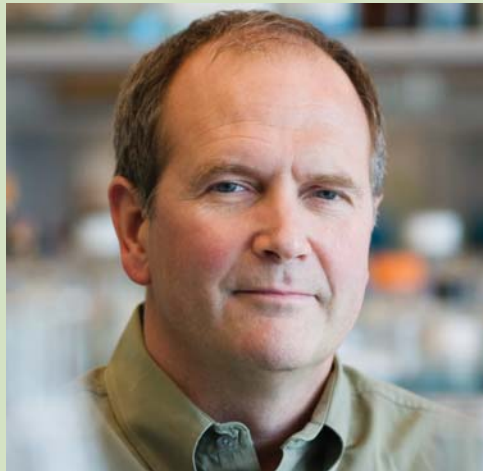
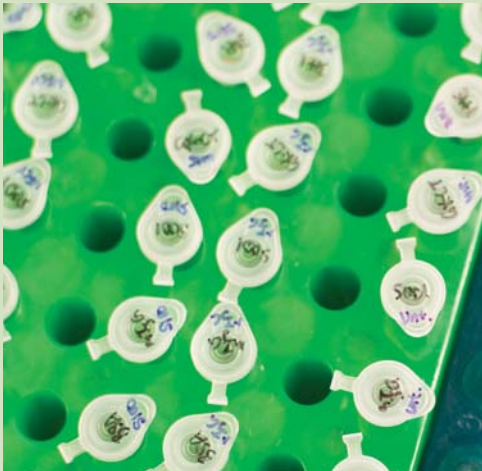
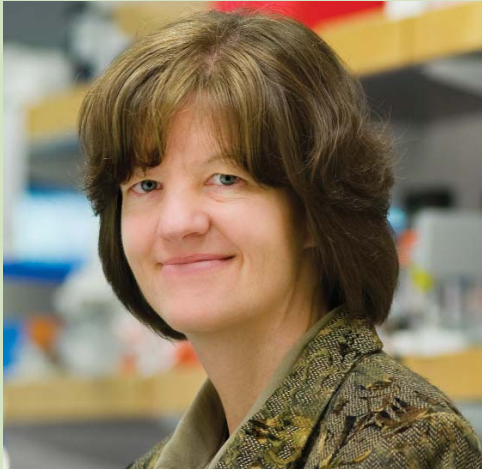




Annual Report 2009





Welcome to the Brain Research Centre

Composed of more than 100 billion cells, the brain is one of the most complex and mysterious organs in the body. Each cell is connected to about 10,000 others by synapses, the structures through which information is communicated. This communication allows us to feel emotion, perceive, think, and move. However, when cells cannot communicate with each other, either because of injury or disease, the results can be devastating.

Alzheimer's disease, autism, stroke, and mood disorders are just some of the more than 1000 disorders that affect the brain, and their impact on the mental, physical, and emotional well-being of patients and families is immeasurable.

Many disorders are not simply the result of random biological failure, and instead are the result of a complex interplay between environmental, social, and genetic factors. With estimates indicating that nearly one in three Canadians will be directly affected by a disease, disorder, or injury of the brain at some point in their lives (Neuroscience Canada), translating research from the laboratory bench into care at the bedside is at a critical juncture. Finding ways to maintain brain health from the early years through to successful aging is of paramount importance.

To tackle this challenge, the Brain Research Centre, a unique partnership of Vancouver Coastal Health Research Institute and the Faculty of Medicine at the University of British Columbia, has brought together scientists, physicians, health professionals, patients, and community partners to work collaboratively and across disciplines to investigate brain function, structure, and disease. Our expertise, together with our state-of-the-art technologies, unparalleled training environment, and outstanding partnerships have resulted in ground-breaking discoveries which will bring benefit to patients and families across Canada and worldwide.



Letter from the Director

Some of the features that have set the Brain Research Centre apart from other research institutes around the world have been our ability to engage the top research expertise, create innovative and productive research facilities, and to build bridges and partnerships where none existed before.

This has never before been as true as in the past two years. With the support of Vancouver Coastal Health and the University of British Columbia, the Brain Research Centre is helping to forge the development of a new Centre for Brain Health. When operational, this new facility will merge the clinics that treat neurological and psychiatric diseases, effectively integrating fundamental research with clinical research and advanced clinical care. The Centre for Brain Health will move beyond treatment of disease to include research and promotion of healthy brain function. I am proud that the Brain Research Centre is playing such a critical role in this important project.

In other areas, discoveries at the Brain Research Centre, supported by generous individual, government, and organization philanthropic contributions, continue to be remarkable.

We have gained new insight into how the brain learns and develops. As the brain develops, neurons proliferate, specialize, make and refine connections, and form circuits and pathways. Understanding these processes is important for managing learning disabilities, improving memory, and promoting recovery after brain injury.

Discoveries in the area of Alzheimer's disease and Parkinson's disease, together

with new projects in aging research, have spearheaded the creation of strategies that promote successful aging.

Together with the Institute of Mental Health, psychiatric clinics, and community partners, we are finding new ways to manage and treat schizophrenia, bipolar disorder, and depression. These partnerships are helping our efforts in opening the discussion on mood disorders.

Advances in imaging technologies, as well as our understanding of the cellular and molecular mechanisms of cerebral blood flow and stroke, have led to a comprehensive program in fundamental stroke research and rehabilitation.

The past two years have been filled with numerous achievements and significant milestones. I invite you to read through this report to learn more about some of the amazing things happening at the Brain Research Centre.

MAX S. CYNADER, CM, OBC, PhD, FRSC, FCAHS
Director, Brain Research Centre

Thank you to our supporters



Research and training at the Brain Research Centre would not be possible without the generous support of numerous government partners, organizations, and individuals. We wish to thank:

- the Provincial and Federal Governments for their contribution of more than \$57 million towards the creation of the Centre for Brain Health, as well as for their continuing support of our research operations;
- the Multiple Sclerosis Society of Canada, the Alzheimer Society of British Columbia, the Heart and Stroke Foundation of BC & Yukon, and other community health organizations for providing funding for investigators and students;
- the Development Office at the University of British Columbia and the VGH & UBC Hospital Foundation for their ongoing fundraising efforts;
- the BC Ministry of Advanced Education for providing stable, operational support that enhances the work of the Brain Research Centre;
- the Michael Smith Foundation for Health Research (MSFHR), the Canadian Institutes of Health Research (CIHR), the Canada Foundation for Innovation (CFI), the BC Knowledge Development Fund (BCKDF), the Natural Sciences and Engineering Research Council of Canada (NSERC), and other associations for providing funds to students and investigators, as well as operational funds to the Brain Research Centre.

The Brain Research Centre sponsors and hosts several seminars, journal clubs, and special events, and offers a world-class research and training environment.



Biological, genetic, and environmental factors influence learning and development, with long-term implications for general health and well-being. Nurturing and enriched environments can contribute to positive early experiences, establishing a solid foundation for future success and health.



New insight into how the brain learns and develops

During early brain development, the brain undergoes a great amount of change. Brain cells grow, specialize, and develop connections at an enormous rate. These connections, called synapses, allow us to learn. When brain cells fail to develop properly, form inadequate or inappropriate connections, or are injured, a variety of developmental problems may result. Brain Research Centre members are at the forefront of investigating how the brain develops and how to maintain brain health.

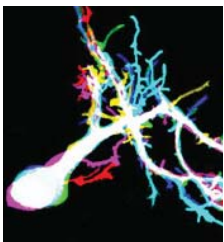
Tim O'Connor and **Ana Mingorance-Le Meur** discovered why the adult brain loses its capacity to re-grow connections and repair itself. They identified two proteins—called cortactin and calpain—that control the growth of neurons and their ability to form new connections. This finding could lead to therapeutics that rejuvenate the brain for a wide variety of learning and developmental disorders, such as fragile X syndrome.

A solid understanding of the cellular and molecular causes of learning and developmental disorders is important to understanding how to devise therapies for these disorders. Equally important is understanding how to maintain and improve brain health through the learning years.

Research has shown that mutations in neuroligins and neuroligins, proteins found naturally in the brain, play a role in autism. **Kurt Haas** and **Ann Marie Craig** are working to understand the molecular pathways that lead to the development of this disorder. Dr. Craig discovered that these two proteins interact to stabilize synapses. Dr. Haas is investigating how the interactions of these two proteins affect neuron growth, as well as how mutations found in some patients with autism produce abnormal growth behaviour in brain neurons.

Research by **W. Thomas Boyce**, the BC Leadership Chair in Child Development, has shown that more than just genetic and cellular factors play a critical role in brain development. Together with researchers at the University of California, Berkeley, he found that socioeconomic status can cause detectable differences in the structure and function of the prefrontal cortex—the area of the brain involved in executive functions, such as problem-solving, creativity, self-control, and attention—in children. It appears that chronic stress and lack of environmental enrichment are key factors within socioeconomic status that cause this discrepancy in brain development. However, Dr. Boyce believes that with early identification these brain differences can be reduced through training.

Such training programs already exist, and **Adele Diamond**, a Canada Research Chair in Developmental Cognitive Neuroscience, has shown for the first time that these programs can be effective. She evaluated a program called “Tools of the Mind,” which was developed over 12 years by educational psychologists, that incorporates activities such as dramatic play and the use of aids to facilitate memory and attention. For example, one child holds an image of an ear to encourage listening while another child reads aloud. Dr. Diamond found that the innovative curriculum may improve academic performance, reduce diagnoses of attention deficit hyperactivity disorder, and close the achievement gap between children of different socioeconomic backgrounds.





Creation of strategies that promote successful aging

In the 2001 Census, Statistics Canada reported that persons aged 65 and older represented nearly 13% of the total population of Canada. At the same time, they predicted that this population would increase to nearly 15% of the population by 2011. By 2030, the population is expected to increase to nearly 25%. With the size of the aging population expected to continue growing in the coming years, the promotion of the health and well-being of this group is one of the most

serious challenges for our health system.

A big step in addressing this challenge is the Canadian Longitudinal Study on Aging, a large, national, long-term study designed to examine health patterns, trends, and ways to reduce disability and suffering among aging populations. By following approximately 50,000 Canadian men and women aged 40 and older for a period of at least 20 years, researchers will collect biological, medical, psychological, social, and economic information to assess how genetic and environmental factors have an impact on aging.

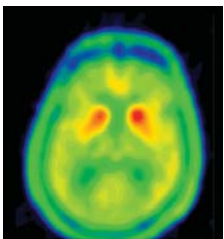
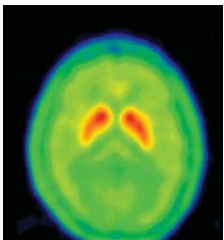
By studying adults over a number of years, researchers will be better able to understand how to maintain brain health as we age. This is one of the most complete studies of its kind ever to be undertaken in Canada and around the world.

The Brain Research Centre has brought together experts in neurodegeneration, genetics, geriatric medicine, and other disciplines to help drive the research in British Columbia. **Max Cynader, Michael Hayden, and Michael Kobor** are leading the national assessment of genetic and epigenetic factors involved in healthy aging. **Andrew Wister and Jon Stoessl** are leading the assessment of healthy aging in the Vancouver cohort.

The work to be undertaken in the Canadian Longitudinal Study on Aging is complemented by a strong record of Brain Research Centre investigations into aging and neurodegeneration.

Weihong Song discovered that Valproic Acid, a drug used to treat epilepsy and bipolar disorders, blocks the formation of plaques that cause Alzheimer's disease. He found that if Valproic Acid is used as a treatment in early stages of the disease that memory deficit is reversed. A small clinical trial is currently underway and results are expected within the next two years.

The work of **Jon Stoessl** and others at the Pacific Parkinson's Research Centre played an instrumental role in the discovery of a genetic defect that causes a rare Parkinson's-related disorder called Perry Syndrome. Dr. Stoessl and colleagues provided a substantial number of the DNA samples that led to the discovery.



PET imaging provides information about the function of dopamine producing cells in the brain. Warmer colours represent higher levels of function of these cells. In images of healthy subjects (middle) we see greater cell function compared to images of Parkinson's disease subjects (bottom), where dopamine function is reduced. *Images courtesy of Jon Stoessl.*



Physical activities, such as walking, running, and swimming, together with cognitive and social activities, such as playing chess, reading, or completing crosswords, contribute to aging successfully.

Consuming a balanced diet, getting adequate sleep, and minimizing stress are also important.

Mood disorders are one of the most common mental illnesses in Canada. With early recognition and treatment, positive health outcomes can be achieved. However, many individuals do not seek treatment because of the stigma associated with having such a disorder.





Opening the discussion on mood disorders

Mood disorders are the most common mental illnesses in Canada, and affect people of all ages, genders, and cultures. These disorders, which include depression and bipolar disorder, often go untreated because of the stigma against mental illness. However, efforts by Brain Research Centre investigators are improving diagnoses, increasing treatment options, and creating dialogue on these issues.

Bipolar disorder is characterized by changes in brain function that lead to manic or depressive episodes, which manifest with dramatic alterations in mood, behaviour, thinking, and judgement. These mood episodes last from weeks to months and are associated with significant impairment in function and everyday living. During a manic episode, a patient has irritable or elevated mood, increased energy, rapid thoughts and speech, decreased need for sleep, and impaired judgement. During a depressive episode, a patient is sad with intense and persistent feelings of despair, hopelessness, lack of energy, and often suicidal thoughts.

Manic symptoms are thought to be due to an increase in the activity of the brain dopamine system, which regulates behaviour, motivation and reward, mood, attention, and learning. However, there has been little direct evidence confirming this hypothesis. By using positron emission tomography (PET), **Lakshmi Yatham** provided the first direct evidence that antimanic mood stabilizers, such as valproate, work by reducing dopamine transmission. His ongoing work is exploring if manic episodes are associated with hyperactivity in the dopamine system and whether it is possible to predict who is at higher risk of relapse of manic episodes.

Understanding the causes and mechanisms of bipolar disorder are important in order to develop effective treatment strategies. Treatment usually involves a combination of mood stabilizing medications, psychotherapy, and support groups. Dr. Yatham's work indicating that mood stabilizing drugs treat manic episodes by reducing dopamine transmission has substantial clinical implications. It may now be possible to develop new treatments that target the dopamine system in specific ways, as well as to predict who may be at higher risk of a manic relapse.

While clinical neuroimaging, such as PET or functional magnetic resonance imaging (fMRI), may inform the development of treatment plans and strategies for mood disorders, little is known about the potential impact these technologies may have on how patients, families, and caregivers perceive their diagnosis and treatment. Furthermore, it is not well understood how these technologies could reduce the stigma patients feel about having a mood disorder.

Mood disorders are surprisingly common, but they are treatable. Through innovations at the Brain Research Centre, diagnoses are improving and treatment options are expanding.

Judy Illes, Director of the National Core for Neuroethics, and her colleagues completed the second study in a series that sought to understand the attitudes of patients and physicians towards the possible use of neuroimaging technologies in the diagnosis and treatment of depression. She found that patients value the promises that neuroimaging can bring, believing that the results would encourage their participation in psychotherapy, engage them in counselling, increase compliance with treatment, and mitigate stigma. This is important because expectation about a positive outcome following treatment has been shown—through **Jon Stoessl's** work in Parkinson's disease—to influence the actual outcome.

A comprehensive program in fundamental stroke research and rehabilitation

A stroke occurs when the blood supply to a part of the brain is impeded, causing brain cells to die. It is the third leading cause of death in Canada, and the leading cause of long-term adult disability. By working collaboratively and with a bench-to-bedside philosophy, the Brain Research Centre has developed a comprehensive program in fundamental stroke research and rehabilitation.



The process of cell death following a stroke is complicated. When brain blood flow is impeded, glutamate receptors on brain cells are over-activated, resulting in a cascade of cellular messages leading to the “self-destruction” and death of brain cells. **Yu Tian Wang** discovered a protein called SREBP1 that is associated with a specific glutamate receptor—known as the NMDA receptor—whose activation causes this self-destructive behaviour. Interestingly, Dr. Wang found that inhibition of SREBP1 can alter the function of NMDA receptors following a stroke, which in turn drastically reduces the death of brain cells. This is significant because SREBP1 may represent a target for a new class of neuroprotective therapeutics against stroke.

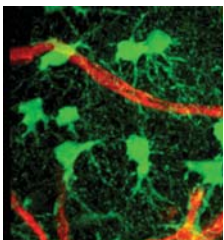
Brian MacVicar is also working to understand the mechanisms of cell death, as well as brain blood flow. He discovered the mechanism by which astrocytes, a type of brain cell, regulate brain blood flow. He found that brain metabolism and the level of brain activity regulate whether astrocytes constrict or dilate blood

vessels. This is important because after a stroke, brain blood flow is altered and becomes unrelated to metabolic activity, which can cause irreparable damage to areas of the brain. This finding brings us one step closer to understanding why this happens, and provides a new avenue of exploration for possible treatments.

Supporting our strong platform in fundamental stroke research is an equally strong research platform in stroke rehabilitation strategies.

Traditional stroke rehabilitation includes exercise and physical therapy activities. **Tania Lam** is developing new strategies specific for gait rehabilitation following stroke. Most gait rehabilitation programs have focused on helping stroke patients re-learn how to walk on a straight path, incorporating little in the way of turning movements, such as avoiding obstacles. However, new research by Dr. Lam has shown that such kinds of turning exercises should be included. In order to turn the body, the brain causes gradual adaptations of the basic muscle activity patterns required for straight ahead walking, which enables us to travel smoothly along a curved path and remain in proper balance. Dr. Lam found that stroke survivors often have reduced ability to modulate this activity in their damaged leg. These results will now guide the development of new stroke rehabilitation programs.

Lara Boyd is using powerful techniques called functional magnetic resonance imaging (fMRI) and transcranial magnetic stimulation to find innovative ways to stimulate rehabilitation and recovery in stroke patients. She is investigating whether inhibiting the undamaged hemisphere of the brain after a stroke could enhance brain function in the damaged hemisphere, thereby enhancing function of damaged limbs. If effective, this could become a novel accompaniment to more traditional rehabilitation programs.



Two-photon microscopy allows for a detailed view of brain function (bottom). Astrocytes (in green) are important in regulating brain blood flow through blood vessels (in red). *Image courtesy of Brian MacVicar.*



More than 70% of people with stroke find it difficult to use their hands and arms for daily tasks. Janice Eng has developed a set of exercises patients can do themselves with minimal supervision by therapists that significantly improves recovery of function.

Our members have achieved a number of notable successes over the past two years. We have also engaged in a considerable number of intellectual activities. The following pages list investigator achievements; intellectual activities, including meetings, conferences, and Research Days; and member names and departmental affiliations.

Individual Achievements

CHRIS AHERN

2008-2009 McDonald Scholar
(Heart & Stroke Foundation)

JASON BARTON

Martin M. Hoffman Award for Excellence
in Research (UBC Faculty of Medicine)

W. THOMAS BOYCE

Sunny Hill Health Centre BC Leadership
Chair in Early Childhood Development

LARA BOYD

Golden Synapse Award (Society for
Neuroscience)

NEIL CASHMAN

Fellow of the Canadian Academy of
Health Sciences

ANN MARIE CRAIG

Fellow of the Royal Society of Canada

UBC Killam Research Prize

MAX CYNADER

Member of the Order of Canada

ADELE DIAMOND

William James Distinguished Lecturer
(Association for Psychological Science)

YWCA Women of Distinction Award
(Science, Technology & Industry category)

STEPHEN DRANCE

Lifetime Achievement Award (Canadian
Ophthalmological Society)

HOWARD FELDMAN

Fellow of the Canadian Academy of
Health Sciences

Ralph Fisher and Alzheimer Society of BC
Professor in Alzheimer's Research

DAN GOLDOWITZ

Applebaum Visiting Professorship

MICHAEL HAYDEN

2007 Prix Galien Canada Award

Canada Research Chair in Human
Genetics and Molecular Medicine
(renewed)

Finalist in the 2008 Globe and Mail
Nation Builder competition

CLYDE HERTZMAN

Elected President of the Council for Early
Child Development

Canada Research Chair in Population
Health and Human Development
(renewed)

JUDY ILLES

Canada Research Chair in Neuroethics

Finalist in the YWCA Women of
Distinction Award competition (Science,
Technology & Industry category)

MICHAEL KRAUSZ

Leading Edge Endowment Fund Chair in
Addiction Research

IAN MACKENZIE

2008 Annals of Neurology Prize for a
Distinguished Contribution to Clinical
Neuroscience

BRIAN MACVICAR

Elected President of the Canadian
Association of Neuroscience

PATRICK MCGEER

2007 Biomedical Science Ambassador
Award

ROBERT MOLDAY

Bill and Marilyn Webber Lifetime
Achievement Award (UBC Faculty of
Medicine)

Canada Research Chair in Visual Science
(renewed)

TONY PHILLIPS

Elected Councillor for the Society for
Neuroscience

Elected Vice President of the Collegium
Internationale
Neuropsychopharmacologia

Named Scientific Director of the Institute
of Neuroscience, Mental Health &
Addiction (CIHR)

PETER RIECKMANN

Appointed Regional Director (Pacific
Northwest) for the endMS National
Research & Training Network

Multiple Sclerosis Society of Canada
Research Chair

JANE ROSKAMS

2008 Synapse Award for Mentorship
(CIHR)

JOHN SCHRADER

Canada Research Chair in Immunology
(renewed)

TERRY SNUTCH

Honorary degree from
Simon Fraser University

WEIHONG SONG

Appointed Special Advisor to the UBC
President on China

Canada Research Chair in Alzheimer's
Disease (renewed)

Distinguished Achievement Award in
Excellence in Basic Science Research (UBC
Faculty of Medicine)

JON STOESSL

Canada Research Chair in CNS Disorders
(renewed)

Fellow of the American Academy of
Neurology

Fellow of the Canadian Academy of
Health Sciences

HELEN TREMLETT

European Charcot Foundation Young
Investigators Award

JANET WERKER

Canada Research Chair in Psychology
(renewed)

CATHARINE WINSTANLEY

Wyeth Preclinical Psychopharmacology
Award (British Association of
Psychopharmacology)

TODD WOODWARD

2008 New Investigator Michael Smith
Prize for Research in Schizophrenia (CIHR)

TREVOR YOUNG

Elected to the UBC Senate

Fellow of the Canadian Academy
of Health Sciences

Summary of Activities

The Brain Research Centre has hosted or co-sponsored four Research Days over the past two years, with great attendance at each event. Local, national, and international researchers presented results and updates at the following events:

- Epigenetics of Neurodevelopment
- Inflammation in De- and Re-generation of the Central Nervous System
- Morphological Plasticity
- Protein Misfolding Diseases

The Brain Research Centre, together with the Let's Talk Science Partnership Program, UBC Faculty of Medicine, and Vancouver Coastal Health Research Institute, hosted the first Vancouver Brain Bee competition in 2009. It was the first time the event—a neuroscience competition for high school students that's styled after a traditional spelling bee—was hosted in Vancouver, and it was one of the largest regional competitions in Canada.

The Brain Research Centre helped sponsor the 4th Annual Canadian

Student Conference for Biomedical Computing, which was held at UBC in 2009. More than 80 people attended the event, coming from universities in British Columbia, across Canada, and around the world. Students presented their own research on variety of topics covering computing and engineering, and several keynote speakers addressed the delegates. This was the first time the conference was held in Western Canada.

The Graduate Program in Neuroscience and the CIHR/MSFHR

Strategic Training Program in Neurobiology and Behaviour, in conjunction with the Brain Research Centre, once again hosted the Neuroscience Extravaganza in 2007 and 2008. More than 120 people participated in these events. The following two categories were the poster themes for the event:

- cellular and molecular
- systems and behaviour

Numerous journal clubs and seminar series sponsored by the Brain Research Centre have met on a weekly or monthly basis to discuss

new research developments in neuroscience. Some of these clubs and series are:

- Monthly Neuroscience Pizza Lab Seminars
- Multiple Sclerosis – From the bench to the bed and back
- Neurobiology of Psychosis Journal Club meetings
- Prefrontal Cortex Journal Club meetings
- Synaptic Journal Club meetings

The Neuroscience Research Colloquia hosted the following guest speakers and local laboratory presentations in 2007-2008 and 2008-2009 (in chronological order):

KEVIN OCHSNER

Columbia Univ.

“It’s the thought that counts: The neural basis of the cognitive control of emotion”

NATALIE DAKERS & PIETER CULLIS

CDRD

“How CDRD can help BC’s researchers turn discoveries into medicines”

KEVIN CAMPBELL

Univ. California, Berkeley

“Congenital muscular dystrophies with central nervous system involvement”

ALVARO PASCUAL-LEONE

Harvard Med. Sch.

“Modifying decisions by right prefrontal stimulation: Translational applications into drug abuse and obesity”

SUSAN MCCONNELL

Stanford Univ.

“Wiring up the brain: Assembling cortical circuits during development”

BERNARD CRESPI

Simon Fraser Univ.

“Evolutionary neurogenomics of the social brain: Evidence from autistic-spectrum and psychotic-spectrum conditions”

RICHARD KRAMER

Univ. California, Berkeley

“Engineering light-activated ion channels and receptors for remote control of neuronal activity”

ADAM ANDERSON

Univ. Toronto

“Emotion, attention, and memory”

GERHARD DAHL

Univ. Miami

“Pannexin1: The elusive ATP release channel?”

ROBERT HESS

McGill Univ.

“Our sense of position”

TOMOAKI SHIRAO

Gunma Univ., Japan

“Role of actin cytoskeleton in neuronal development – Different distribution of drebrin isoforms in developing neurons and their functions”

DAVID VOCADLO

Simon Fraser Univ.

“Reciprocal O-glycosylation and phosphorylation of tau: Design and use of small molecule inhibitors to block tau hyperphosphorylation in vivo”

TREVOR YOUNG

UBC

“How do mood stabilizers work? Refining their metabolic and cytoprotective properties”

POLINA GOLLAND

MIT

“Functional hierarchy: Representation and modelling of spatial patterns of activation in fMRI”

GARY GLOVER

Stanford Univ.

“Real-time fMRI”

DAVID PARK

Ottawa Health Res. Inst.

“Mechanisms of dopaminergic loss in models of Parkinson’s disease”

PETER RIECKMANN

UBC

“Models of tissue regeneration in multiple sclerosis”

DAVID EISENSTAT

Univ. Manitoba

“The GABA hypothesis, forebrain development, and autism spectrum disorders: Role of DLX transcription factors”

TOMAS PAUS

Univ. Nottingham, England

“Population neuroscience and imaging of brain structure”

DAVID EUSTON

Univ. Arizona, Tucson

“Multineuronal activity patterns in rat frontal cortex during sleep and behaviour”

JUDY ILLES

UBC

“Critical crossroads in neuroscience and neuroethics”

ADAM FRANKEL

UBC

“Building a molecular printing press to manufacture encoded peptide libraries”

DENIZ KIRIK

Lund Univ., Sweden

“Dyskinesias in Parkinson’s disease: Implications of recent findings in animal models for therapy in patients”

JAKOB LINNET

Aarhus Univ., Denmark

“Pathological gambling”

PETER KALIVAS

Med. Univ. South Carolina

“Addiction pharmacotherapies revealed by cocaine-induced neuroplasticity”

HANK GREELY

Stanford Univ.

“Neuroimaging, pain, and society”

THEO HAGG

Univ. Louisville, Kentucky

“Targeting the vasculature for neuroprotection after spinal cord injury”

EMMELINE EDWARDS

NIH/NINDS

“Neuroscience research funding 101 at NINDS”

ARMAN RAHMIM

Johns Hopkins Univ.

“4D PET imaging: Beyond conventional dynamic 3D PET”

RITA BALICE-GORDON

Univ. Pennsylvania

“Neuron-astrocyte signalling in synaptogenesis”

CHRISTOPHER AHERN

UBC

“Investigating the therapeutic inhibition of voltage-gated sodium channels”

MARY PHILLIPS

Univ. Pittsburgh Sch. Med.

“Imaging emotion in the human brain: A neural systems approach toward understanding biological mechanisms of mood disorders”

JOHN DUNCAN

Univ. Cambridge, UK

“Mental programs and the frontal lobe”

NANCY KANWISHER

MIT

“Spatial patterns of fMRI response: What information do they contain and what can they tell us about object representations?”

WINSTON BYBLOW

Univ. Auckland, New Zealand

“Motor recovery after stroke: Metaplasticity and prediction”

ALAIN BERTHOZ

Collège de France, France

“Neural mechanisms of cognitive strategies for spatial memory for navigation and spatial orientation: fMRI studies and intracranial recordings in epileptic patients”

TONY WEST

Chicago Med. Sch.

“Nitregic modulation of corticostriatal transmission: Implications for Parkinson’s disease”

ROBERT ROGERS

Univ. Oxford, UK

“The neuropsychopharmacology of gambling behaviour and social risky choice”

EDOARDO MARCORA

California Inst. Tech.

“Hunting for huntingtin function in synapses”

CONNIE SANCHEZ

Lundbeck Res.

“The antidepressant of the future – The challenges of today’s drug discovery research”

OURY MONCHI

Université de Montreal

“Functional neuroimaging studies of cognitive deficits in Parkinson’s disease”

NEENA SINGH

Case Western Reserve Univ.

“The ironic role of iron in prion disorders”

JOSEPH TSIEN

Sch. Med. at the Med. Coll. Georgia

“Real-time encoding patterns of hippocampal memories”

RICHARD RANSAHOFF

Cleveland Clinic, Florida

“Chemokines and the CNS-intersections of immunobiology and neurobiology”

GAUTAM AWATRAMANI

Dalhousie Univ.

“Light-activated channels targeted to ON bipolar cells restore visual function in retinal degeneration”

MARCUS KOCH

Univ. Med. Ctr. Groningen,

The Netherlands

“Some non-classical ideas about multiple sclerosis”

ILLANA GOZES

Journal of Molecular Medicine

“AL-108: A case study for drug discovery and development toward cognitive enhancement and neuroprotection”

TODD GOLDE

Mayo Clinic, Jacksonville

“Novel methods to target A-beta production and aggregation in Alzheimer’s disease”

SVEN MEUTH

Univ. Wurzburg, Germany

“More than a leak: Tivo-pore domain potassium channels in neuroinflammation and neurodegeneration”

WILLIAM NEWSOME

Stanford Sch. Med.

“Perception, reward, and choice: Toward a neurobiology of decision-making”

ALAN FINE

Dalhousie Univ.

“How is long-term synaptic plasticity expressed? Answers from single synapses visualized in hippocampus”

NICHOLAS SPITZER

Univ. California

“Making the match: Activity-dependent specification of transmitter and receptor expression”

RON MACKAY**NINDS**

“Dopamine neurons from pluripotency to old age, the contribution of stem cell biology”

GRANT GILLETT

Univ. Otago Med. Sch., New Zealand

“Psychopaths, brain function, and moral responsibility”

ED BOYDEN**MIT**

“Optical brain control: Analyzing and engineering normal and pathological neural circuit dynamics”

ALICE O'TOOLE

Univ. Texas, Dallas

“Understanding the neural representation of facial identity and viewpoint: A pattern-based classification approach”

DALTON SURMEIER

Northwestern Univ.

“Dichotomous dopaminergic modulation of synaptic plasticity in the striatum”

RONALD SKELTON

Univ. Victoria

“Spatial navigation in virtual space: Evidence for a new cognitive-behavioural model from traumatic brain injury and eye-tracking”

SUSAN AMARA

Univ. Pittsburgh Sch. Med.

“Neurotransmitter transporters: A dance of domains and substrates?”

ART KRAMER

Univ. Illinois Beckman Inst.

“Enhancing cognitive and brain function of older adults”

TOM CARMICHAEL

UCLA

“Neuronal regeneration after stroke: Tracing the threads of Ariadne”

DANIEL DURSTEWITZ

Univ. Heidelberg

“Dopamine-controlled delta oscillations regulate dynamical and computational regimes in cortical networks”

DAVID SELF

Univ. Texas Southwestern Med. Ctr.

“Mechanisms of D2 receptor sensitization in cocaine relapse”

DON STEIN

Emory Univ. Sch. Med.

“Progesterone, sex, and brain injury: From the laboratory to the patient's bedside”

RAJ RATAN

Burke-Cornell Med. Res. Inst.

“Twists and turns on the transcriptional road to oxidative cell death: Implications for brain protection and repair”

BILL DOBYNS

Baylor Coll. Med.

“Lessons from life on the x chromosome: The developmental and genetic basis for microcephaly with disproportionate brainstem and cerebellar involvement”

DONALD STUSS

Rotman Res. Inst.

“Fractionation of mental state attribution after focal frontal lesions”

LEONARDO BELLUSCIO

NIH

“Understanding neural circuitry through olfactory maps”

ALCINO SILVA

UCLA

“Unravelling the molecular and cellular mechanisms of memory allocation in neuro-networks”

JEFF NOEBELS

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“Expanding the epilepsy genome”

DANNY WEINBERGER

NIH

“From genes to brain”

CARLOS PORTERA-CAILLIAU

UCLA

“Local blood flow predicts mode of long-term dendritic plasticity in peri-infarct cortex”

PRAKASH KARA

Med. Univ. South Carolina

“Binocular visual processing in complete cortical microcircuits revealed with two-photon calcium imaging”

ADRIAN IVINSON

Harvard Neurodiscovery Ctr.

“Is there a place for drug discovery in academia?”

LISA SAKSIDA & TIM BUSSEY

Cambridge Univ.

“Memory, perception, and the ventral visual-perirhinal-hippocampal stream: Thinking outside of the boxes”

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Eco Audit

This report was printed on Forest Council-certified paper with 50% recycled fibre and 25% post consumer waste.

Trees saved: 1.48

Wood Reduced (lbs): 852.76

Water Reduced (Gals): 1253.86

Landfill Reduced (lbs): 132.96

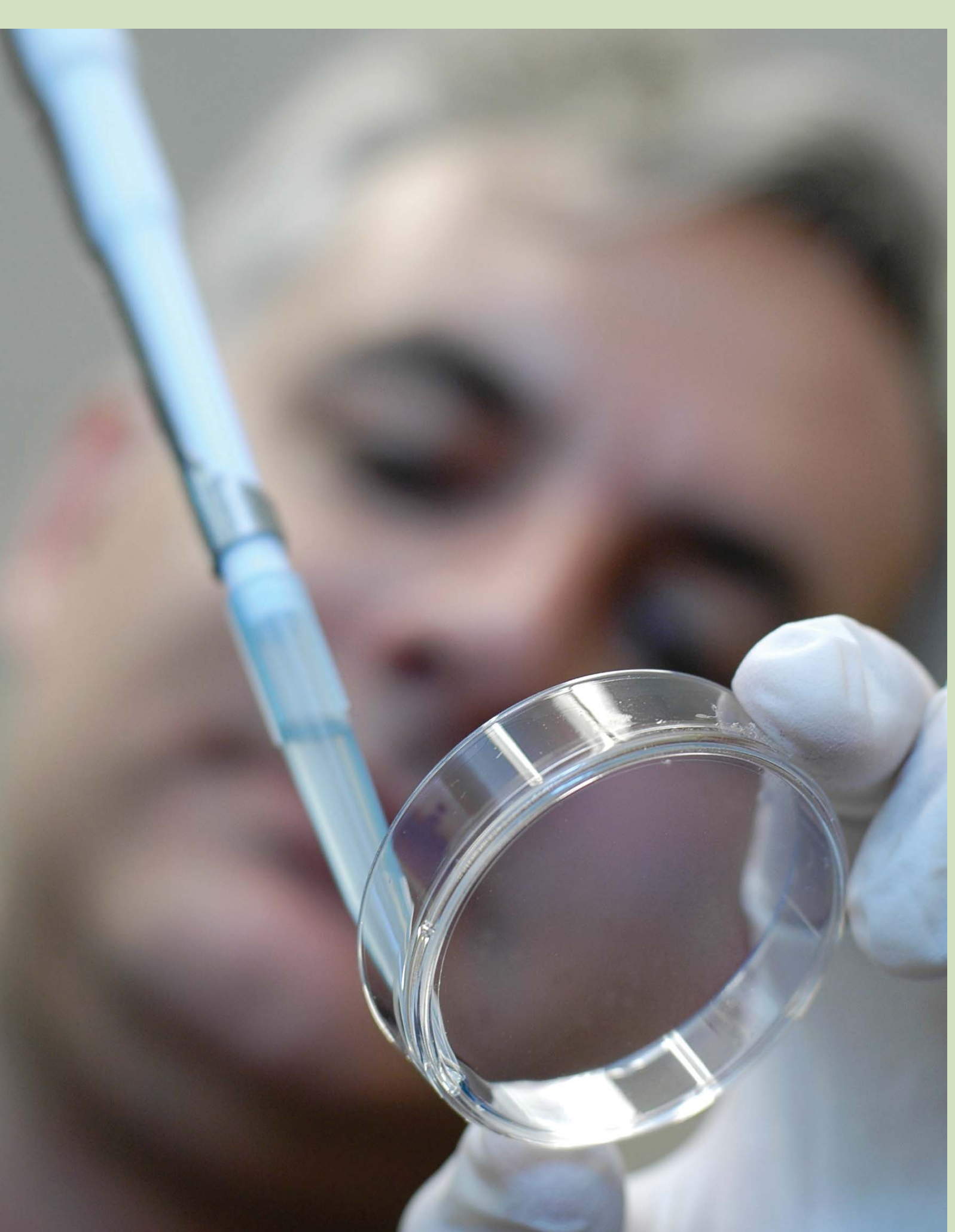
Net Greenhouse Emissions Reduced (lbs): 257.93

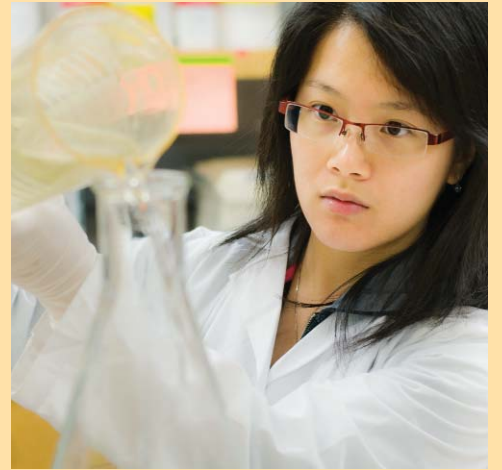
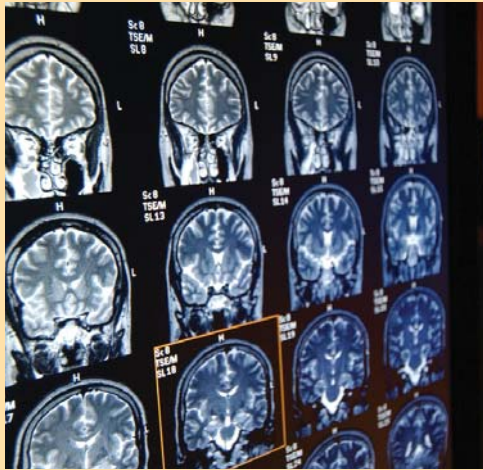
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