2001; 27: Program No. 886.8.

Little C, Hickie I, **Ward P,** Naismith S, Scott E. Functional magnetic resonance imaging correlates of implicit sequence learning in patients with depression. Presented at the 8th Conference on Functional Mapping of the Human Brain. Available on CD ROM in *Neuroimage* 2002; 16(2).

Lagopoulos J, Ward PB. An fMRI Study of Covert Orientation of Attention. Presented at the 8th Conference on Functional Mapping of the Human Brain. Available on CD ROM in *Neuroimage* 2002; 16(2).

Malhi G, Lagopoulos J, Ward P, Kumari V, Mitchell P, Parker G, Teasdale J, Sachdev P. FMRI of cognitive generation of affect in bipolar depression. Presented at the 8th Conference on Functional Mapping of the Human Brain. Available on CD ROM in *Neuroimage* 2002; 16(2).

RESEARCH GRANTS

NISAD Grants

NISAD scientists were successful in obtaining the following grants administered by the Institute in the 2001-2002 period.

Selective alterations in ionotropic glutamate receptors in the anterior cingulate cortex in schizophrenia (Third Forum of European Neuroscience).
Zavitsanou K. University of Wollongong, Metabolic Research Centre, 2002 ($1,000).

The St George Bank Foundation Scholarship for Schizophrenia Research.
McDonald D, Draganic D, Ward P. The St George Foundation, 2002-2004 ($75,000).

Analysis of gene expression in schizophrenia using genetic technology: NISAD PhD scholarship for schizophrenia research.
Draganic D, Tooney P, Ward P, McDonald D. The Ronald Geoffrey Arnott Foundation, 2002-2003 ($10,000).

Analysis of gene expression in schizophrenia using genetic technology: NISAD PhD scholarship for schizophrenia research.
Draganic D, Tooney P, Ward P, McDonald D. The Perpetual Foundation, 2002-2003 ($10,000).

NISAD-Supported Grants

NISAD infrastructure support played a vital role in the success of the following grant applications from NISAD scientists and affiliates in 2001-2002.

Correlation between neural membrane phospholipid composition and atypical antipsychotic drug binding in schizophrenia.
Huang XF, Zavitsanou K. University of Wollongong Metabolic Research Centre Grant, 2001 ($2,270).

Functional neuroanatomy of sustained attention, working memory and inhibition deficits in schizophrenia.
Kent A, Fox A, Jablensky A. NHMRC Network Neuroimaging Consortium Grant, 2001 ($2,000).

The Hunter Medical Research Institute Young Investigator of the Year
Johnston P. Hunter Medical Research Institute, 2001 ($5,000).

The effects of tachykinin NK1 receptor antagonists on stress responses associated with opioid withdrawal.
Tooney P, Chahl L. University of Newcastle RMC Grant, 2001 ($9,000).

Clinical Neuroscience Program –80ºC freezer.
Schall U, Tooney P et al. Faculty of Medicine and Health Sciences Equipment Grant, 2001 ($20,895).

Detection of structural changes in post mortem brain of schizophrenia patients and in rat brain after phencyclidine administration.
Zavitsanou K, Huang XF, Mattner F, Katsifis A. Australian Institute of Nuclear Science and Engineering Grant, 2001-2002 ($16,645).

Can dietary intervention enhance drug efficiency in treating schizophrenia?
Huang XF, Zavitsanou K. University of Wollongong URC New Partnership Grant, 2001-2002 ($10,000).

Investigating changes in gene expression in psychosis using microarray technology.
Tooney P, Scott R, Chahl L, Carr V. Hunter Medical Research Institute Clinical Neuroscience Program, 2001-2002 ($110,000).

Development of microarray technology for biomedical research in Newcastle.
Tooney P. Hunter Medical Research Institute Young Investigator Award, 2001-2003 ($21,000).

Visual scanpaths to dynamic facial expression stimuli in schizophrenia (Viewpoint eye tracker).
Loughland C, Johnston P. Hunter Medical Research Institute Clinical Neuroscience Program Grant, 2002 ($9,000).

Visual scanpaths to dynamic facial expression stimuli in schizophrenia (Viewpoint eye tracker).
Loughland C, Johnston P. University of Newcastle Faculty of Health Equipment Grant, 2002 ($10,220).

Brain mechanisms of attention problems in people with schizophrenia and bipolar disorder.
Clunas N. Ian Scott Fellowship, Australian Rotary Health Research Fund, 2002 ($26,000).

Computer software and hardware package for the analysis of gene expression profiles.
Scott R, Tooney P, Rostas J, Dickson P, Calford M. University of Newcastle, School of Biomedical Sciences Research Infrastructure Block Grants, 2002 ($35,865).

New animal model to investigate anti-psychotic drug-induced obesity and related metabolic disorders.
Huang XF, Ward P, Zavitsanou K. University of Wollongong MRC Grant, 2002 ($8,000).

A neuropsychological investigation of primary and secondary delusions.
Ward P, Coltheart M, Langdon R, Rossell S. Health Research Foundation Sydney South West Research Grant, 2002-2003 ($20,300).

Neural pathophysiology of posterior cingulate cortex in schizophrenia.
Huang XF, Zavitsanou K, Newell K. University of Wollongong URC / MRC Grant, 2002-2004 ($30,000)

CONFERENCE PRESENTATIONS

Invited Presentations

NISAD scientists were invited to give presentations at the following conferences/meetings.

Dixon G, Sarris M, Harper C. Better brain banking – issues of the tissues. Invited presentation at the Second Asia Pacific Forum on Brain Banking, Fukushima, Japan, November, 2001.

Sarris M, Boyes M, Garrick T, Harper C. The NSW Tissue Resource Centre – Just the first steps in a marathon. Invited presentation at the Second Asian Pacific Forum on Brain Banking, Fukushima, Japan, November, 2001.

Tooney P. Neuropeptides and their role in the pathology of schizophrenia. Invited presentation at the Australasian Society for Biological Psychiatry meeting, Melbourne, December, 2001.

Ward P. Association of regional structural brain measures with mismatch negativity in schizophrenia patients. Invited presentation at the Hunter Medical Research Institute Clinical Neuroscience Program Seminar, Newcastle, Australia, December, 2001.

Tooney P. Gene expression profiling in brain disorders using DNA microarrays. Invited presentation at the Hunter Medical Research Institute Clinical Neuroscience Program Seminar, Newcastle, Australia, December, 2001.

Ward P. Neurocognitive approaches to identifying phenotypic markers for schizophrenia. Invited presentation at the Genes, Neurons and Mental Illness National Symposium, Sydney, Australia, June, 2002.

Conference Presentations

NISAD support played a vital role in the development of the schizophrenia research initiatives that led to the following conference presentations/submissions.

Ward PB, Schall U, Lagopoulos J, Bender S, **Little C**. Functional brain imaging of increasing task difficulty in the Tower of London in patients with schizophrenia and healthy volunteers. Presented at the 7th World Congress on Biological Psychiatry, Berlin, Germany, July, 2001.

Johnston P, Katsikitis M, **Carr V.** Modelling facial emotion recognition in schizophrenia. Presented at the 7th World Congress on Biological Psychiatry, Berlin, Germany, July, 2001.

Dixon G, Harper C. Neuron ratios in the anterior thalamus in schizophrenia. Presented at the 7th World Congress on Biological Psychiatry, Berlin, Germany, July, 2001.

Sheedy J, Loughland C. Schizophrenia research and nursing: a partnership with the NISAD Schizophrenia Research Register. Presented at the 12th Annual Winter Symposium, Rozelle Hospital, Sydney, July, 2001.

Ward PB, Schall U, Lagopoulos J, Bender S, **Little C.** Functional brain imaging of increasing task difficulty in the Tower of London in patients with schizophrenia and healthy volunteers. Presented at the Evoked Potential International Conference, Paris, France, July, 2001.

Hinton T, Johnston G. Localisation of GABA-C receptor mRNA in rat and human brain. Presented at Australasian Winter Conference on Brain Research, Queenstown, New Zealand, August, 2001.

Sheedy J, Loughland C. The NISAD Schizophrenia Research Register: Training partnerships in clinical and technical measurement skills. Presented at the NSW Institute of Psychiatry, Second National Conference, Sydney, September 2001.

Sheedy J. The NISAD Schizophrenia Research Register: Citizen Profiles. Presented at the NSW Consumer Advisory Group Annual Conference, Sydney, November, 2001.

Ward PB, Schall U, Lagopoulos J, Bender S, **Little C**. Functional brain imaging of increasing task difficulty in the Tower of London in patients with schizophrenia and healthy volunteers. Presented for the Society for Neuroscience Conference, San Diego, USA, November, 2001.

Loughland C, Williams L. Visual scanpath aberration to faces and facial expressions in schizophrenia: Evidence for specificity and familial transmission. Presented at Australasian Society for Psychiatric Research Conference, Melbourne, December, 2001.

Loughland C, Carr V, Lewin T. The potential impact of differences in sampling sources on schizophrenia research. Presented at Australasian Society for Psychiatric Research Conference, Melbourne, December, 2001.

Little C, Ward PB, Lagopoulos J. Functional magnetic resonance imaging correlates of auditory sensory memory in healthy volunteers. Presented at the Australasian Society for Psychiatric Research meeting, Melbourne, Australia, December, 2001.

Malhi G, Little C, Ward P, Lagopoulos J, Wen W, Ivanovski B, Mitchell P, Kumari V, Teasdale J & Sachdev P. FMRI of Cognitive Generation of Affect in Bipolar Depression. Presented at the Australasian Society for Psychiatric Research meeting, Melbourne, Australia, December, 2001.

Sarris M, Arianayagam M, **Garrick T, Harper C.** Sub-regional quantitative analysis of brain volumes in schizophrenia. Presented at the Australasian Society for Psychiatric Research Meeting, Melbourne, December, 2001.

Garrick T, Sarris M, Harper C, Kril J, Pamphlett R. Mamillary bodies in schizophrenia and alcohol abuse. Presented at the Australasian Society for Psychiatric Research Meeting, Melbourne, December, 2001.

Tooney P, Yip J, **Zavitsanou K, Huang XF, Chahl L**. Distribution of tachykinin receptors in the human amygdala. Presented at the Australian Neuroscience Society Annual Meeting, Sydney, February, 2002.

Zavitsanou K, Huang XF. Increased NMDA and AMPA receptor densities in the anterior cingulated cortex in schizophrenia. Presented at the Australian Neuroscience Society Annual Meeting, Sydney, February, 2002.

Bell W, Huang XF, Sarris M. Analysis of neural membrane phospholipid fatty acid composition in schizophrenia. Presented at the Australian Neuroscience Society Annual Meeting, Sydney, February, 2002.

Newell K, Dixon G, Harper C, Huang XF. Reduced numbers of parvalbumin-positive neurons in the posterior cingulate cortex in schizophrenia. Presented at the Australian Neuroscience Society Annual Meeting, Sydney, February, 2002.

Hinton T, Carland J, **Chebib M, Johnston G.** Chlorpromazine modulates human recombinant ionotropic GABA receptors expressed in xenopus oocytes. Presented at the Australian Neuroscience Society Annual Meeting, Sydney, February, 2002.

Sarris M, Arianayagam M, **Garrick T, Harper C**. Sub-regional quantitative analysis of brain volumes in schizophrenia. Presented at the Australian Neuroscience Society Annual Meeting, Sydney, February, 2002.

Garrick T, Sarris M, Harper C, Kril J, Pamphlett R. Mamillary bodies in schizophrenia and alcohol abuse. Presented at the Australian Neuroscience Society Annual Meeting, Sydney, February, 2002.

Garrick T, Sarris M, Sheedy D**, Harper C.** An Australian Tissue Resource Centre. Presented at the Workshop on Brain Banking, Washington, USA, March, 2002.

Sheedy J. The NISAD Schizophrenia Research Register: A partnership with community volunteers. Presented at the Western Sydney Area Mental Health Service Conference, Sydney, April, 2002.

Sheedy J. The NISAD Schizophrenia Research Register: looking at wellness. Presented at the 6th Research Nursing Festival, Mt Druitt, NSW, Australia, May, 2002.

Garrick T, Sarris M, Sheedy D, **Harper C.** 'Using our brains': a valuable resource for research. Presented at the 23rd Collegium Internationale Neuropsychopharmacolgicum meeting, Montreal, Canada, June, 2002.

Little C, Hickie I, **Ward P,** Naismith S, Scott E. Functional magnetic resonance imaging correlates of implicit sequence learning in patients with depression. Presented at the 8th Conference on Functional Mapping of the Human Brain, Sendai, Japan, June, 2002.

Lagopoulos J, Ward PB. An fMRI Study of Covert Orientation of Attention. Presented at the 8th Conference on Functional Mapping of the Human Brain, Sendai, Japan, June, 2002.

Malhi G, Lagopoulos J, Ward P, Kumari V, Mitchell P, Parker G, Teasdale J, Sachdev P. FMRI of cognitive generation of affect in bipolar depression. Presented at the 8th Conference on Functional Mapping of the Human Brain, Sendai, Japan, June, 2002.

Ward P, Solowij N, Peters R, Otton J, Chesher G, Grenyer B. An MRI study of regional brain volumes in long-term cannabis users. Accepted for presentation at the British Association of Psychopharmacology, Harrogate, UK, July, 2002.

Zavitsanou K, Ward P, Huang XF. Selective alterations in iontropic glutamate receptors in the anterior cingulated cortex in schizophrenia. Accepted for presentation at the 3rd Forum of European Neuroscience, Paris, France, July, 2002.

Johnston P, Schall U, Ward P, Lagopoulos J, Rasser P. An fMRI investigation of executive function in early psychosis. Accepted for presentation at the 3rd International Conference on Early Psychosis, Copenhagen, Denmark, September, 2002.

Boyes M, Garrick T. Mental illness, neuroscience and the Tissue Donor Program. Accepted for presentation at the Mental Health Nurses Conference, Sydney, October, 2002.

NISAD RESEARCH STUDENTS

PhD Scholars

In the past year NISAD has provided support for the following PhD scholars.

Ms Karin Aubrey
Department of Pharmacology, University of Sydney
Modulation of glycine receptors
Supervisor: Dr Robert Vandenberg

Ms Nikola Bowden
School of Biomedical Sciences, University of Newcastle
Gene expression profiling in schizophrenia.
Supervisors: Dr Paul Tooney, Prof. Rodney Scott

Ms Tina Hinton
Department of Pharmacology, University of Sydney
GABA receptors and transporters in schizophrenia.
Supervisors: Prof. Graham Johnston

Mr Aaron Kent
Department of Psychology & Department of Psychiatry and Behavioural Science, University of Western Australia
Executive function in individuals at risk for schizophrenia: physiological correlates of sustained attention, response inhibition and working memory activation.
Supervisors: Dr Allison Fox, Prof. Pat Michie, Prof. Assen Jablensky

Ms Kelly Newell
Department of Biomedical Science, University of Wollongong
Neural pathophysiology of posterior cingulate cortex in schizophrenia.
Supervisors: Assoc. Prof. Xu-Feng Huang, Dr Katerina Zavitsanou

Mr David Wheeler
Department of Pathology, University of Sydney
Memory dysfunction in schizophrenia, Alzheimer's disease and alcoholic Wernicke-Korsakoff's syndrome.
Supervisors: Dr Gavin Dixon, Prof. Clive Harper

Ms Judith Weidenhofer
School of Biomedical Sciences, University of Newcastle
The role of the tachykinins and their receptors in schizophrenia: an investigation at a cellular and genetic level.
Supervisors: Dr Paul Tooney, Assoc. Prof. Loris Chahl

Science Honours Students

In the past year NISAD has provided support for the following Science Honours students.

Mr David Burns
Department of Biomedical Sciences, University of Wollongong
Correlation between neural MPC and D2, D4 and 5-HT binding efficiency in schizophrenia.
Supervisors: Assoc. Prof. Xu-Feng Huang, Dr Katerina Zavitsanou

Ms Kelly Newell
Department of Biomedical Sciences, University of Wollongong
Neuronal Analysis of the posterior cingulate cortex in schizophrenia: evidence for decreased GABAergic interneurons.
Supervisor: Dr Gavin Dixon

Ms Sonja Schleimmer
Department of Pharmacology, University of Sydney
Alterations of GAT-1 and GAT-3 transporters in the frontal cortex of individuals diagnosed with schizophrenia.
Supervisors: Prof. Graham Johnston, Ms Tina Hinton, Dr Gavin Dixon

Mr Tu Hao Tran
Department of Pathology, University of Sydney
Are neuron phenotypes differentially affected in alcohol-related brain damage?
Supervisors: Dr Gavin Dixon, Prof. Clive Harper

NISAD Summer Student Scholars

In the past year NISAD has provided support for the following Summer Student Scholars.

Mr Wayne Anderson
School of Biomedical Sciences, University of Newcastle
Investigation of tachykinin receptors in the brain.
Supervisor: Dr Paul Tooney

Ms Sinthu Sithamparanathan
Department of Pathology, University of Sydney
Mechanisms of memory dysfunction in schizophrenia – a postmortem study.
Supervisor: Prof. Clive Harper

Mr Tu Ho Tran
Department of Pathology, University of Sydney
Thick or thin – can the choice of section thickness bias the measurement of neuronal density in human cerebral cortex?
Supervisor: Dr Gavin Dixon

THESES AWARDED

Doctor of Philosophy

Dr Carmel Loughland.
Department of Psychology, University of Sydney.
Impaired face and facial expression processing in schizophrenia: Visual scanpath evidence for specificity and familial transmission.
Supervisors: Dr Lea Williams, Dr Evian Gordon

Honours (Bachelor of Science)

Ms Kelly Newell
Department of Biomedical Science, University of Wollongong
Neuronal Analysis of the posterior cingulate cortex in schizophrenia: evidence for decreased GABAergic interneurons.
Supervisors: Dr Gavin Dixon, Assoc. Prof. Xu-Feng Huang, Prof. Clive Harper.

SCHIZOPHRENIA RESEARCH INFRASTRUCTURE SUPPORT

Schizophrenia Research Register

The following schizophrenia research projects were provided with volunteers from the NISAD Schizophrenia Research Register.

Langdon R, Ward P, Coltheart M. Social attention and reasoning in schizophrenia.
Schizophrenia Research Unit, Liverpool Hospital and Macquarie Centre for Cognitive Science, Macquarie University.

Karayanidis F, Schall U, Meem L, Stojanov W. Task-switching in schizophrenia.
Discipline of Psychology, University of Newcastle.

Michie P, Schall U, Todd J, Karayanidis F. A study of sound processing in individuals with schizophrenia and their family members.
Discipline of Psychology, University of Newcastle.

Loo C, Copolov D. A TMS study of auditory hallucinations.
Prince of Wales Hospital.

Karayanidis F, Johnston P, Devir H. Facial emotion processing in schizophrenia.
Discipline of Psychology, University of Newcastle.

Drysdale K, Kerr A. Inhibition in schizophrenia: examined by a directed forgetting task.
Discipline of Psychology, University of Newcastle.

Rossell S, Coltheart M, Ward P. A neuropsychological and neuroimaging investigation of semantic processing in patients with schizophrenia, delusional disorder, mania and controls.
Macquarie Centre for Cognitive Sciences, Macquarie University.

Baker A, Lewin T, Carr V. Counselling for alcohol and other drug problems among people with a psychotic illness.
Discipline of Psychiatry, University of Newcastle.

Baker A, Richmond R, Carr V, Lewin T, Wilhelm K. Intervention for smoking among people with a mental illness.
Discipline of Psychiatry, University of Newcastle.

Johnston P. Differences in evoked cortical activation during semantic word processing between normals and patients with schizophrenia, and their structural and symptomatic correlates.
Discipline of Psychiatry, University of Newcastle.

Harris A. Emotional well being in schizophrenia – an fMRI study.
Westmead Hospital.

NSW Tissue Resource Centre

The following schizophrenia research initiatives have received tissue from the NSW Tissue Resource Centre.

Hinton T, Johnston G. Investigation of GABA systems in the pathophysiology of schizophrenia.
Department of Pharmacology, *University* of Sydney.

Bell W, Huang XF. Membrane phospholipid composition and 5HT binding efficiency in schizophrenia.
Department of Biomedical Science, University of Wollongong.

Huang XF. Schizophrenia and the neuropathology of the brain hypothalamus.
Department of Biomedical Science, University of Wollongong.

Schlemier S, Johnston G. Investigation of GABA systems in the pathophysiology of schizophrenia.
Department of Pharmacology, University of Sydney.

Leah J, Wilce P, Paxinos G. Genetic architecture of human cerebral cortex.
School of Biomolecular and Biomedical Sciences, Griffith University.

Martins R. Predictors of cognitive deterioration in subclinical memory disturbances.
Department of Psychiatry and Behavioural Science, University of Western Australia.

Zavitsanou K, Huang XF. Neural pathophysiology of posterior cingulate cortex in schizophrenia.
Department of Biomedical Science, University of Wollongong.

INFORMATION ON DIRECTORS

Ian Gordon Harrison

Chairman (Non-executive)

Qualifications: Chairman Professional Conduct Committee #4 1998; Conducted Australian Federal Police Corruption Inquiry for Federal Attorney General 1996-1997; Appointed Senior Counsel 1995; Lecturer in Law, University of NSW Law School 1975-1980.
Experience: Appointed Chairman 2000. Board member since 1999.

Michael Shepherd

Deputy Chairman (Non-executive)

Qualifications: Vice Chairman, Committee for Sydney; Chairman, Challenger First Pacific Ltd; Vice Chairman, Australian Stock Exchange; National Councillor and Regional Chairman, Securities Institute of Australia; Director, The Shepherd Centre; Governor, The Sir David Martin Foundation; Australian Hearing Services Authority.
Experience: Board member since 2001. Appointed Deputy Chairman November 2001.

Christine Bennett

Qualifications: MBS, University of Sydney; FRACP (Fellowship of the Royal Australasian College of Physicians); Master of Paediatrics, University of NSW; Managing Director, Total Healthcare Enterprises Ltd; Partner of Health, Education and Community Services Group, KPMG (2000-2001); CEO of Westmead Hospital and Community Health Service (1997-2000); Director of Population Health and Clinical Services, South Eastern Sydney Area Health Service (1995-1996).
Experience: Board member since 2001.

Stanley Victor Catts

Qualifications: Founding Chair of NISAD 1995-1999; Professor of Hospital and Community Psychiatry, University of QLD.
Experience: Board member since 1995. Chairman 1995–2000.

Peter Dempsey

Qualifications: Chief Executive Officer, Baulderstone Hornibrook Group; Vice President and Director, Australian Constructors Association; Member of the Government's Standards and Conformance Advisory Council.
Experience: Board member since 2001.

John Fraser

Qualifications: Global Chairman, UBS Asset Management; Former Managing Director Asia Pacific, UBS Asset Management; Board Member of the Australian Stock Exchange.
Experience: Board member from March 2001 – May 2002.

Pru Goward

Qualifications: Federal Sex Discrimination Commissioner; Commonwealth Spokesperson, Sydney 2000 Games (1999-2000); First Assistant Secretary, Office Of The Status of Women, Department of Prime Minister and Cabinet (1997-1999).
Experience: Board member since 2001.

Don McDonald

Qualifications: Project Director, NSW Health/NISAD Partnership Project; Director, ANZ Executors and Trustees; Director, NSW Institute of Psychiatry; Former Conciliator, NSW Government; Former Secretary, Construction, Forestry, Mining and Energy Union
Experience: Board member since 1995. Deputy Chairman 1995 – 2001.

Bernard McNair

Qualifications: Group Manager, Wesley Health and Counselling Services; Trustee Research Trust Fund, Schizophrenia Fellowship of NSW; Director, Lottie Steward Hospital, Dundas; Immediate Past President, Schizophrenia Fellowship of NSW; Board Member, Mental Health Council of Australia.
Experience: Board member since 1996.

Patricia Michie

Qualifications: Professor of Psychology and Head of School, School of Behavioural Science, Faculty of Science and Information Technology, University of Newcastle; Adjunct Professor in School of Psychiatry and Behavioural Science, University of Western Australia; Member of Neuroimaging Consortium of NHMRC Network for Brain Research in Mental Disorders.
Experience: Board member since 2000.

Patricia Oakley

Qualifications: Partner, Brophy Oakley Consulting (Issues Management and Government Relations); Chief of Staff, Andrew Refshauge's Office, NSW Government (1995-1999); Press Secretary and Political Strategist for Dr Refshauge as Deputy Leader of the Opposition (1990-1995); former journalist, Australian Broadcasting Corporation.
Experience: Board member since 2001.

Dymphna Rees Peterson

Qualifications: BA (Behavioural Sciences); Grad. Dip. Ed; MA (Aboriginal Studies); State President, ARAFMI NSW Inc; Vice President of the ARAFMI National Council; Consultant in Vocational Education and Training; Lecturer; Editor and Writer; works widely in the mental health sector advocating for the needs of families of people with mental illness; parent of an adult son with schizophrenia.
Experience: Board member since 1999.

Thomas Lindsay Rosser

Qualifications: Managing Director, PonyEXPRESS Corporation (USA); Vice Chairman Global Internet Consortium.
Experience: Board member 1999–2001.

Peter Young

Qualification: Executive Vice Chairman, ABN AMRO Australia; Chairman, ABN AMRO Rothschild; Chairman, National Rail Corporation; Governor, Taronga Foundation; Director, Australia Business Arts Foundation.
Experience: Board member since 2001.

FINANCE

The abridged consolidated financial position accounts and financial performance for the year ended 30 June 2002 have been prepared from audited financial statements, passed by the Board of Directors, who are responsible for the presentation of those financial statements and the information they contain.

For a better understanding of the scope of the audit by Wallace and Barrow, this report should be read in conjunction with Wallace and Barrow's report on the unabridged financial statements. This report may be obtained from:

NISAD Schizophrenia Research
384 Victoria Street
Darlinghurst NSW 2010
Ph: (02) 9295 8407

Financial Performance
for the year ended June 30 2002:

	2002	**2001**
INCOME		
Fundraising	560,338	348,210
External grant income	1,076,692	702,209
Sundry income	14,090	80,668
Total	1,651,120	1,131,087
LESS EXPENSES		
Research	916,632	856,488
Marketing & fundraising	402,965	227,160
Administration	158,964	104,635
Total	1,478,561	1,188,283
Net Surplus / (Deficiency)	172,559	(57,196)
Opening retained earnings	21,274	79,189
Closing retained earnings	193,833	21,993
Transfer (to) / from reserves	19,576	(719)
Retained earnings	213,409	21,274

MAJOR DONORS

$50,000 or more

Baulderstone Hornibrook

Department of Health NSW

Mineworkers Trust

$20,000 to $49,999

Alstom

Australian Gaming Machine Manufacturers Assoc Ltd

BT Financial Group

Minter Ellison Lawyers

St. George Foundation Limited

UBS Asset Management (Australia) Ltd

VSL Prestressing (Aust) Pty Ltd

$5,000 to $19,999

AbiGroup Contractors Pty Limited

Australand Holdings Ltd

Barclay Mowlem

Bhegis JV

Boral Limited

Coates Hire

CSR Construction Materials

Deutsche Bank

EMC Consulting

F & D Normoyle

Fletcher Constructions Australia Limited

Grant Samuel & Associates

Hanson Australia Pty Ltd.

Ingal Civil Products

Interlink Roads P/L

Leighton Holdings Limited

Lundbeck Australia Pty Ltd

Macquarie Bank

Marrickville Municipal Council

Merivale Group

One Steel Limited

Palcologos, Mr & Mrs Theo & Coralie

Perpetual Foundation, The

Planet Fix Pty Ltd

Racing Victoria

Ronald Geoffrey Arnott Foundation, The

Rotary Club of North Sydney, Inc.

Rotary Club of Sydney Cove

Smorgon Steel Group Ltd

South Sydney Junior Rugby League Club Limited

Thiess Pty Ltd.

Tony Bleasdale & Associates

Trylow Plant Hire P/I

Walter Constructions

$1,000 to $4,999

ARAFMI Cowra Branch

Arenco Pty Limited

Bankshouse Mental Health Carers Support Group, The

Bomaderry Bowling Club Ltd

Briggs, Mr Gary

Bristol-Myers Squibb Australia Pty Ltd

Cardinal Holdings (Aust) Pty Ltd

CFMEU NSW Branch

Cole, Mr Tony

Consolidated Constructions Pty Limited

Ecotech

Ferguson, Mr Andrew

Gibson, Mr Jack

Godfrey Hirst

Gypro-Tech (Aust) Pty Ltd

Henley, Mr Thomas

Holmes, Mr Malcolm

Hyder Consulting

J A Bradshaw

John Holland Group Pty Ltd

Joy Mining Machinery

Jucovic, Mr Thomas

Kenealy, Mr & Mrs Bill & Betty

Lilyfield Printing

Lions Club of Kiama Inc

Madeira Form Work Pty Ltd

Martin Irwin & Richards

McCormack, Mr & Mrs CA & SJ

McGrath, Prof John

Multiplex Campbelltown Hospital Project

Multiplex Constructions Pty Ltd

Oakley, Ms Trish

Pallos, Mrs Margit

PEP (Progressive Employment Personnel) Inc.

Pittwater RSL Club Limited

Powell, Mrs Frances

Qua-In Pty Ltd

Ranjit Kumar, Mr Paul

Rotary Club of Albion Park

Skirka, Ms Ingrid

Smith, Mr Godfrey

St Marys Rugby League Club Limited

Swan, Mrs Susan

Sydney ('76) Ionian Club Inc.

Tait, Mr & Mrs David & Nicola

Total Electrical Connection Pty Ltd

University Of Wollongong

Weekes, Mr Richard

Westray Engineering

Whitehead, Mr & Mrs Dick & Judy

$200 to $999

Action Skyline NSW

ARAFMI Central Coast

Baron-Hay, Mr Myles
Barton, Mr/Ms H A
Behrens, Ms Jeannena
Bell Scaffolding
Benedek, Ms Marianne
Bennett, Dr. Christine
Blakemore, Mr Andrew
Boone & Willard Plumbing Pty Limited
Bowering, Mr Kevin
Breene, Mr Jim
Bulgin, Mr Don
Camarda & Cantrill
Canberra Trademen's Union Club Inc.
Caton, Mr Christopher
Construction Industry Drug and Alcohol Foundation, The
Cornelius, Ms H
Coster, Mr Ross
Cronulla RSL Memorial Club Limited
D M E Engineering Services Pty Ltd
Davies, Mr David
De Martin & Gasparini Pty Ltd
Dial A Dump Pty Ltd
Dilectite, Mr Markus
Down To Earth Club
Doyle, Ms Michelle
Draganic, Mr Daren
Durham, Mr Paul
Eagleston, Mr Gary
Eagleston, Mrs C
Ferguson, Mr John
Ford, Mr & Mrs Damian & Martine
Freeman, Mr Christopher
Gazal, Mr Michael
Ghaleb, Mr & Mrs Michael & Jeanette
Gluskie, Mrs S C
Greenham, Mr Geoffrey
Hayward, Mr Allan
Holt, Mrs Gillian
Hume, Ms Denise
Insultech Group Pty Ltd
JKB Constructions Pty Ltd
John Goss Projects Pty Ltd
John R Burton Contractors
Jones, Mrs Dorothy
Kele Project Management Pty Ltd
Kotzur, Mr & Mrs Earl & Barbara
Lawrence, Mr & Mrs D & E
Lidcombe Plastering Services
Lifese
Linder, Mrs Anne
Lopes, Ms Ana
Macarthur Engineering
Maiden, Mr Peter
McDonald, Mr Don
Metropolitan Restorations Pty Ltd
MGW Roofing
Mills, Mr David
Minogue, Mr N
Mitchell Contractors Pty Ltd
Moodie, Mr & Mrs R & S
Multi Systems Pty Ltd
Muscat, Mr Charles
Northern Beaches Mental Health Support Group
O'Dea, Mr Rod
Otis Elevator Co Pty Ltd
Parramatta City Council
Pfizer Pty Limited
Pinfold, Mr & Mrs M
Police Department Employees Credit Union Limited, The
Pollack, Mrs Renee
Poole, Ms Joan
Rathborne, Mr & Mrs Brian & Jill
Riverwood Legion & Community Club Limited
Robberds, Mr Lionel
Robertson, Mr & Mrs W
Robinson, Ms Wendy
Rohy's Painting Pty Ltd
Rosenstrauss, Mr Al
Rotary Club of Illawarra Sunrise
Rotary Club of Wollongong
Salgo, Ms Julie
Sassall Glass & Joinery Pty Ltd
Scamps, Mr Daniel
Schuman, Mr Alex
Scott, Mr & Mrs Jane & Alf
Sebastians Constructions
Selwyn, Ms Heather
Simmons, Mr Stuart
Sleights Plumbing
Smith, Ms Kylie
Thomas, Mrs Jenny
ThyssenKrupp Elevator Australia Pty Limited
Titley, Dr Keith
Tooney, Dr Paul
V M F Holdings
Webb, Mr Paul
Webster, Ms Zoe
Westpac Banking Corporation
WGE Pty Limited
White, Mr Richard
Williams, Mrs Marion
Wyld, Mr Ronald
Zappia, Ms Maria

Bequests

Webb, Mr Norman