

Connections

Issue Four

SPINAL CORD INJURY

Rugby stars pitch in for new research unit

Inside the Integrative Neuroscience Facilities

Drug development

Calendar 2012





On our cover: All Black captain Richie McCaw is the patron of the CatWalk Spinal Cord Injury Trust and is pictured overleaf with Professors Louise Nicholson and Richard Faull. The event was a Black Tie dinner to raise funds for spinal cord injury rehabilitation and research.

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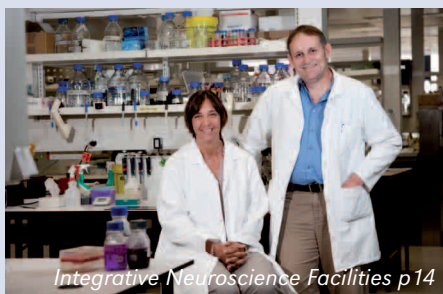
Photography by Jeff Brass, Godfrey Boehnke, Laura Fogg, Aaron Fritz, Warren Jones and Iain MacDonald.



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Connections - The Centre for Brain Research magazine

Spring 2011 Issue Four

The Centre for Brain Research is a unique partnership between scientists, doctors and the community. Established in 2009, cross-faculty research teams carry out world-class neuroscience research, alongside clinical collaborations with leading neurologists, neurosurgeons and physicians in the Auckland region.

Editorial contact details

Connections is published by the Centre for Brain Research (CBR). Previous issues of Connections are available from the CBR. They can also be accessed as PDFs at:

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Letter from the Director

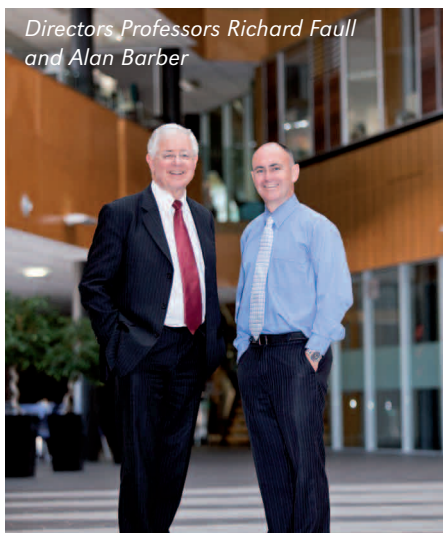
It is hard to believe that almost two years have passed since we launched our Centre for Brain Research in November 2009. During that short time we have made excellent progress with bringing together our scientists, clinicians and the community.

Our major strategic initiatives embracing the Brain Recovery Clinic, Biobank and Integrative Neuroscience Facilities are all moving forward with philanthropic funding support that now totals \$2.67M. Since our last newsletter earlier this year, there have been some exciting developments, including the strategic initiatives detailed below and the appointment of our first Aotearoa Foundation Postdoctoral Research Fellows. These developments represent substantial progress in promoting new research collaborations and advancing the mission and goals of the Centre for Brain Research.

Our Brain Recovery Clinic was launched by the Associate Minister of Health, the Hon Dr Jonathan Coleman in April 2011. Professor Alan Barber has done a superb job in bringing together a clinical team coordinating ongoing treatment in stroke with exciting new research opportunities linking patients, clinicians and researchers in the Centre. Dr Coleman noted this was a paradigm shift promoting multidisciplinary research in a clinical environment and was very supportive of our vision to extend the clinic in the future to embrace other brain disorders such as traumatic brain injury, dementia and neurodegenerative diseases. On a tour of the clinic, we saw the exciting transcranial magnetic stimulation research and the range of experts including neurologists and speech language therapists working with children and adults. We now have an expert team meeting weekly, assessing patient recovery and providing new opportunities for clinically focused research that is critical to finding and developing new treatments for brain disease. Led by the Directors Professor Alan Barber and Dr Cathy Stinear, the team includes our new research nurse Raewyn Hopkins, as well as exercise neuro-rehabilitation experts, optometrists, and speech language therapists.

The Brain Recovery Clinic has received special and vital foundation support from the Freemasons of New Zealand. At the launch event the chairman of the Freemason's Roskill Foundation, David Mace, presented a cheque for \$265,000 that will be invaluable in assisting with the ongoing development of stroke research in the Centre for Brain Research, providing special support for research equipment in the Brain Recovery Clinic. Critical, state-of-the art transcranial magnetic stimulation equipment will be purchased to create a new 'neuro-navigation unit'. This equipment will be vital for our

Directors Professors Richard Faull and Alan Barber



scientists in boosting patient recovery and progressing this exciting research. This is great news for the Centre and we are so grateful for the tremendous philanthropic support from the Freemasons of New Zealand. David Mace is a special supporter of the Centre; he is the Deputy Director of our Advisory Board and spearheads our philanthropic funding initiatives in the wider community.

I am delighted to announce that a long-standing relationship with the CatWalk Trust has now been cemented in an exciting new research development. Through a \$504,000 donation, the CatWalk Trust has established New Zealand's first Spinal Cord Injury Research Unit based here in the Centre for Brain Research. This unit will form part of our Integrative Neuroscience Facilities, performing pre-clinical research into spinal cord injury and repair. Professors Louise Nicholson and Colin Green, along with Research Fellow Dr Simon O'Carroll, played a key role in securing this funding. This research unit which will work towards the CatWalk's dream of finding a cure and getting spinal cord injury victims 'Back on their Feet'. The CatWalk Trust is a charity set up by equestrian Catriona Williams, who was injured in a horse riding accident in 2002. All Blacks captain Richie McCaw is the patron of the charity and is very supportive of this research drive.

The Biobank, established earlier this year with a donation of \$1M over 5 years from the Hugh Green Charitable Trust, is well underway under the directorship of Professor Mike Dragunow. We have appointed two new

Annual Report and CBR blog

We have released our Annual Report for 2010, detailing all our developments. It makes for a very interesting read, and is a credit to everyone in the Centre! You can read the Annual Report on our website: <http://www.fmhs.auckland.ac.nz/faculty/cbr/about/annualreport.aspx>

To keep up to date with CBR news throughout the year, please sign up to our blog:
<http://centreforbrainresearch.wordpress.com/>

research technicians to develop technologies and resources to provide human tissues and cells for expanded lab-based research on human brain disease across the Centre. The Biobank is a central platform linking the Integrative Neuroscience Facilities and the Brain Recovery Clinic providing new and exciting research opportunities for the development of drug testing in the laboratory for a number of brain diseases.

In summary, the Centre for Brain Research is growing fast and I hope you enjoy reading about all these exciting developments in our newsletter. The first two years have seen both the establishment and expansion of the core elements of the Centre; we now comprise 51 research groups across the University, 35 clinicians across the Auckland hospitals and 13 community organisations.

We look forward to an exciting, challenging and stimulating future as we collectively push back the boundaries of multidisciplinary team research across the university, hospitals and community in order to develop new treatment initiatives to promote a better future for New Zealanders affected by brain disease. Thank you all for your vital and valuable contributions. The CBR is well placed to face the challenges of the future.

Professor
Richard Faull

Spinal Cord Injury Research Unit

A generous \$504,000 donation from The CatWalk Spinal Cord Injury Trust has enabled the establishment of a new Spinal Cord Injury Research Unit in the Centre for Brain Research. In this article we explore the hopes for the exciting new research underway.

Rugby stars pitch in

New Zealand has gone rugby mad over the last few months, and anyone who has watched a match surely has to feel admiration for the players. Being such a physical game, the chance of injury is high. One accidental bad landing or a tackle in the wrong place, at the wrong time, and a player's life can be changed forever.

Indeed, every five days, another person suffers a spinal cord injury in New Zealand. The average age for an accident is 26 years old, with a greater proportion of men being affected (80%) due to violence and sports related injuries. Rugby, boxing and diving participants are particularly prone to injury.

So it was a really emotional night when 600 rugby fans and players gathered to help raise money for spinal cord injury. Hosted by The Black Friday Trust and the NZ Rugby Players Association at the Langham Hotel, the all star dinner was called "Believe", and aimed to encourage victims to believe in themselves and to get back on their feet. It was all thanks to the tireless work of three recipient charities, The CatWalk Trust (research), New Zealand Spinal Trust (rehabilitation) and the New Zealand Rugby Foundation (prevention and support).

An amazing \$200,000 was raised on the night for two important causes; upgrading the Auckland Rehabilitation Unit and supporting the newly-established Spinal Cord Injury Research Unit (SCIRU) which is based here at the Centre for Brain Research.

SCIRU has been established by the CatWalk Trust with the aim of finding a cure for spinal cord injury (SCI). The unit is underpinned by research undertaken by Professors Louise Nicholson and Colin Green and Dr Simon O'Carroll and forms part of the Integrative Neuroscience Facilities led by Associate Professor Bronwen Connor. Louise was there at the fundraising dinner and says it was an honour to help.

"On the night I was quite overwhelmed by the willingness of people to give so generously to the cause," says Louise. "With this research we want to find a cure, and we want to do it in a way that provides hope for people with spinal cord injury."

The CBR team were privileged to be part of the fundraiser, and just a little overwhelmed by the star power of the All Blacks and Blacks Caps who also shared the dream. The players held nothing back in their efforts to raise funds. Ali Williams may be known as one



Professor Louise Nicholson with All Black Dan Carter

of the 'jokers' of the All Black squad but he had many in the crowd close to tears as he shared the emotional story of his father's own experience with SCI and the impact a devastating injury can have on a family.

The star turn of the night came when the lights dimmed and MC Jackie Clarke announced a special guest making his musical debut. It was none other than All Blacks captain Richie McCaw, striding out of the mist, clad in full Scottish regalia amid a skirl of bagpipes! His pitch-perfect rendition of Amazing Grace wowed the crowds, and put an incredibly personal touch to the fundraiser.

Louise was impressed by the commitment of the players. "There is such a responsibility in taking money from donors, where every cent has been hard won through blood, sweat and toil. It certainly focuses your mind on the goal - we want to see people out of chairs and back on their feet."



Richie McCaw played the bagpipes at the 'Believe' fundraising dinner



All Black Richie McCaw with Professor Richard Faull

New hope for Spinal Cord Injury victims

The Spinal Cord Injury Research Unit is the first in New Zealand, and is dedicated to gaining a better understanding of the causes of disability following injury, and to developing new treatments towards a cure. It has been established through a generous half million-dollar donation by the CatWalk Spinal Cord Injury Trust.

The trust was started in 2005 by friends and family of Catriona Williams. Cat was one of New Zealand's leading international equestrian riders, but is now C6/C7 tetraplegic and confined to a wheelchair following a riding accident in 2002. The Trust's aim is to get spinal cord injury victims back on their feet - to see people like Cat walk again.

"There is such a responsibility in taking money from donors, where every cent has been hard won through blood, sweat and toil. It certainly focuses your mind on the goal – we want to see people out of chairs and back on their feet."

Professor Louise Nicholson, SCIRU leader

Research carried out by Professor Louise Nicholson, Professor Colin Green and Dr Simon O'Carroll, has discovered that one of the critical changes taking place after spinal cord injury is an increase in the number of communicating channels, called gap junctions, between nerve cells. These channels play a major role in spreading the damage from the site of injury to areas that would otherwise not be affected.

With project funding from the CatWalk Trust, the team has developed and tested small molecules called mimetic peptides that function to block these channels. Using models of spinal cord injury, they have shown that delivery of this peptide early after an injury prevents inflammation, protects nerve cells from death and leads to improved walking ability.

Dr Simon O'Carroll says; "This is a very exciting breakthrough as currently no reliable treatment exists for acute spinal cord injury. If we can prevent the spread of damage early, people who suffer an injury may not have the same degree of disability and if we can act early enough, there may possibly be no



Dr Simon O'Carroll with Professor Louise Nicholson

disability at all."

Professor Louise Nicholson is keen to stress that the research team has grown their spinal cord studies in association with the CatWalk Trust. "For me, that's what is so special about this relationship," says Louise, "that we have both developed together to where we can now see a joint future. Sitting the research unit in the Integrative Neuroscience Facilities in the CBR means we have a framework and a platform for growth."

The Spinal Cord Injury Research Unit will provide a focus for expertise and maintain spinal injury research models for researchers from throughout New Zealand working on spinal cord injury and repair. The unit aims to grow international collaborations, as well as playing a key role educating students in spinal injury research, raising clinical awareness and training emerging neuroscientists.

"Can you imagine in our lifetime seeing someone in a wheelchair with dexterity in their hands, or dancing again?"

The Director of the Integrative Neuroscience Facilities in the CBR, Associate Professor Bronwen Connor, says that she is also excited by developing a hub of spinal cord expertise; "So much of our brain research can be applied to help people with spinal cord injuries, through new drug developments and cell replacement strategies. I can really see our research taking off exponentially."



From L:R: Professor Louise Nicholson, Dr Simon O'Carroll, CatWalk fundraisers Paula Petrie and Stephanie Iremonger, and Professor Richard Faull

The CatWalk Trust has been a long-time sponsor of the Brain Bee Challenge competition for high school students. CatWalk Trust spokesperson Meg Speirs says; "Spinal cord injury is a major cause of disability for the young and active. Support of research and scientists of tomorrow is crucial. This unit offers the facilities for spinal injury researchers nationwide to progress their research to a clinical level."

The unit will now provide scientific laboratory training for winners of the Brain Bee Challenge. Louise and the research team will supervise summer placements for budding neuroscientists to develop spinal cord research in New Zealand.

"Can you imagine in our lifetime seeing someone in a wheelchair with dexterity in their hands, or dancing again?" asks Louise. "My dream is to see benefits from this research in my lifetime, but if not, that's why we train the next generation of scientists. This dream will live on."

Brain Recovery Clinic Launch

The Hon. Dr Jonathon Coleman welcomes the new clinic as a place to bring together clinicians, researchers and the community.



The Associate Minister for Health Hon. Dr Jonathan Coleman launched the Brain Recovery Clinic and visited the research teams. Here he is pictured with Professor Suzanne Purdy and Speech Language Therapists working with children who have had cochlea implants.

The new Brain Recovery Clinic at The University of Auckland Clinics was launched on April 21st by the Associate Minister of Health Hon. Dr Jonathan Coleman.

As part of the Centre for Brain Research, the clinic provides assessments for long-term stroke patients to review the latest treatment options available. Working with CBR therapists and scientists, stroke patients can also link into the latest trials of stroke rehabilitation therapies.

The Hon. Dr Jonathan Coleman welcomed the new clinic as a place to bring together clinicians, researchers and the community, where people can be treated and benefit from greater collaboration. "The Centre for Brain Research is a great example of collaboration, with over 200 researchers all working towards a common goal of finding and developing new treatments for neurological disease," he said.

"The work and advances in treatment undertaken at the Clinic will lead to a better quality of life for people living with a brain injury or neurological condition. Ultimately that's the greatest potential benefit the Clinic offers."

Professor Alan Barber, Head of the Stroke Service at Auckland City Hospital and a Director of the Centre for Brain Research says; "There are 45,000 stroke survivors in

New Zealand. Until now, there have been few services available for people living with the ongoing effects of stroke after they have been discharged from the hospital system. We are changing that."

"At our assessments we ensure that everything is being done to reduce the risk of someone having another stroke. In addition, 'check-up' appointments will mean that patients can be referred to complementary clinics for further rehabilitation such as speech language or exercise therapy. Collaborations with other medical services mean that patients can be referred to their GPs or District Health Boards for a complete care service."



Hon Dr Jonathan Coleman

Stroke Check-Ups

Anyone who has had a stroke, no matter how long ago, can be referred to attend the clinic, to assess their current medical and rehabilitation status. Referrals need to come from GPs and other doctors, or the Stroke Foundation of NZ.

Contact:

09 923 1831

brainrecovery@auckland.ac.nz

Web: <http://www.fmhs.auckland.ac.nz/faculty/cbr/about/brainrecoveryclinic.aspx>



Professor Alan Barber is the Director of the Brain Recovery Clinic

Research Nurse

Thanks to generous support from the Hugh Green Charitable Trust, the CBR has been able to appoint a Research Nurse, Raewyn Hopkins, to the Brain Recovery Clinic. Here we find out more about Raewyn.

What's been your career to date to bring you to this point?

I am a dual trained Registered General Nurse (bachelor) and have a Master of Public Health. This combination allows me to see health from both the focused one-on-one personal patient/client perspective and the broader public/community perspective. Although my basic training was in nursing and I have held senior staff nurse roles, I have moved a long way from the 'traditional' at the bedside nurse image. For the past 12 years as a clinical researcher I have been able to use and extend my abilities. For example, sound research requires good clinical judgement as well as rapport and mutual trust between the researcher and patient, as long term relationships and involvement are important in monitoring long-term outcomes. I currently work 0.6 of the week and the other part of my week I continue my work in respiratory genetic research, lung health assessments and smoking cessation.

What research are you working on at the moment?

I'm presently running a study for Dr Cathy Stinear where we give patients Transcranial Magnetic Stimulation followed by an intensive physiotherapy workout for the upper limbs that were affected by the stroke to improve function in these limbs. We are also beginning to collect blood specimens from volunteers to contribute to the Biobank housed in the Centre for Brain Research so that molecular biomarkers may be isolated and studied to see how these changes are contributing to a person's risk of a neurological disorder.

What do you like about being part of the Centre for Brain Research?

I am very excited about the opportunity to work in a team led by Professor Faull. The people here are very enthusiastic about making a difference to the lives of those people affected by neurological disorders. Translational research is so important, and I love the fact that it is a full circle, so that we go from bedside to bench to bedside and

back out to the community. It is a unique approach to problem solving and discovery. This approach is becoming more widely accepted as the preferred approach to understanding more of the complex health problems we face and has led to great collaborations between the medical and science communities.

If you could work on any science project in the world, what would that be and why?

I like the combination of clinical and genetic research that I am currently undertaking. Both Richard Faull and Rob Young (who set up the Respiratory Genetics Lab I work in where we have developed the first gene-based test for lung cancer susceptibility) are intelligent, caring passionate men who want to make a difference and improve the outcomes for patients in their chosen areas. Understanding the complexities of a disease through the many gene, environment and lifestyle processes is very important. We need to work on prevention and screening for lifestyle modification and better long term health.

Now about you. Where are you from and what brought you to Auckland?

I am a Mainlander, born in the town of Balclutha in South Otago. I came to Auckland after some years working in England. I have enjoyed travel in Europe, Africa, and have also enjoyed a little time as a volunteer in Cambodia.

It's your day off. How would you spend your perfect day?

A round or two of golf, gardening and walking. I love listening to good music, and maybe attending a concert like an orchestra, opera or ballet if there is one on.

Where would you recommend people visit in New Zealand and what's your favourite part?

Start at the top and work down not forgetting side roads and walking tracks! The South Island is the best especially the lakes including Benmore and Avimere as well as the better known ones such as Queenstown, Tekapo and Wanaka. The Catlins area is very special to me as it was where we went on family picnics and holidays. It has amazing views, native fauna and flora – especially the red of the Rata. It also has wonderful native birds and numerous sea animals such as seal colonies and penguins.

Freemasons' generous donation for stroke research



The longstanding commitment of the Freemasons of New Zealand to brain research was given another boost at the launch of the Brain Recovery Clinic.



The Roskill Foundation Chair David Mace proudly handed over a cheque for \$265,000 to support stroke research in the

Centre for Brain Research.

The grant will enable the establishment of a Neuro-Navigation Unit, which will be used to undertake research into transcranial magnetic stimulation. This technique is being trialled to enhance recovery from stroke, through non-invasive painless brain stimulation. This equipment will be an important tool for the Centre's new Brain Recovery Clinic whose aim is to enhance and support neurology care for people living with stroke and to promote their recovery and rehabilitation. Other disorders are also potential research and clinical targets, including tinnitus, amblyopia (lazy eye), language areas, depression and movement disorders.

David Mace said: "The Freemasons Roskill Foundation has been a long-term supporter of brain research, and we are very committed to furthering scientific knowledge to help people. We regard the establishment of the Brain Recovery Clinic as very important for New Zealand, as more research on stroke is absolutely vital."

The Neuro-Navigation Unit is a complex array of various components including clinical examination and cognitive testing tools, Linux computers and imaging analysis software, two transcranial imaging units, recording equipment, amplifiers and nerve stimulators.

Brain Bee 2011

The North Island Brain Bee champions were crowned in June

Auckland school students dominated the North Island Brain Bee Challenge held at the Centre for Brain Research in June. Byung Cheol Cho from Auckland Grammar School was crowned individual North Island Champion, while Byung and three fellow schoolmates made it a clean sweep for their school when they also took home the Brain Bee Challenge Teams title.

Launched in 2007 in New Zealand, the Brain Bee Challenge attracts some of New Zealand's brightest Year 11 students, challenging them in subjects about the human brain and neuroscience. The first round of this year's North Island competition involved over 1200 students from Whangarei to Wellington, with 154 students from 44 schools participating in person at the North Island finals.

Teams and individuals were tested on topics such as intelligence, memory, emotions, sensations, movement, stress, ageing, sleep, addiction, Alzheimer's and stroke. Byung Cheol Cho quickly established and held a strong lead in the individual competition, being pressed by runner up Fuma Naito from Westlake Boys' High School with Kaustubha Ghate, also from Auckland Grammar School, in third spot.

Auckland Grammar further showed their dominance and knowledge of the subjects in the Brain Bee Championship Teams final, pulling together to keep out Auckland's Westlake Girls' High School in second place, with St Cuthbert's College in third and neighbouring Diocesan School for Girls in fourth place.

North Island Brain Bee winner Byung will now prepare to take on his counterpart from the South Island along with the individual winners from Australia's eight states at the Australia - New Zealand Brain Bee Challenge in early 2012. The Australia-New Zealand National Finals event will be held as a feature component of the large international Australian Neuroscience Society conference on Australia's Gold Coast at the end of January in 2012.

Brain Bee Challenge coordinator, Professor Louise Nicholson says: "The 2011 Brain Bee Challenge was a huge success. It was a very exciting day, with the pressure of the competition off set by opportunities for teachers and students to talk to scientists at the Centre for Brain Research and take part in laboratory visits. We had some 75 staff participating in the Brain Bee Challenge, and it is wonderful to see this interaction between our current researchers and the future scientists of tomorrow."



From top to bottom: The winning Auckland Grammar School team; Byung Cheol Cho pictured with Professor Richard Faull and teacher Gavin Jennings; the individual final; and 2010 winner Rachael Wiltshire

"Science is so important in our everyday lives and neuroscience is such an exciting and fascinating field of study. The Brain Bee Challenge gives both students and teachers first-hand experience of the exciting opportunities The University of Auckland can offer those with a real interest in science and in particular, neuroscience."

New Zealand leading the world

The 2010 New Zealand winner of the Brain Bee has also excelled on the international stage. Rachael Wiltshire from Samuel Marsden College in Wellington finished 5th equal in the world in the International Brain Bee, which was held in Florence, Italy in July, in conjunction with the 8th Annual International Brain Research Organization World Congress of Neuroscience (IBRO). Rachael achieved the second highest mark in the first round, the highest equal mark in the anatomy challenge (100%) and the highest mark in the third round, but was not quite as strong in the patient diagnosis section. The USA finished on top, Australia came second, while NZ tied with Canada for 5th place.

Rachael says, "The entire experience has been amazing in terms of opening up a world of new opportunities. I would like to thank all the scientists and clinicians at the Centre for Brain Research who helped me to get so far."

We have created a video highlighting the range of activities on the day, which you can view here: <http://www.fmhs.auckland.ac.nz/faculty/cbr/events/Brainbeechallenge.aspx>



International neuroscience

Renowned international scientists visit Auckland

International Neuropsychological Society

Auckland was treated to a second international neuroscience and neuropsychological conference this year, when the joint meeting of the International Neuropsychological Society (INS) and the Australian Society for the Study of Brain Impairment (ASSBI) was held on the 6th-9th of July, at the SkyCity Convention Centre. This was the first time either society has held a meeting in New Zealand, and was attended by around 500 delegates from 13 countries.

The conference was organised by a joint New Zealand-Australia organising committee, which included a number of CBR members. The Centre for Brain Research was a platinum sponsor, with keynote speaker Professor John Hodges visiting the CBR.

The central theme of the meeting was 'the social brain', but topics were wide-ranging, including the use of neuroimaging techniques to examine neural networks of the brain in acquired and developmental neural disorders, new developments in frontotemporal dementias, the neural bases of memory systems, emotion and dissociative amnesias, the development of language, the effect of aging on fluid intelligence and rehabilitation of acquired brain disorders.

Local co-convenor of the organising committee, Dr Lynette Tippett, reported that the meeting had been a tremendous success and ran smoothly, despite pre-meeting worries about the travelling ash cloud which had grounded flights in both Australia and New Zealand just days before the conference. Fortunately this cleared and enabled safe travel to New Zealand from all directions, which proved to be a positive omen for a memorable meeting. International delegates were overwhelmed by the wonderful powhiri by HakaLegend, with conference attendees called onto the formal meeting area by local psychologists Margaret Dudley and Erana Cooper (Department of Psychology). The conference began with a moving opening by invited speaker Professor Erin Bigler, who has a unique and personal connection with New Zealand, with Margaret and Erana again playing a special and moving part in his introduction.

Lynette reported that attendance at the broad range of presentations from basic neuroscience research through to neuroimaging and assessment and rehabilitation of brain impairment was fantastic. One highlight was the much



anticipated debate "Is neuropsychology redundant in the age of neuroimaging?" with eminent participants Professors Jason Mattingly, Erin Bigler and Hans Markowitsch on the 'yes' side and Professors John Hodges, Barbara Wilson and Mike Corballis on the 'no' side. The debate was tight and compelling, with the 'no' side winning, possibly because of the killer blow by Barbara Wilson who showed a PET scan of someone in persistent vegetative state and one of someone with an Oxford PhD - with no obvious difference between the two!

"The meeting was abuzz with excitement and visions for the future" said Lynette. "This was captured in the INS Presidential Address by Professor Rus Bauer, who urged neuropsychologists to embrace and integrate their investigations and findings with developments in a range of approaches in contemporary neuroscience. This was a great meeting for the CBR to be involved in, as it recognised the importance of what lies at the heart of the CBR approach - innovative translational neuroscience that aims to improve the lives of people and families living with brain disease."

CBR prize winners

Many Centre for Brain Research staff and students presented at the International Neuropsychological Society conference, with a lucky few receiving the top prizes. PhD student Victoria Martin won the International Neuropsychological Society Laird S. Cermak Award for the best research presented in the area of memory. Her first study from her doctoral work was also published in the prestigious journal *Proceedings for the National Academy of Sciences USA*. Victoria works in the laboratory of Dr Donna Rose Addis, and is studying the role of the memory area of the brain, the hippocampus, for future imaging using functional MRI.

PhD student Valerie van Mulukom won the Australian Society for the Study of Brain Impairment Travel Award for the best

abstract submitted by a student. Her poster presented the results of her functional MRI study examining hippocampal (memory) and amygdala (emotional) responses to the novelty of future simulations.

Post-graduate diploma student Peter Bull won the Australian Society for the Study of Brain Impairment Kevin Walsh award for the best abstract submitted by either an Honours or Masters student. His poster described a research project he conducted in Dr Donna Rose Addis' lab that investigated how enhanced memory for negative images is influenced by the type of recognition memory test used.

Visiting speakers

The CBR has recently hosted a number of high profile international neuroscientists, and been treated to excellent talks on the latest research. Professor Craig Garner from Stanford University visited Dr Johanna Montgomery to develop their research on synaptic plasticity. This fascinating research area is currently being applied to further understand autism.

Professor Hans Goebel from Germany, a world-renowned neuropathologist based at the Johannes Gutenberg-University Medical Centre in Mainz with expertise on myopathy and neurodegenerative diseases, developed links with the neuropathology department, which is essential for underpinning CBR human brain research. Also discussing their research on neurodegenerative diseases were genetic experts Professors James Gusella and Marcy MacDonald from Harvard Medical School. The internationally renowned team are collaborators with Professors Russell Snell and Richard Faull's HD transgenic sheep programme and they provided updates on their exciting research on the neurogenetics of Huntington's disease. You can read more about Russell's work in our feature on the Integrative Neuroscience Facilities.

CBR making headlines

Research groups across the centre have been featured in national and international news media.



Dr Cathy Stinear performing Transcranial Magnetic Stimulation

CBR in the news

Ever Wondered? The Centre for Brain Research featured in an episode of Kiwi science programme Ever Wondered? focussing on the brain. The episode in August featured Professors Mike Dragunow, Richard Faull, Alan Barber and Dr Cathy Stinear. The episode will be available on the Science Learning Hub <http://tvnz.co.nz/the-learning-hub/learning-hub-science-group-4095692>

Attitude TV Research on preterm babies with brain injury was featured in an episode of Attitude TV in August. Professors Laura Bennet and Alistair Gunn are researching ways of reducing brain injury. <http://tvnz.co.nz/attitude/s2011-e23-video-4354265>

Launch of Brain Recovery Clinic and Spinal Cord Injury Research Unit

The Brain Recovery Clinic was featured on One News in April at its exciting launch:

<http://tvnz.co.nz/health-news/new-brain-recovery-clinic-opens-in-akld-4137231>

Research on tinnitus at the clinic was also featured in The Listener:

<http://www.listener.co.nz/lifestyle/health/the-buzz-on-tinnitus/>

The launch of SCIRU led by Professor Louise Nicholson was featured in the NZ Herald in August.

http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10745183

The Human Brain: Disease and Cure

Professor Richard Faull was featured on Stratos TV in August, discussing his world-leading research on the human brain which has led to new insights into the treatment of brain disease.

<http://www.scoop.co.nz/stories/CU1108/S00162/the-human-brain-disease-and-cure.htm>



Positively Parkinson's

CBR scientists have advised with the development of a new book for Parkinson's patients. Written by former TV producer Ann Andrews who has Parkinson's disease, the book focuses on practical tips for people living with the condition. Professor Richard Faull and Associate Professors Bronwen Connor and Debbie Young and Dr Henry Waldvogel all contributed to the book.

Ann says that there is hope for people with Parkinson's. "The more you do for yourself, the more exercise you do, the more determined and bloody-minded you are, the better chance you've got," she says.



Dr Matteo de Nora CNZM has supported tinnitus research at the CBR

Supporters of CBR honoured

In the latest Queen's Birthday honours, several significant supporters of the CBR were honoured. Mr John Graham, CBE, ED, the former Chancellor of The University of Auckland was knighted (KNZM) for his extensive services to education and sport. Mrs Rosie Anne Horton, QSO, QSM, was made a Dame Companion of the New Zealand Order of Merit (DNZM) for her services to philanthropy in the Auckland region. Dr Matteo de Nora, of Monaco was made a Companion of the New Zealand Order of Merit (CNZM) for his services to yachting but of far greater relevance to the Centre for Brain Research, for his extensive contribution to research in the area of tinnitus. Matteo is the founder of the Tinnitus Research Initiative which links the world leaders in this field, including researchers here such as Dr Grant Searchfield and his team in the Department of Audiology.



Dr Donna Rose Addis is pictured here with Prime Minister John Key

Scientific Stars

Dr Donna Rose Addis was recently named a 'Rising Star' by the Association for Psychological Science. She was also selected from hundreds of nominees as one of ten New Zealand's 2011 Influencers by Unlimited Magazine in July. You can view Donna talking about her research here: <http://www.youtube.com/watch?v=NZEkpA8e-fk>.

Fellow psychologist Professor Mike Corballis was also appointed Sage Distinguished Fellow at the Sage Center for the Study of the Mind at University of California Santa Barbara during May. You can read more of Mike's distinguished research career in his book on the Recursive Mind.

Corballis, M. C. 2011. The recursive mind: The origins of human language, thought, and civilization. Princeton, NJ: Princeton University Press.

Celebrating research

Centre for Brain Research scientists are generating cutting-edge new brain research.



Brainwaves Emerging Scientists

Brainwaves

Emerging scientists from across the CBR are continuing to organise excellent seminars and workshops to develop our neuroscience research. The team of students, technicians and early career scientists are also keen to link to community groups and clinicians, and would welcome suggestions on community talks. If you would like to join Brainwaves, please email Dr Simon O'Carroll: s.ocarroll@auckland.ac.nz



Professor Martin Wild

Prestigious EU award

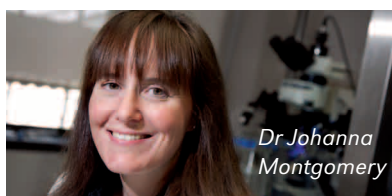
Professor Martin Wild from the Comparative Neurobiology and Neuroethology research team in the Department of Anatomy has been awarded a very prestigious EU Marie Curie Fellowship. The FP7 'International Incoming Fellowships' aim to benefit the EU European Research Area by attracting scientists from other parts of the world for a fellowship of 1-2 years. Around 137 of the 798 submissions that make it past the first round are awarded. Martin will be undertaking research into the reproductive pathways of birds, hosted by the laboratory of Jacques Balthazart at the University of Liege, Belgium.



Professor Richard Faull

Alumni talks

Professor Richard Faull recently spoke to alumni of The University of Auckland in Sydney and Melbourne. The talks in May focussed on 'The Excitement and Challenges of the Human Brain'. Richard is keen to forge links internationally to support research at the CBR.



Dr Johanna Montgomery

AWCBB

Dr Johanna Montgomery has been appointed the Chair of the Australasian Winter Conference on Brain Research, held annually in Queenstown. This conference is the primary neuroscience conference in New Zealand and it now forms part of Queenstown Research Week, a week-long celebration of our science research. She aims to further grow the national and international appeal of the conference and attract more New Zealand and Australian neuroscientists.



Professor Laura Bennet leads a HRC project looking at brain injury in preterm babies, which includes student Miriam Koome

Poster prizes

PhD student Eric Kim won the Wexler Prize for the best poster in the science section at the International Huntington's Disease Conference. Eric is part of Professor Richard Faull's group, and was thrilled to be presented with the prize by Nancy and Alice Wexler at the concluding ceremony of the conference.

The annual Faculty of Medical and Health Sciences student research awards, HealthX, saw the top prize of the day being presented to Miriam Koome from the Fetal Physiology and Neuroscience group. Miriam was awarded the Auckland Medical Research Foundation Emerging Researcher prize, for her study considering the use and safety of steroids as a standard clinical treatment for preterm babies, conducted with supervisor Professor Laura Bennet. Miriam was presented with her award and \$5,000 travel prize by AMRF president Jeff Todd.

In the poster category, Rebekah Bower, an honours student from Dr Debbie Hay's group (co-supervised by Dr Henry Waldvogel) was awarded the first prize of \$1000 for her work researching the location of the appetite hormone amylin receptor in the human brain.



Professor Ian Martin at the launch of the CBR

Advisory Board Chair international role

We are delighted to congratulate Professor Ian Martin on his appointment to the new position of Deputy Vice-Chancellor (Strategic Engagement). Professor Martin has been the Dean of the Faculty of Medical and Health Sciences and the Chair of the CBR Advisory Board. As Dean he has led the Faculty through a period of substantial growth in its teaching and research activities, a major redevelopment of the Grafton Campus and a substantial increase in philanthropic support including the CBR. As Deputy Vice-Chancellor (Strategic Engagement), Professor Martin will have responsibility for International Relations (taking over this function from the previous Pro Vice-Chancellor (International) position), Government Relations (national and local), Communications and Alumni and Advancement. Professor Ian Reid will manage the role of Dean of FMHS while a new appointment is made.

Brainiacs take over Auckland

A lifelong love of learning took centre stage at the Auckland Business School on Saturday 19th March, when the Centre for Brain Research held its annual public Brain Day.



Over 3000 people visited the free event, which forms part of international Brain Awareness Week. The open day is held in association with the Neurological Foundation of New Zealand, and aims to raise awareness of brain research. According to the Dana Foundation, who organises the international campaign, the event is the busiest of its kind in the world.

Visitors were engaged on every level, with brain painting and 'play-dough surgery' for budding neuroscientists and neurosurgeons, right through to tips on ageing well for those at the other end of the life spectrum.

Scientists from across the centre gave a series of lectures in the Fisher and Paykel Appliances Auditorium, which were filled to capacity. Neurologist Professor Alan Barber, the Deputy-Director of the centre, spoke about his research into stroke and the need to treat patients urgently. Psychologists Associate Professor Karen Waldie and Professor Ian Kirk talked about child development and learning and memory, while movement scientist

Professor Winston Byblow prescribed exercise for keeping your brain young.

Professor Suzanne Purdy talked about her team's research on music and language, including updates on the CeleBRation Choir. The final exciting talk of the day came from neurosurgeon Dr Edward Mee, recounting the history of surgery on the brain.

Children were also catered for, with a series of workshops and lectures helping young adults to experience the brain. One of the lecturers was neuroscientist, Dr Johanna Montgomery. "It's really important to us to be able to tell the public what brain scientists do," she says. "We love what we do – the brain is such an amazing organ. To be able to convey this to adults and children alike and enable them to see how cool it is to be a neuroscientist is great for the present and the future of neuroscience and health research in New Zealand."

Community groups from all over Auckland

also took part in the day, with a Community Expo providing information on many different neurological conditions. It was a chance for people with similar interests to find out vital information on the services available to people with brain disease.

New to 2011 was the addition of the 'Brainiacs Kids' Club'. Young adults of all ages made their own brain model and then used the model as a map, to explore a giant tour of the brain around the event. Science experiments were laid out on this 'Mind Map', demonstrating brain anatomy, our senses and movement control.

Neurophysiologist Dr Cathy Stinear was the organiser of the science labs. "We had a range of interesting activities to demonstrate some fascinating things about the brain," she says. "If you've ever wondered how you can be tricked by illusions, or what a real human brain looks like, then you can discover the answers to these and many more questions at Brain Day. We're really pleased by the success of the event and are already planning for next year!"



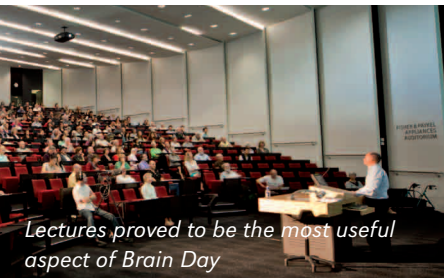
There were many activities for budding scientists with the 'Brainiac Kids' Club'

Brain Day Research

You may have been handed a yellow sheet at this year's Brain Day – all visitors were asked to fill in a questionnaire to evaluate the event. The results were very exciting, showing that the average age of attendees was 47 years old, but with an age range from 8 to 84 years. 21% had a neurological condition, and 10% were caring for someone with a neurological condition. Although most people (79%) rated the lecture series as the reason they attended, many also visited the community expo (59%), and the laboratory demonstrations (33%). When rating aspects of Brain Day, participants' average response was 'strongly agree' for the statements 'I learnt something useful', 'I think lectures are a good way to gain information on brain research', and 'I would recommend Brain Day to my friends'. Comments and suggestions included better signposting and healthier food, which we will work on for next year.



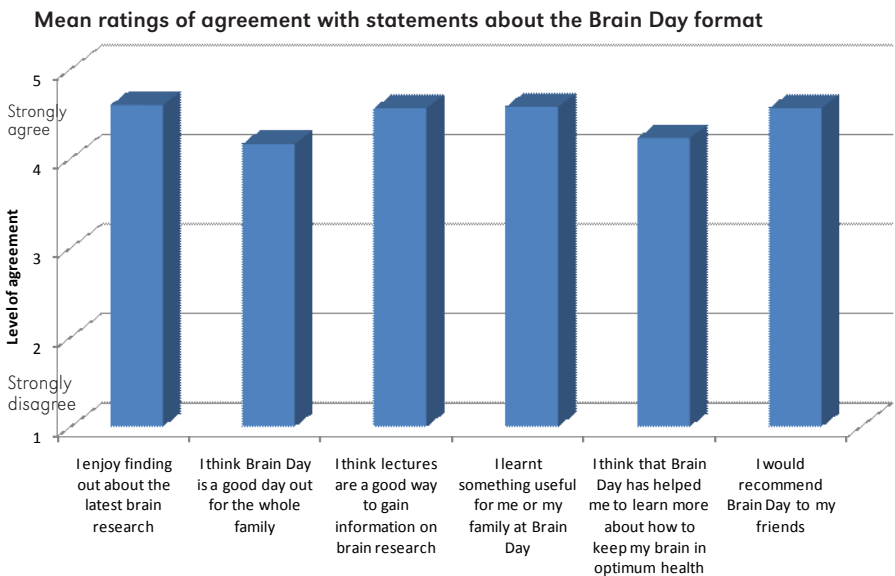
Brain Day research will help us to improve future events



Lectures proved to be the most useful aspect of Brain Day



Human Brain Bank Technical Manager Jocelyn Bullock with Arnav Shetty



Participants were asked to rate agreement from 1= strongly disagree, to 5=strongly agree.

Be a Scientist for the Day

Budding scientist, 11 year old Arnav Shetty, was amazed to win the prize to 'Be a Scientist for the Day'! Arnav took part in the research to evaluate Brain Day, and was the lucky person drawn from the respondents. He was treated to a tour of the Neurological Foundation Human Brain Bank, with Technical Manager Jocelyn Bullock as his host. Arnav met the students in Professor Richard Faull's team, and says he loved learning about the brain. "I really enjoyed the day and learning about the brain. The friendly and highly intelligent staff and students working here are very inspiring and full of fun and humour".

Date for your diary!

Brain Day 2012 will be held on Saturday 17th March 2012.

Waikato Lions Brain Bank Tour



The Waikato Lions Club was the proud winner of a charity auction tour of the CBR, with a \$3000 donation at the Huntington's Disease Auckland charity dinner. The group opened the tour to MS Waikato members, and a 30 strong group of science enthusiasts visited the Medical School in September. The group received a lecture from Professor Richard Faull and Dr Maurice Curtis, and then a tour of the Neurological Foundation Human Brain Bank. Tour organiser Peter Knox says that his friends were so interested in learning more about

the brain bank as his wife Janelle has Huntington's disease. "We are so grateful for this amazing opportunity to glimpse what is happening in the world of brain research," he said. "Unravelling the secrets of science took new meaning when those of us who will benefit from the work that the team carries out could see and touch the future. We all hold on to the hope that you will find those magic discoveries and I am sure you all mirror that same hope by wishing to discover them."

Eureka!

In this special feature we look at the journey of research through the Integrative Neuroscience Facilities.

“The drugs of tomorrow start with the research of today.” Associate Professor Bronwen Connor, Director of the INF

With a shock of white hair flying wildly about his face, the mad scientist lets out a wail of excitement. Down the lens of the microscope lies the answer to a scientific mystery which has been puzzling researchers for decades. Sending lab books flying, the scientist leaps up and runs wailing down the corridor to let the world know his discovery...

It's the Eureka moment we imagine every scientist has at least once in their lifetime. Yet the truth is that research is usually a long, painstaking process, with new discoveries only arising through many scientists building on each other's knowledge. Indeed, the breakthrough is usually just the beginning.

That's why the Centre for Brain Research has established the Integrative Neuroscience Facilities (INF), bringing together pre-clinical scientists from across the centre to share resources and experience. In this special feature we take a look at the breadth of research in the INF, and explore the research process.



Fishing for genes

As we've seen with the Rugby World Cup, New Zealand has a wonderfully diverse population. People from all over the world have made this beautiful land their home, and proudly wear the All Blacks fern motif on their face. It's this sea of heritage that excites geneticists like Professor Russell Snell.

“Genetic population studies are like casting your net out for an interesting catch,” says Russell. “We don't know what we will find, but we know that the population diversity in New Zealand makes it a special place to do this research.”

Russell's team is one of the leading genetic research groups in the world looking at neurodegenerative disorders like Huntington's and Alzheimer's disease. Russell was part of the international team that discovered the Huntington's disease (HD) gene in 1993 – a discovery that revolutionised HD care. Now his team, based at the School of Biological Sciences, is keen to further understand the genetic causes of brain disease.

“One of the major challenges in studying disease is sorting out what is responsible for initiating the disease process and its critical symptoms, from those that are a consequence of the disease,” Russell explains. “One way of approaching this conundrum is to look for genetic clues that can be proven to either initiate the disease or modify its progression. These clues ultimately are tracked down to be mutations or actual DNA changes in genes, which we then know are definitively involved in

the disease process.”

“Ultimately understanding the genetics including risk factors which underlie our susceptibility to a disorder empowers us to understand the disease – and hopefully a way to do something about these terrible illnesses.”

Russell is working with a team of scientists and clinicians to bring this goal closer. In conjunction with the Biobank, the group is developing a process to collect human tissue for research. Patients and volunteers will donate blood to the Biobank, which will then be analysed for any genetic changes. Screening millions of DNA sequences should enable the team to spot differences in genes or the products of genes, which means they have a starting point to work out the disease process.

“Research into these diseases starts first and foremost with patients, and indeed without patients and research participation we can't discover anything,” Professor Russell Snell

While the research is being developed Russell is keen to encourage patients to sign up to the CBR's Research Volunteer Register. This allows the CBR to keep volunteer's contact details so that when a suitable research study comes up participants can be informed. “Research into these diseases starts first and foremost with patients, and indeed without patients and research participation we can't discover anything,” says Russell.



Professor Russell Snell's team at work in the School of Biological Sciences

Indeed Russell is excited about the potential of the new Biobank for patients. "As we're discovering around the world, the fastest progress can be made when you have many talented and skilled people working together, and that's what we have here in the CBR. It's one of the joys of our Kiwi informality, as anyone can talk to anyone, with free thought and discussion. Ultimately it means we can make observations that others may miss."

You can find out more about the CBR Research Volunteer Register on our website: <http://www.fmhs.auckland.ac.nz/faculty/cbr/contact/volunteers.aspx>

Designing disease models

Huntington's disease is an incurable genetic brain disorder, where sufferers generally develop uncontrolled movements and sometimes psychiatric problems in midlife. It's this late onset which has been hard for scientists to study, as previous disease models tended to develop symptoms immediately. It's a problem which Professor Russell Snell and his team were keen to solve.

Working with Professor Richard Faull and with generous support from the Freemasons of New Zealand, the group have developed a new model to better understand how the gene causes the disease. Using cutting-edge technology, the group has transferred an entire human HD gene into sheep, and are now researching the effects. Sheep were chosen as they have comparatively large and complex brains like humans and a long lifespan and so make an ideal animal to study.

"We're looking at the progression of the disease, as we want to see if we can spot molecular changes before any symptoms appear," says Russell. "This slow disease

progression means we could potentially have a window of opportunity, where we can test a treatment to slow or even halt the condition – before any symptoms appear."

Ten years on and the project is now attracting significant international interest. The sheep are studied in Australia, and thanks to support from the 'Cure Huntington's Disease Initiative' in the USA, the research team now includes scientists from New Zealand, Australia, USA and the UK.

"It's been a tough project for us to get off the ground, but now it's doing exactly what we're after," says Russell. "This is a catalyst for many experts to get together, and ask questions which one day may make a difference."

Molecular detectives

If researchers like Russell are the detectives of the science world, it's scientists like Associate Professor Nigel Birch who are the Crime Scene Investigators. Once an interesting gene or molecule has been identified, a whole team of scientists come on board to try to work out what it does. Using a range of molecular, cellular and behavioural tests, gradually a picture of its function is pieced together.

Nigel is the Deputy-Director of the Integrative Neuroscience Facilities, and his team is particularly interested in nerve cell communication. "Neuronal function underpins human behaviour; it makes us who we are," says Nigel. "And neuronal function requires communication between nerve cells across synapses. So it's absolutely critical that we characterise and identify molecules that guide this process of connection between neurons."

A synapse is a gap between two nerve cells, where electrical messages are transferred through a rush of molecules. The stronger these connections are, the more messages can be transferred, ultimately enabling us to

learn and make new memories. The process is known as synaptic plasticity, but it's thought it goes wrong in many diseases.

"We're looking at a synaptic molecule called neuroserpin," says Nigel. "In patients with schizophrenia, the expression (production) of neuroserpin has been altered, indicating it may play a role in the development of the disease."

"Indeed, there's evidence in many brain diseases that individual connections between neurons are compromised. We need to understand how these connections are made and change over time, and characterise the molecules that regulate this plasticity."

"For New Zealand to stay at the forefront of international neuroscience we need to have high-level expertise at our fingertips. It's only then that we can make significant advances in neuroscience, by fully understanding nerve cell function." Associate Professor Nigel Birch

Researchers across the Integrative Neuroscience Facilities are studying critical molecules to better understand what goes wrong in brain disease. Alongside Nigel in the School of Biological Sciences, Associate Professor Tom Brittain is studying neuroglobin, a neuroprotective molecule that blocks nerve cell death, while Associate Professor David Christie is working on the creatine transporter, a molecule that plays a critical role in energy metabolism in the brain. Nigel also collaborates with researchers like Dr Johanna Montgomery, who studies synapse function. By linking together, the INF provides a pipeline of research from genes, to cells, to disease models and ultimately into humans.

Continues overleaf



Professor Russell Snell



The Huntington's disease sheep model



Associate Professor Nigel Birch with Honours Student Annie Yang

Eureka!

Our feature on the Integrative Neuroscience Facilities continues.

While the CBR is recognised as excelling internationally at this preclinical research, more support is urgently needed. Currently each research area is project funded, which means that critical expertise and knowledge can be lost when staff members leave. Now the INF team is keen to future-proof its research with a skilled technician who can train new students and staff.

"To do research we need sophisticated equipment and highly trained researchers to operate it," says Nigel. "For New Zealand to stay at the forefront of international neuroscience we need to have high-level expertise at our fingertips to use the technology optimally. It's only then that we can make significant advances in neuroscience, by fully understanding nerve cell function."

From the laboratory to the clinic

Huntington's disease ravages the human brain, slowly killing millions of brain cells, each responsible for normal human functioning.

By the end of a sufferer's life, the brain is so shrunken you can see the changes with the naked eye. Research in the CBR has shown that this cell death corresponds with the severity of the symptoms. So, what if we could find a way to keep the cells alive?

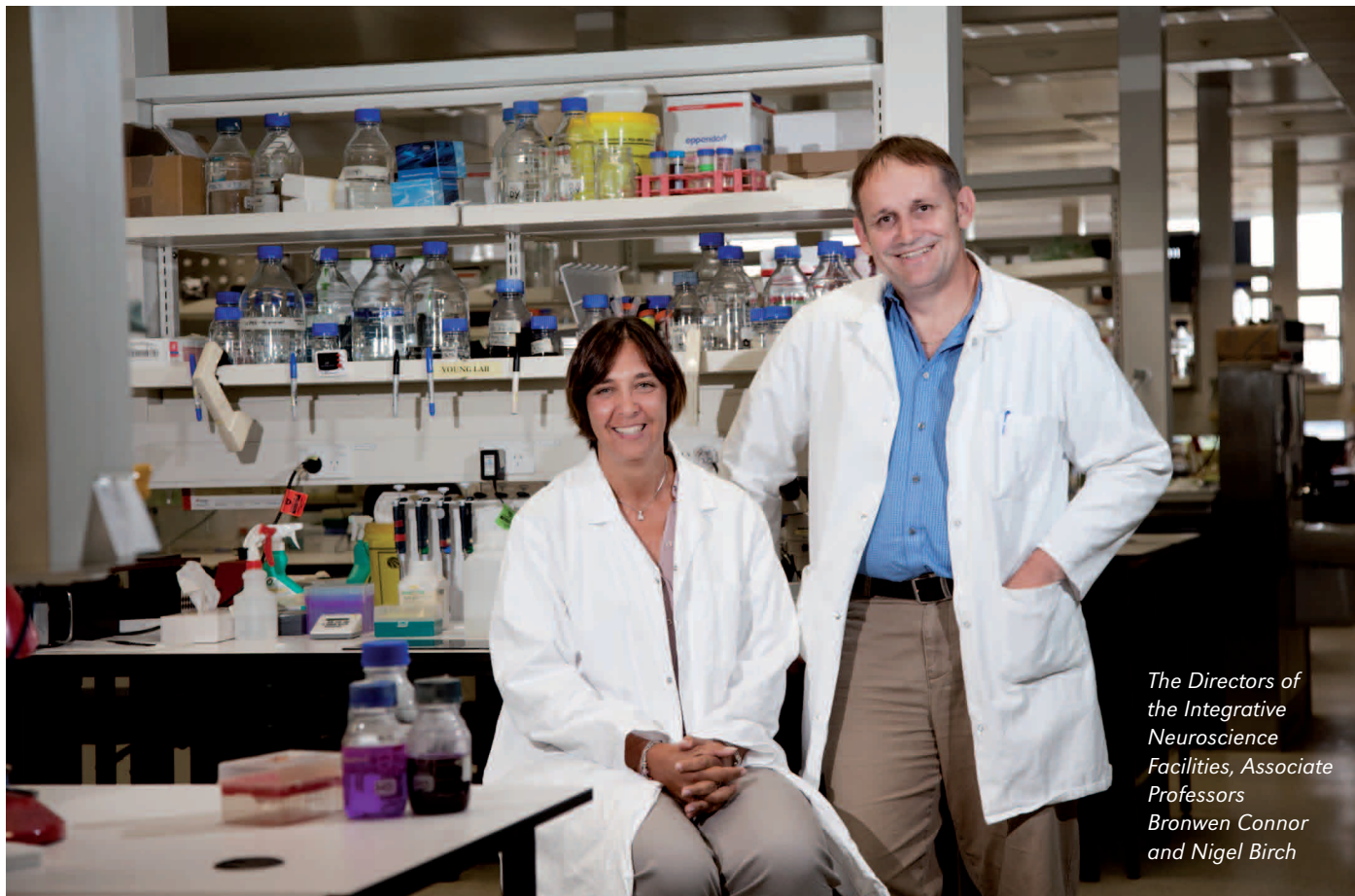
That's the hope of Associate Professor Bronwen Connor, who is the Director of the Integrative Neuroscience Facilities. Her research team has shown that increasing the levels of a molecule called Brain Derived Neurotrophic Factor (BDNF) can actually keep cells involved in Huntington's disease alive. Using a cutting-edge technique, the team use a virus called Adeno-associated virus, to transfer BDNF into GABA-ergic neurons in the basal ganglia of rats. When these cells are attacked by a neurotoxin involved in Huntington's disease acid they seem to be better protected and stay alive. Not only that, but movement problems are also prevented.

Now the 'Cure Huntington's Disease Initiative' in the USA, a major funder of HD research, has given the group \$1 million to progress the research towards a clinical trial. Bronwen is very excited by the possibilities of the

funding; "We are now testing this treatment in the most clinically relevant HD rodent model available - we are the only group in Australasia able to use this disease model. The rats develop symptoms progressively just like humans, so it means we can test this treatment before any symptoms appear."

"Over time we look at the effects on the rats' movement, cognitive function and behaviour. Ultimately we then look at their brains, to see if we have prevented the disease from taking hold. It means we could be developing a therapy for HD right here in New Zealand"

"The really exciting thing about the Integrative Neuroscience Facilities, is that we have so much expertise right here, from genetics, to cells to disease models. We have collaborations with scientists who can find new drug targets, all the way through to testing in clinically relevant models." Associate Professor Bronwen Connor



The Directors of the Integrative Neuroscience Facilities, Associate Professors Bronwen Connor and Nigel Birch



Dr Debbie Hay, Associate Professor Nigel Birch, and Professor Russell Snell in the School of Biological Sciences

The study is the final stage of testing before the method is taken into human clinical trials. Testing in animal models is essential to ensure new treatments can both protect cells and prevent the clinical symptoms of a disease. Bronwen says the data will be invaluable to see if the treatment can actually prevent symptoms - keeping brain cells alive could mean that patients stop shaking, or can move out of a chair. Ultimately, it means patients could have a better quality of life.

"The really exciting thing about the Integrative Neuroscience Facilities," says Bronwen, "is that we have so much expertise right here, from genetics, to cells to disease models. We have collaborations with scientists who can find new drug targets, all the way through to testing in clinically relevant models."

"Now with the Brain Recovery Clinic we even have direct links to patients, so it means we can feed into early phase clinical assessments to find out what patients need and want. We see so much potential for our research in the INF actually making a difference to patients, and we're very excited by that."

If you would like to support research at the Integrative Neuroscience Facilities, please contact Communications and Liaison Manager Laura Fogg at cbr@auckland.ac.nz

Targeting migraines

Imagine driving along a road when suddenly black and white jagged stripes flicker through your windscreen.

Next minute a bolt of lightning hits and your head is put into a vice. And then you are hit by an overwhelming wave of nausea. Would you think you were going mad? Or just recognise it as a migraine?

This overwhelming array of symptoms is the experience for an estimated 20% of women, and overall 10-15% of the population, who suffer from migraine headaches. It's a huge economic drain for New Zealand, with thousands of people missing work every year through being unable to function.

"Migraines cause so much suffering for people, and yet we know very little about how they are caused," says Dr Debbie Hay. "Scientists are still arguing about whether to target nerves or blood vessels as the key to treating migraine, and there are very few medicines on the market. While there are some effective drugs to relieve pain, there is nothing yet available to prevent a migraine from happening."

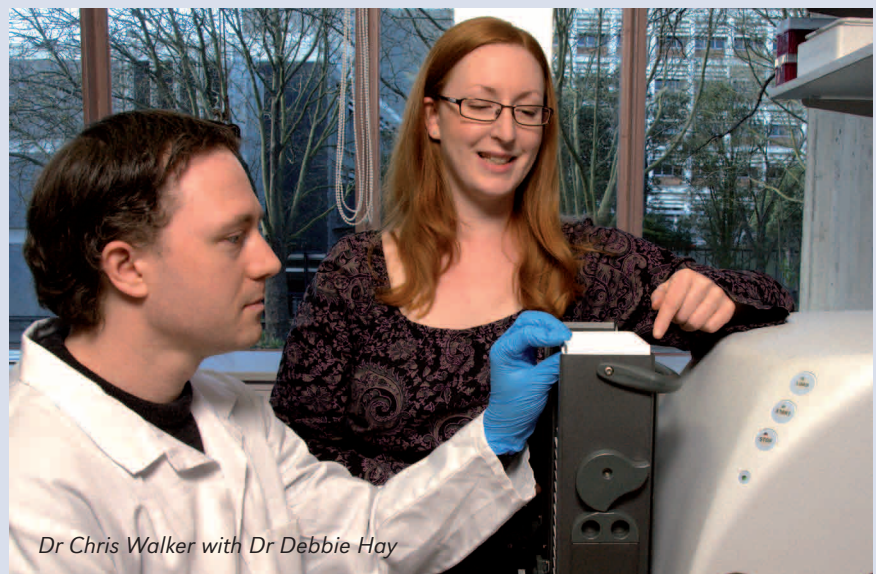
Debbie and her team in the School of Biological Sciences are hoping to develop new preventative migraine drugs. The team are working on a cellular signalling molecule called CGRP, which is found in high levels during a migraine attack.

By analysing its signalling pathways in neurons, they aim to fine tune the cellular process so that CGRP levels are less active. The team is currently studying individual rat cells, but they hope to move to human neurons in the near future.

"The trigeminal ganglia is our focus," says Debbie, "as this is the nerve cell hub which coordinates head pain processing. We're working with Professor Richard Faull and the Human Brain Bank to develop our studies with human cells. Once we have this information, we're really excited we can move towards developing more effective treatments for sufferers."

The results from Debbie's work will also have implications for dental pain and conditions such as trigeminal neuralgia. "That's the exciting thing about fundamental research," enthuses Debbie. "We often start out looking for one solution, but along the way we make new discoveries which help other conditions. If you never ask questions, you will never find answers."

You can read more about Debbie's work in her latest journal publication: Archbold JK, Flanagan JU, Watkins HA, Gingell JJ, Hay DL. Structural insights into RAMP modification of secretin family G protein-coupled receptors: implications for drug development. Trends Pharmacol Sci. 2011 Jun 29.



Dr Chris Walker with Dr Debbie Hay

Funding success

Research across the CBR has been boosted with generous funding support



Greg Dunning presenting funding support to Professor Richard Faull

Kayaking for Parkinson's and Alzheimer's research

The North Shore Rotary Club recently presented Professor Richard Faull with a \$4000 cheque, thanks to the efforts of Greg Dunning. Greg is a keen kayaker, and decided to plan an adventure to beat all adventures by kayaking the Mississippi River from source to the sea. He travelled through 10 states and paddled 3700km through wilderness areas, 29 dams and locks and then through commercial shipping in the later part of the journey.

He averaged 50kms per day for 70 days to achieve his dream. Greg says he treated the journey as a series of day paddles, setting a number of smaller goals to achieve, which he knocked off to make his final destination. The Rotary Club sponsored his epic journey to raise \$4000 towards Parkinson's and Alzheimer's research in the Centre for Brain Research. Greg's daughter works in this area of research in the USA, and so it is a cause close to his heart.

New Zealand Tinnitus Support Network

The New Zealand Tinnitus Association has donated \$12,000 to the Audiology Section, which works with the Centre for Brain Research. This funding will be used to establish the New Zealand Tinnitus Support Network, to help people suffering from ringing in the ears.

Dr Grant Searchfield is the Head of Audiology and says, "We've always been supportive of the Tinnitus Association, and over the years we have been doing very similar things for the community. So it's very exciting that we're now joining forces to help patients, as together we can do more."

The funds will be used to promote community awareness of tinnitus and how it can be prevented by limiting exposure to excessive noise. The Audiology team will also offer support and counselling services for people with tinnitus. Research in the CBR is showing that brain training can help people to focus away from the sounds they can hear.

"Our students will be running a consulting service by phone, internet or one on one, so that patients can get advice," says Grant. "We can provide not only the latest research focussed advice to GPs and health professionals, but also being community focussed means that patients can shape our research activities to find solutions to problems they want answered".

For more information, please visit www.tinnitus.org.nz

To book an appointment at the Hearing and Tinnitus Clinic, please contact: tinnitus@auckland.ac.nz

New hope for neurological patients with Health Research Council Funding

Groundbreaking research developing new treatments for neurological disorders has been given the go-ahead with funding from the Health Research Council of New Zealand (HRC). Over \$7 million of new grant funding has been awarded to scientists working in the Centre for Brain Research.

The new programmes include \$4.46M over five years to Professor Mike Dragunow and his team running the Biobank and Human Brain Bank. Over 100,000 New Zealanders are currently living with neurodegenerative conditions. The rate of Alzheimer's disease is increasing in New Zealand, and CBR researchers are contributing to the global effort to find more effective treatments to combat this, and other devastating neurological disorders.

Professor Dragunow will work with Professor Richard Faull and other scientists to study the underlying causes and treatments for Alzheimer's, epilepsy, Parkinson's, and Huntington's disease. The world-class team of neuroscientists and chemists has well-developed linkages with neurosurgeons, gerontologists, other clinical groups in the District Health Boards involved in clinical trials, and with NZ Biotechnology industries. Their goal is to translate lab-based research into therapies for patients suffering from neurodegenerative diseases.

Other projects funded include a study to determine personalized treatment pathways for stroke patients. Dr Cathy Stinear and her team at the Brain Recovery Clinic will use MRI and other techniques to define the rehabilitation strategy which will work best for each patient. In another project, Professor Laura Bennet's team will examine whether stem cells could help brain-injured preterm babies.

The CeleBRation Choir will also be studied as a potential therapy for people with communication disorders. Professor Suzanne Purdy will link with a multi-disciplinary team including speech language therapists, qualitative researcher Associate Professor Stephen Buetow, rehabilitation expert Professor Kathryn McPherson from AUT, music therapist Alison Talmage and CBR Communications Manager Laura Fogg. The team will look at therapeutic outcomes from being part of the CeleBRation Choir, for people who have problems talking because of a stroke, along with people with Parkinson's disease who can develop voice or speech problems.



Dr Grant Searchfield (right) discusses use of donated funds with Greg Gable, board member of the NZ Tinnitus Association



New research will investigate therapeutic outcomes from CeleBRation Choir involvement

Grants

- Professor Michael Dragunow
Neurodegeneration in the Human Brain - Mechanisms and Therapeutic Targets
60 months, \$4,467,504
- Professor Laura Bennet
Can Pluripotent Amnion Epithelial Cells help the Injured Preterm Brain?
36 months, \$1,154,402
- Professor Alan Barber and Dr Suzanne Barker-Collo with Professor Valery Feigin
at AUT Extension to the Traumatic Brain Injury Burden in New Zealand Study
14 months, \$345,465
- Dr Cathy Stinear
TRIO: Targeted Rehabilitation, Improved Outcomes
36 months, \$1,126,268
- Professor Suzanne Purdy
SPICCATO: Stroke and Parkinson's Community Choir Engagement and Therapeutic Outcomes
12 months, \$149,986

Grant funding success for CBR researchers

Scientists at the Centre for Brain Research have been awarded almost \$500,000 for four new research projects. The funding comes from the Auckland Medical Research Foundation and the Neurological Foundation of New Zealand.

Induced neural precursor cells (\$144,023 – 2 YEARS)

A/Prof Bronwen Connor, Dr Christof Maucksch, Dr Mirella Dottori, A/Prof Cris Print, Dept of Pharmacology. Funded by Auckland Medical Research Foundation.

It has long been considered that once a cell reaches maturity it is unable to change to a different cell type. However, recent advances in stem cell biology have shown that mature cells, such as skin cells, can be transformed back to an "embryonic-like" stem cell state where cells exhibit pluripotency (the ability to become any cell type) by the forced expression of specific genes (reprogramming). Advancing

this capability, we propose it is possible to convert one cell type to another directly, without the need to first revert the cell to a pluripotent stem cell state. This project aims to establish an innovative approach for generating immature brain cells (neural precursor cells) directly from adult human skin. Of major significance is that this will avoid the need to generate an intermediate embryonic stem cell phase, providing neural precursor cells for research and therapeutic applications without risk of tumour formation from pluripotent stem cell contamination. This project will establish cell reprogramming as a key capability in New Zealand. The ability to directly generate human neural precursor cells offers a powerful system for studying brain development, modeling neurological disease, drug discovery and eventually, cell replacement therapy.

The synaptic basis of autism (\$136,351 – 1 YEAR)

Co-funded by Auckland Medical Research Foundation and the Neurological Foundation
Dr Johanna Montgomery, Prof Craig Garner, Dept of Physiology & Centre for Brain Research.

Autism Spectrum Disorders are complex disorders that are diagnosed based on behavioural symptoms including social and cognitive impairments, communication difficulties and repetitive behaviours. Interestingly, many of the genes that have been implicated in Autism encode proteins found at excitatory synapses in the brain. In this research the team will form an international collaborative research effort to test the hypothesis that the Autism-associated mutations in these synaptic proteins disrupt the function of synapses. Using electrophysiology recordings as a measure of synapse function, the team will compare how proteins that are associated with Autism can alter synapses in the hippocampus, the part of the brain critical for cognitive functions such as learning and memory. They will also begin to determine the mechanisms underlying how these changes occur. These experiments have the potential to determine how the formation,

plasticity and maturation of excitatory synapses may be disrupted in Autism, leading to interference with cognitive function and behaviour.

CB2 in the brain (\$74,457 – 1 YEAR)

Prof Michelle Glass, Dr Scott Graham, Dept of Pharmacology & Clinical Pharmacology. Funded by Auckland Medical Research Foundation.

Cannabinoid CB2 receptors have been suggested to be an appealing target for neuroinflammatory disorders as many believe them to be found only on immune cells. However, their distribution is actually highly controversial with some groups reporting wide spread neuronal distribution, while others see little evidence for CB2 in the brain. Part of the reason for these discrepancies are that the antibodies used to detect this protein are not entirely specific. Furthermore, many of the assumptions about CB2 expression in the brain are based on animal studies and may not represent the situation in the human brain. As many drug companies are aiming to bring CB2 directed therapies onto the market it is critical that the localisation of the receptor be accurately determined. This study aims to optimise a sensitive method which will allow for the determination of CB2 gene expression in the normal healthy human brain.

Validation of the EpiNet platform and the EpiNet study group

Dr Peter Bergin, Auckland City Hospital, Auckland (\$85,464)

Funded by the Neurological Foundation.

In the July 2009 grant round, the Neurological Foundation approved funding for Dr Peter Bergin's international collaborative pilot study which set up an internet-based platform to recruit patients for epilepsy drug trials. The platform, called EpiNet, is now functioning and is able to be accessed by adult and paediatric neurologists from anywhere in the world. In this second study phase, the EpiNet study group, led by Dr Bergin and involving an international collaboration of epileptologists, will undertake a study to validate both the EpiNet study group and the EpiNet platform before undertaking clinical trials. The group will circulate 50 fictitious case histories to doctors who have expressed interest in participating in the EpiNet project, and ask them to enter details into the EpiNet database, using standard and internationally approved epilepsy classification systems. Investigators' results will be compared. As well as confirming that investigators 'speak the same language' globally, the study will also determine how much variability there is when classifying individual cases using the classification schemes. At the same time, the group will undertake steps to confirm that the database and systems procedures are robust.

Aotearoa Foundation Fellowships

The Aotearoa Foundation Neuroscience Postdoctoral Fellowships are a generous gift from Julian Robertson's Aotearoa Foundation in New York.

The new fellowships aim to support development of the Centre's strategic initiatives, to help foster future research leaders here in New Zealand, and to progress world-class neuroscience across the Centre for Brain Research. With a large number of excellent candidates, appointing the fellows was a difficult task for the selection panel.

Professor Peter Thorne led the process; "We have been so impressed by the calibre of young scientists applying to work at the CBR. It was a hard choice, but we were won over by the excellent quality of the applications, the enthusiasm of Gjurgjica and James for their research projects and their superb achievements to date."

Introducing Dr James Coxon

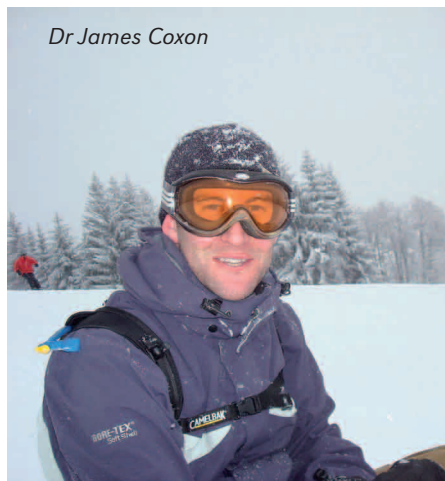
James will work in the laboratory of Professor Winston Byblow, along with Professor Greg Anson, Dr James Stinear and Dr Nick Gant.

What a fantastic opportunity to get the CBR postdoctoral fellowship. What research will you be working on?

Thanks, it's great to see this sort of opportunity being offered at Auckland and I'm excited to be joining the CBR. I'll be conducting research on the aging brain and the benefits of exercise on neuroplasticity. Basically, we're going to make a group of 60+ers get a sweat on for a few months and see to what extent this improves their cognitive & motor function. We'll use MRI scans and non-invasive brain stimulation to quantify changes in brain structure and function with the aim towards showing that exercise later in life can protect against neurodegeneration.

What's been your career to date to bring you to this point?

I studied Sport and Exercise Science at Auckland University and completed my PhD in Movement Neuroscience in 2007. I then took up a postdoc in Belgium, the home of strong beer brewed by monks, twice-fried fries with mayonnaise, waffles and chocolate. It's a good thing everyone rides a bike to offset all those calories. I've been based at the K.U. Leuven within the Research Center for Movement Control and Neuroplasticity. My research in Leuven has investigated cognitive control



Dr James Coxon

of action in the aging brain using functional Magnetic Resonance Imaging and diffusion imaging of white matter tracts - the axons of nerve cells which electrical messages travel through.

What interests you about this area of research? What are your biggest hopes for it?

I'm fascinated by the complexity of the human brain, and the idea that our brains are sculpted by what we do throughout life. Intuitively, I think we all know that exercise is not just good for our bodies, it's good for our brain as well. Hopefully science can provide enough evidence to support this intuition such that individuals, corporations, and governments take action. Who knows, perhaps there'll be fewer years spent on this earth suffering from neurodegenerative disease.

What interests you about being part of the Centre for Brain Research?

I think the Centre has a great vision. It's a reflection of the way New Zealanders view the world. We get our hands dirty, help each other out, and make the most of what resources we have. This can lead to quite an innovative approach to science.

What would you say is the most exciting area in neuroscience right now?

Tough question - I've been in Belgium for four years where people rarely show their excitement about anything. Just the other day I was reading that if you connect young and old mice together such that they share a blood supply, the brains of old mice show increased



Dr Gjurgjica Badzakova

neurogenesis. That's pretty exciting, but a scary proposition for us humans...

Now about you. Where are you from and what brought you to Auckland?

I grew up in Hawke's Bay and made the unconventional choice to move to Auckland for my university education. For several years I enjoyed living in a big, multicultural city with all it had to offer in terms of festivals, food, and outdoor activities. After some time away in a small European town, the decision to move back is partly motivated by the knowledge of what Auckland has to offer.

"I think the Centre has a great vision. It's a reflection of the way New Zealanders view the world. We get our hands dirty, help each other out, and make the most of what resources we have. This can lead to quite an innovative approach to science."

Dr James Coxon

It's your day off. How would you spend your perfect day?

My perfect day involves a snowboard and clear blue skies after a large snowfall. If it's summer time, I'll settle for a spot of fishing and a swim followed by a nice NZ wine with friends and family while I spark up the BBQ.

Where would you recommend people visit in New Zealand?

The far north. Matai Bay is a nice spot to get away from it all.

Introducing Dr Gjurgjica Badzakova

Gjurgjica will work in the laboratory of Dr Lynette Tippett, along with Dr Suzanne Barker-Collo, Professor Mike Corballis and Professor Rob Kydd.

What a fantastic opportunity to get the CBR postdoctoral fellowship.

What research will you be working on?

My research will focus on traumatic brain injury (TBI), which is caused when an external force injures the brain. Even a mild TBI can result in a range of complaints such as headache and dizziness, tinnitus, depression and irritability, poor memory and/or concentration, weakness or numbness in extremities, and loss of coordination. Very often, many patients with mild TBI report significant symptoms despite conventional imaging scans such as magnetic resonance imaging (MRI) and computerised tomography (CT) showing no obvious abnormalities. It is believed that these symptoms are primarily due to more subtle diffuse axonal injury. This is the white matter in the brain which electrical messages are transmitted down, and which may not be captured with these techniques. Our project will utilise diffusion tensor imaging (DTI) in order to understand the exact underlying neuropathology of white matter following mild TBI. This technique relies on measuring the isotropic diffusion of water in neural cells, and initial reports have shown possible alterations in white matter connections in mild TBI. The major aims of this project include investigating the nature of these white matter abnormalities, their course over time, and, most importantly, the functional significance of these in terms of neuropsychological outcomes.

What's been your career to date to bring you to this point?

I completed all of my studies here at the University of Auckland. I have a BSc degree, with majors in psychology and statistics, and I then completed an Honours degree followed by a PhD in the field of Cognitive Neuroscience in the Department of Psychology. Neuroimaging techniques, such as functional magnetic resonance imaging (fMRI) and electroencephalography (EEG), along with behavioural measures and

neuropsychological tests were central to my research. Following my PhD, I worked as a post-doctoral fellow with Professor Michael Corballis on a neuroimaging study using fMRI and DTI looking at cerebral asymmetries and mirror reversals in twins and controls. For the last two years, I have also been studying part-time towards a Postgraduate Diploma in Clinical Psychology due to my desire to register as a clinical psychologist and work with people in clinical settings. This will be my second post-doctoral fellowship and I am very excited that my new project will combine neuroimaging research with clinical work.

What interests you about this area of research? What are your biggest hopes for it?

Brain imaging using advanced scientific technologies such as MRI, is now a fundamental component of brain research. This became quite obvious at the recent International Neuropsychological Society (INS) conference held in Auckland two months ago. I was very excited to see this new direction in research being advocated by leading scientists in the field. However, the biggest hope for me is that we can help people in some way. This can be through using DTI as a potential biomarker, or indicator, of brain injury. This may assist in the classification of TBI. Patient care can also be informed through tracking the course of mild TBI and its effects, and through suggestions for possible therapeutic interventions.

"Coming from a cognitive neuroscience background, the most exciting area in neuroscience would be the advent of brain imaging techniques and how this has allowed us to look in living people at the parts of the brain that are active when we speak, remember, make decisions and feel emotions."

Dr Gjurgjica Badzakova

What interests you about being part of the Centre for Brain Research?

The Centre for Brain Research is the place where people from different areas of brain research can come together. It is also a great place for scientists to work more closely with the community and clinicians. As such, it is wonderful to be exposed to a range of

cutting edge brain research happening here at the University of Auckland. It also allows researchers to collaborate and share ideas, and I feel very privileged to be a part of it.

What would you say is the most exciting area in neuroscience right now?

Coming from a cognitive neuroscience background, the most exciting area in neuroscience would be the advent of brain imaging techniques and how this has allowed us to look in living people at the parts of the brain that are active when we speak, remember, make decisions and feel emotions. More recent imaging techniques, such as DTI, are also allowing us to understand how these areas are connected. I think the next step would be to combine all the different imaging techniques in order to understand in greater detail how the brain areas that make up important neural networks, such as those for memory or language, really work together.

Now about you. Where are you from and what brought you to Auckland?

I am originally from Macedonia, which is small European country. I immigrated to New Zealand 13 years ago with my family and we came to NZ for better opportunities and the general lifestyle. I now have my own family, a five year-old daughter and a one year-old son, and really enjoy everything NZ has to offer.

It's your day off. How would you spend your perfect day?

This is really difficult to imagine given how busy I have been lately! It would be absolutely lovely to have an easy and relaxing day with my family. I would most likely start the day with morning cuddles with my beautiful kids. This would be followed by a nice outing in, hopefully, warm and sunny weather with the whole family. A nice quiet dinner with my husband would be the perfect end to the perfect day.

Where would you recommend people visit in New Zealand?

Unfortunately I have not seen as much of NZ as I would like. I am hoping to fulfil that dream in the near future. However, I have been to Queenstown and, apart from the cold, I found it absolutely enjoyable. It is so picturesque and breathtaking. We are so lucky to live in such a beautiful country.

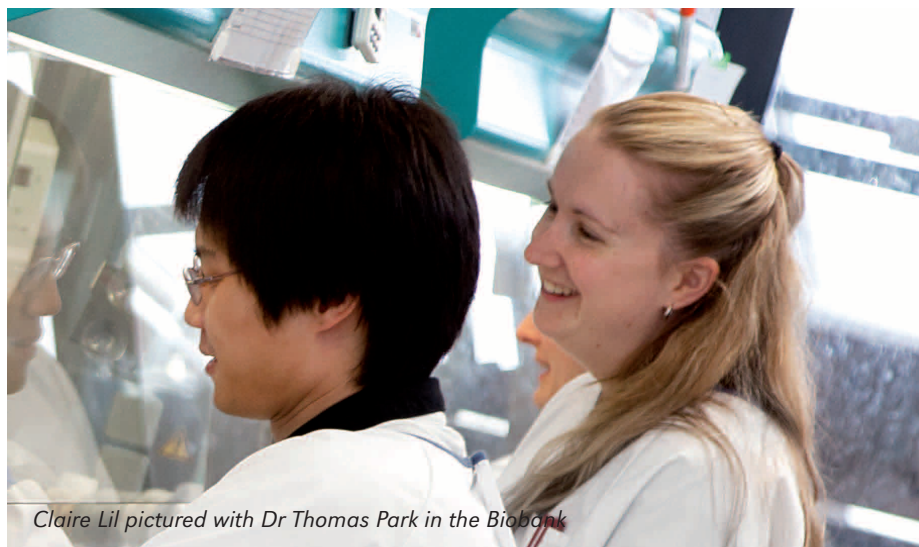
Introducing

In this series we feature scientists and their work from across the Centre for Brain Research. This issue we focus on the new Biobank technicians.

Thanks to a generous \$1 million donation from the Hugh Green Charitable Trust, the CBR has appointed two new research technicians who operate the Biobank.

Working with the internationally recognised Neurological Foundation Human Brain Bank, the new multi-tissue Biobank studies human tissues and cells in conjunction with clinical, neurophysiological and brain imaging information, for expanded lab-based research on human brain disease.

Professor Mike Dragunow is the Director of the Biobank; "We are so pleased to welcome Claire and Inna to our team, as they bring such a wealth of experience with them. We are now getting down to research examining the biology of brain and blood cells, as well as testing new drugs on human cells."



Claire Lil pictured with Dr Thomas Park in the Biobank

Introducing Claire Lil

How would you sum up your research skills and what you're working on at the moment?

Most of my experience is in Molecular Biology and Cell Culture. At the moment I am constructing Tissue Microarrays, which contain small cylindrical cores of tissue from many different diseases, cases, or brain regions. I then perform immunohistochemistry on sections cut from the Tissue Microarray and analyse them using the high throughput microscope called Discovery-1. We are using this technique to give insight into differences in protein expression between different disease states as well as different regions of the brain. I also have experience in culturing cells from human brain tissue with the Neurological Foundation Human Brain Bank.

What's been your career to date to bring you to this point?

I have a Master of Science Degree (majoring in biochemistry) from Massey University. After graduating with this I worked for the Auckland Cancer Society Research Centre on a drug development project for 2.5 years. I then came to work with Professor Mike Dragunow and Professor Richard Faull on a Motor Neurone Disease Research Project supported by the Coker Family Trust. This has led to our developing the newly established Biobank.

What interests you about this area of research? What are your biggest hopes for it?

I think the Biobank provides opportunities to further understand disease progression as well as give some insight into potential therapeutic targets and drug therapies in a number of neurological diseases and this really interests me. I anticipate that it will provide a good platform for testing new drug treatments on cells that have actually come from the human brain.

"I think the Biobank provides opportunities to further understand disease progression as well as give some insight into potential therapeutic targets and drug therapies in a number of neurological diseases and this really interests me."
Claire Lil

What interests you about being part of the Centre for Brain Research?

I think that it is great having everyone who is working on brain research combined into one centre - this means that there is a huge amount of knowledge to draw on and many opportunities available. Everyone is very helpful, friendly and positive.

If you could work on any science project in the world, who would that be and why?

I think being a part of the Biobank is an exciting prospect. In a research area where there is still so much to find out about, the Biobank provides a good opportunity to answer some of those questions.

Now about you. Where are you from and what brought you to Auckland?

I grew up in Dunedin, studied at Massey University in Palmerston North and came to Auckland for work.

It's your day off. How would you spend your perfect day?

Right now, my perfect day would be relaxing on a beach somewhere nice and warm and spending some time with my husband before our new baby arrives

Where would you recommend people visit in New Zealand and what's your favourite part?

My favourite part of NZ is Otago, and in particular Arrowtown in autumn is amazing.



Inna Semenyajenko

Introducing Inna Semenyajenko

How would you sum up your research skills and what you're working on at the moment?

Over the extensive period of my laboratory work I have developed a great understanding of a variety of experimental techniques to investigate and undertake an analytical approach to solving scientific problems, as well as evaluating the experimental results.

My current project is directed at developing methods to study various biomarkers in human blood cells and to determine whether these are altered by antidepressant medication. I am also involved in projects growing, maintaining and studying adult human brain cells.

What's been your career to date to bring you to this point?

My working career has been around molecular biology. I started out as a bench technician at the Institute of Molecular Biology and Genetics (Kiev, Ukraine) and carried out my first research project at the Department of Biosynthesis of Nucleic Acids. After graduating with a BSc degree I was employed as a Research Scientist for many years prior to moving to New Zealand. My NZ career began by working as a Medical Laboratory Technician at Lab Plus. My passion for laboratory research drove me to look for

other opportunities and I made a decision to strengthen my overseas degree in Science by completing a GDipSc at Massey University.

"My biggest hope is for therapeutic advances; hope for developing drugs that could be used to stimulate areas of the brain to repair itself by replacing its own cells."

Inna Semenyajenko

What interests you about this area of research? What are your biggest hopes for it?

What interests me with the Biobank is the study of the mechanisms of neurogenesis in the human brain. Historically, neuroscientists have commonly believed that once the human brain is injured or diseased, there is no way to repair it. However, in the past decade, neuroscientists have discovered that the brain does change throughout life, and can possibly repair itself. Study of neurogenesis in humans offers hope to patients suffering from neurological diseases. My biggest hope is for therapeutic advances; hope for developing drugs that could be used to stimulate areas of the brain to repair itself by replacing its own cells.

What interests you about being part of the Centre for Brain Research?

The Centre for Brain Research at the University of Auckland is a unique

organization. It opens a distinctive and exciting opportunity to work together with a large group of neuroscience researchers, neurologists, neurosurgeons and the community.

If you could work on any science project in the world, who would that be and why?

It would be my current project under leadership of Professor Mike Dragunow at the CBR! This is for two reasons; firstly the research I am involved in is very exciting. Being a part of the Biobank is rewarding as it promises huge hope in discovering new methods of diagnosis and treatment for individuals who suffer from brain disorders. Secondly, I love NZ!

What would you say is the most exciting area in neuroscience right now?

Cellular and Molecular neuroscience is key to understanding neuronal function. Use of human brain cell culture methods to study neurons at a cellular level including morphology and physiological properties, and the ability to manipulate gene and protein expression in a highly controlled manner have transformed neuroscience in the last decade.

Now about you. Where are you from and what brought you to Auckland?

I was born and lived in Kiev in the Ukraine. Almost 10 years ago I moved to Auckland with my husband and our two sons. We came to seek new opportunities knowing that it was a beautiful country and a great lifestyle.

It's your day off. How would you spend your perfect day?

Without a doubt I would spend the day in the outdoors with my beloved family. We enjoy a quiet day on the beach, fishing at a wharf or playing tennis.

Where would you recommend people visit in New Zealand?

Every corner of New Zealand has a beautiful unique aspect to it. One place in particular that amazed me was on the west coast of the South Island – the small town Franz Josef. The mountains were stunning, the air so fresh and the glacier was just breathtaking! I definitely recommend that everyone visits this location.

CBR Kai Arataki

The CBR is working with an esteemed Māori Cultural Advisor.

"I feel that my role is to liaise between scientists and Maori whānau in order for both groups to understand the scientific and cultural issues surrounding health research." Dr Waiora Port, CBR Kai Arataki

The CBR is honoured to be working with esteemed Māori genetics scholar Dr Waiora Port, to help increase Māori engagement in brain research. Waiora works as the cultural advisor for the Northern Regional Genetic Services, and is also a member of the CBR Māori Advisory Board.

As a 67 year old scholar, Waiora came to academic research late in life. With five daughters and eleven mokapuna (grandchildren), plus one great-grandchild, it was quite an achievement when she graduated from her PhD at 74 in 2007! Waiora researched Māori needs in DNA testing for cancer susceptibility, and has continued her interest in ethics research particularly in the field of genetics.

Waiora will discuss and advise CBR scientists about how to undertake research affecting Māori, and will help with greater cultural involvement. Professor Richard Faull is honoured to have Waiora on board as a kaumatua for neuroscience. "Dr Waiora Port is a very special person who has already facilitated and guided our commitment and involvement with Maori whānau, hapu and iwi affected by brain disease over many years. It is indeed an honour and privilege to now formalise her association with the Centre as our own very special Kai Arataki – Maori Cultural Advisor. Waiora's wisdom and guidance will be invaluable in taking



our research to benefit whānau in the wider community so that we can realise our dream of "working together to improve lives" of all New Zealanders."

Despite her research success, Waiora is keen to play down her achievements in preference to helping the next generation. "I just love people!" says Waiora. "My passion has always been teaching and I want to mentor those who seek knowledge for the betterment of all. The more information we can give people, the better decisions they can make on every level."

If you would like to contact the CBR Kai Arataki, please email:
cbr@auckland.ac.nz

All researchers are advised to read granting body Māori guidelines before discussing the next steps of the process.

Neuromuscular Disease Registry Launch

Children and adults with neuromuscular conditions are being invited to take part in the NZ Neuromuscular Disease registry. The registry will accelerate and facilitate clinical trials by locating potential research participants quickly and efficiently. Members of the registry will receive regular updates about research results, as well as about TREAT-NMD activities.

The New Zealand Neuromuscular Disease Registry is generously funded by the Richdale Trust and supported by the Neuromuscular Research Foundation Trust.

For more information, please email
registry@mda.org.nz



Professor Russell Snell, Patron Judy Bailey, Chris Higgins, Miriam Rodrigues, Dr Richard Roxburgh, Hilary Rayner and Dr Rakesh Patel at the NMD Registry launch

Supporting our research

There are many ways you can help brain research at the Centre for Brain Research.

Would you like a scientist to visit your community group?

The CBR team is keen to present their research and the latest knowledge to community groups. They are also keen to hear from community groups about how research could benefit them.

A small donation towards CBR brain research is welcomed. If you would like a scientist to visit your group, please email cbr@auckland.ac.nz

Volunteer drivers

Are you able to volunteer your time to drive people to research studies? Often a large proportion of research grants goes towards providing taxis for patients who are unable to drive themselves. The CBR is keen to reduce this cost so that more funding goes directly towards research.

If you are able to drive for people who are taking part in research, please contact: cbr@auckland.ac.nz

Pictures from top: Bonnie Robinson from Alzheimer's Auckland speaks to CBR scientists - which is reciprocated by our researchers; Participants are needed to take part in human trials for brain research



Research Volunteer Register

Every day at the Centre for Brain Research our researchers are working hard to find and develop new treatments for brain disease. More research is essential. Yet without human volunteers, many of our health and medical studies simply won't happen. We need healthy volunteers as well as people with neurological conditions to participate.

If you are interested in contributing to current or future research projects at the centre, you can join the volunteer register. The register is a secure database, which enables the CBR to get in touch with interested volunteers should a suitable study come up.

For more information visit our website: <http://www.fmhs.auckland.ac.nz/faculty/cbr/contact/volunteers.aspx>

Donate to the CBR

Much of the work of the Centre for Brain Research wouldn't be possible without the support of generous individuals and funding organisations.

Partnerships with friends and supporters enable us to significantly enhance our ability to unlock the secrets of the brain. With your support we will continue to develop new therapies, improve clinical care and educate our communities.

Give online

If you would like to support the work of the CBR, donations can be made to the School of Medicine Foundation Centre for Brain Research Fund.

The fund is a charitable trust and every dollar donated will be spent on research. We greatly appreciate all donations towards research in the CBR, and would like to thank all our supporters.

www.cbr.auckland.ac.nz/contact

Give by cheque

To: The School of Medicine Foundation
C/O Centre for Brain Research Fund
External Relations
The University of Auckland
Private Bag 92019
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New Zealand

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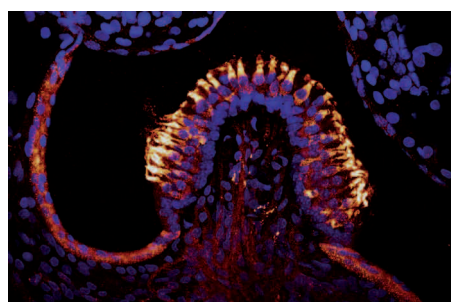
CBR calendar 2012

The CBR has produced a fantastic calendar for 2012, with an array of amazing brain images. Please donate to research at the CBR to get your copy.

Sound waves

Dr Mary O'Keefe, Auditory Neuroscience Group

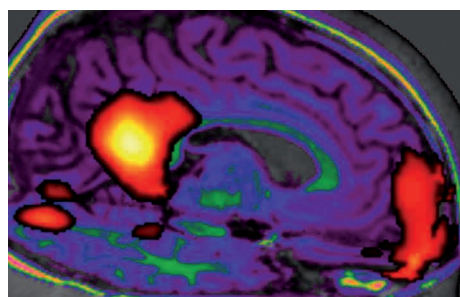
Waving like plant fronds in the sea, this image shows sensory hair cells lining the inner ear. As sound or movement hits our ears and balance system, it causes the hair cells to move and transmit a signal to the brain. In this picture the sensory hair cells are highlighted gold, and the vestibular organ in the ear is immunolabelled blue with NTPDase6 antibody. NTPDase6 is an enzyme which is involved in sensory transduction in the inner ear, when sound or movement gets turned into a nerve signal. The Auditory Neuroscience group study this type of enzyme to further understand their role in hearing and vestibular disease and damage.



Imagining the future

Victoria Martin, Memory Lab

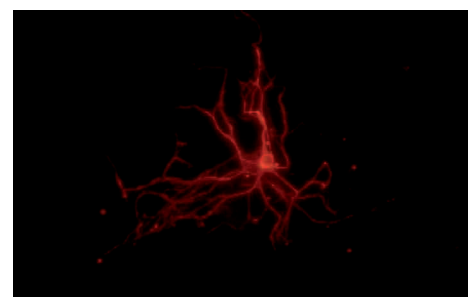
Allowing us to virtually see inside the brain, magnetic resonance imaging is a technique to highlight brain activity. This image shows the brain regions involved in imagining the future; the areas are on average more active when people imagine hypothetical events which might happen to them in the future than when they do a control task of constructing sentences. The Memory Lab team has found that these regions, such as the medial prefrontal, medial temporal, and medial parietal cortex, all overlap with brain regions which activate when people remember past events that have already happened to them. This suggests that remembering and imagining use very similar brain processes.



Brain stars

Amy Smith, Human Neurodegeneration Research

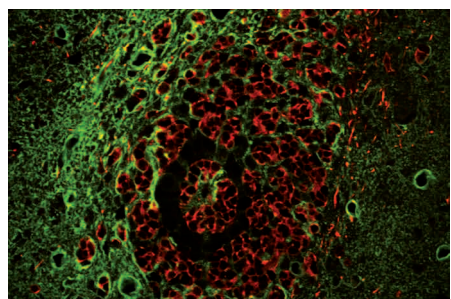
With fiery projections spreading out across the page, it's easy to see why astrocyte cells are named after stars. Astrocytes are brain glial cells which have many functions including scar formation, repair processes, metabolic support, and chemical uptake and release. This astrocyte is from adult human brain tissue and is labelled with a marker for glial fibrillary acidic protein. In the CBR Biobank, the scientists grow brain cells from donated adult human brain tissue and study their functions and response to drugs.



The flow of new life

Ankita Singh, Molecular Neuroanatomy

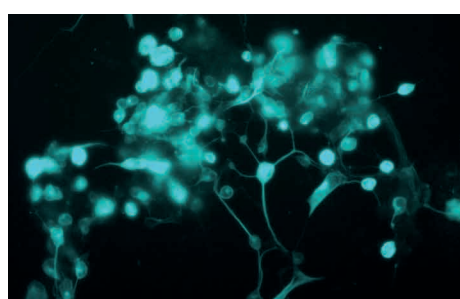
Small balls of cells are flowing in the stream of new life- the Rostral Migratory Stream (RMS) in the brain. Neuroblasts are new brain cells which are born in the subventricular zone (SVZ) and travel down the RMS towards the smell area of the brain. In this process of migration, various molecules are involved in guiding and nourishing these young cells which are studied by the Molecular Neuroanatomy Lab. Connexins, especially connexin 30 (here labeled fluorescently green), are thought to be one of the molecules that are present between the neuroblasts (labeled red) and help to guide them in the right direction.



Transforming neurons

Erin Firmin & Dr Christof Maucksch, Neural Repair and Neurogenesis

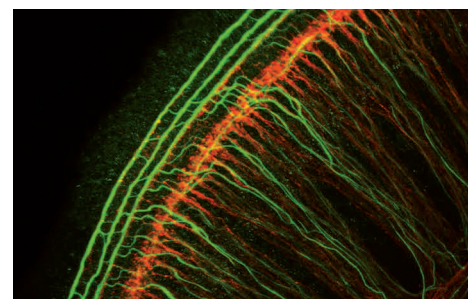
Reaching their first dendrites across the page, these are neurons which have been formed by reprogramming adult human skin cells. The Neural Repair and Neurogenesis Lab reprograms the skin cells by adding new genes, then growing them in cell culture media which promotes neural formation. Neurospheres form gradually and are then given cell culture media to turn them into neurons. Using this technique it is possible that someday we may be able to reprogram skin cells into specific types of neural cells and use these as a therapy for diseases such as Huntington's disease.



Spiral of sound

Cherry Mao, Cochlear Physiology Laboratory

Within all our ears is a conch-like spiralling structure called the cochlea. This is where sound is turned into nerve impulses so we can identify noises like speech. Here, part of a mouse cochlea is labelled with a red neuronal tracing dye called tetramethyl rhodamine dextran (TMRD) and an antibody against a cellular protein called peripherin (green). TMRD labels mainly the single row of inner hair cells and peripherin labels mainly the three rows of outer hair cells.



Support brain research

Displaying the breadth of research underway at the CBR, the calendar showcases the wonders of the brain. You can receive a copy of the calendar with a \$10 donation towards brain research at the CBR.

Vote for your favourite image

You can vote for your favourite neuroscience image! The scientist who took the image with the most votes will receive a \$500 contribution to communicating their research at a scientific conference.

For further information about receiving a copy of the calendar please email:

cbr@auckland.ac.nz

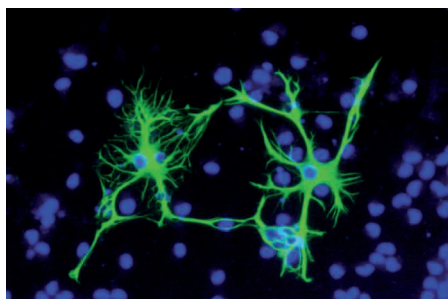
Visit our website to register your vote!

<http://www.fmhs.auckland.ac.nz/faculty/cbr/contact/calendar2012.aspx>

Making friends

Dr Renee Gordon, Neural Repair and Neurogenesis

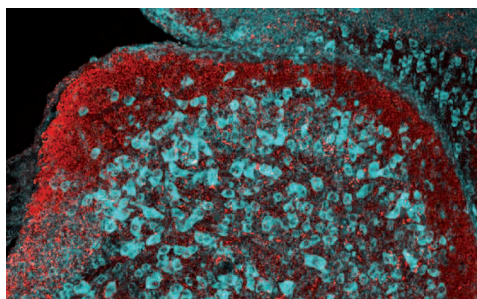
This alien-like image shows two astrocytes forming new connections with each other. The astrocytes were generated from adult neural stem cells grown in culture by the Neural Repair and Neurogenesis Lab. This allows us to understand what directs a stem cell to turn into an astrocyte, and the role astrocytes play in the health and diseased brain. Here the astrocytes are labelled green and the cell nuclei, which are the hub of the cell, are labelled blue.



A sea of noise

Cherry Mao, Cochlear Physiology Laboratory

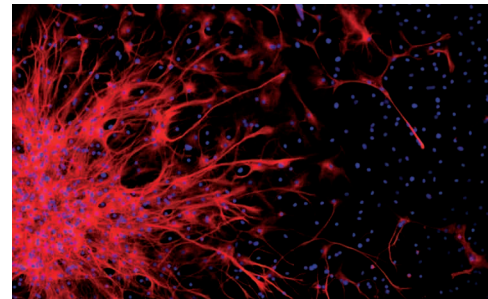
This cell would look just as at home floating under a tropical sea as it does in our inner ear. Emulating an aptly named 'brain-coral', the image actually shows a mouse cochlear nucleus section. The blue fluorescent Nissl stain highlights neuronal tissue, while the red synaptophysin is a pre-synaptic marker, showing where the cell ends and touches another. Nerve impulses rush across this gap via synaptic proteins, and transmit messages from cell to cell. The Cochlear Physiology Laboratory study these connections to better understand how auditory nerve cells develop and integrate together, which could help find a treatment for tinnitus.



The universe within our brains

Dr Renee Gordon, Neural Repair and Neurogenesis

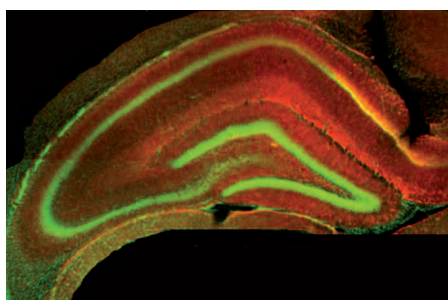
This spectacular image looks like something taken by the Hubble telescope, but actually shows a network of brain cells. The cells are glial cells called astrocytes, which are involved in nerve cell regulation. The astrocytes were generated from adult neural stem cells grown in culture, and are used by the Neural Repair and Neurogenesis lab to study stem cell growth.



The centre of learning and memory

Dr Ji Bai

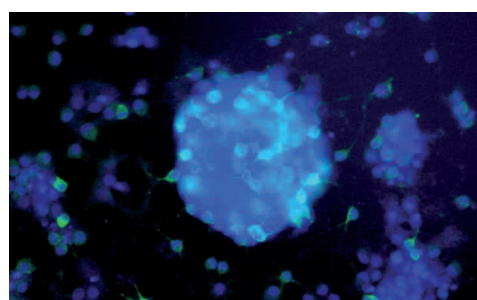
This beautiful immunofluorescent image shows the structure of a rat hippocampus, a brain area involved in learning and memory. The nerve cells are stained green and the star-like house-keeping astrocytes are stained red. The lab is interested in exploring the molecular mechanisms of neuron damages associated with Alzheimer's Disease, in particular the link between astrocyte dysfunction and the disease process for potential drug discovery.



Star burst

Dr Renee Gordon, Neural Repair and Neurogenesis

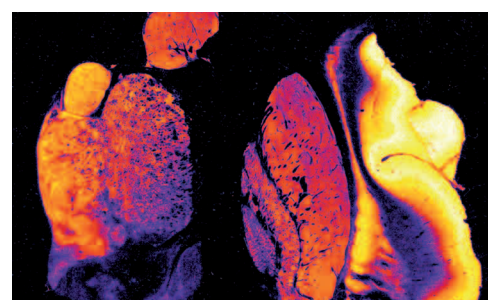
This spectacular image shows the formation of new brain cells, called neurons. The new neurons have been generated from adult stem cells grown in culture. Neurons are involved in all the electric and chemical signalling in the brain and are often lost through brain disease and injury. By generating new neurons from adult stem cells, the Neural Repair and Neurogenesis Lab can better understand how new neurons are made, and hope to develop new therapies to repair the injured or diseased brain.

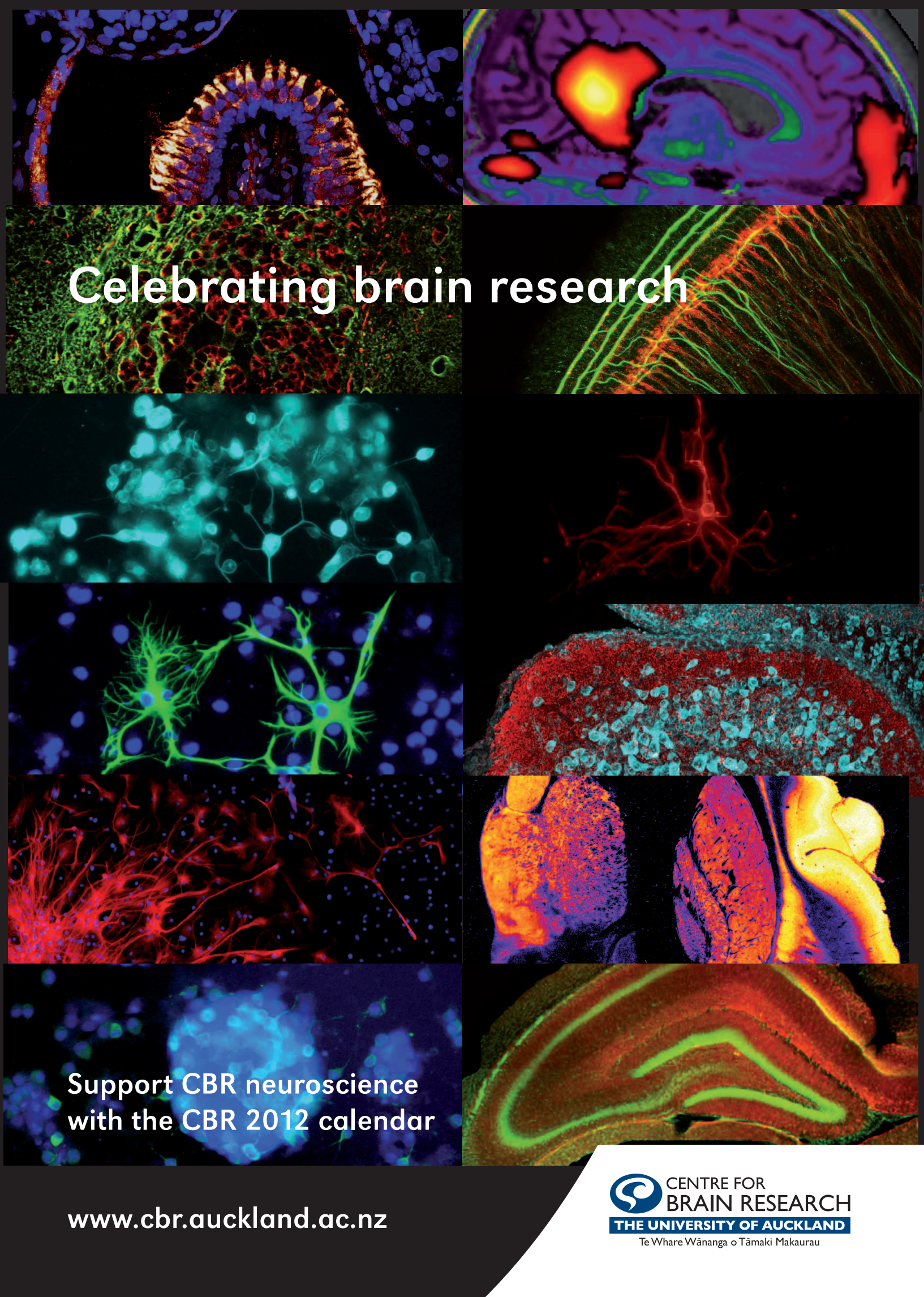


Psychedelic inhibition

Dr Henry Waldvogel & Jocelyn Bullock, Human Brain Bank

This psychedelic image is truly a feast for the eye, but it actually represents the calming network of the brain. The colours highlight the density of GABA_A receptors in the human brain, which are responsible for inhibiting cell activity and reducing nerve excitation. The autoradiogram shows the thalamus on the left, which is mainly responsible for sensory control, and the basal ganglia on the right, which is responsible for movement control. The two structures are separated by the internal capsule which is not labelled. The Human Brain Bank team study human brain tissue to gain an insight into neurodegenerative disorders of the human brain.





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