

BC Research Institute for Children's & Women's Health
2001/2002 Report



Research that matters. Just ask Arran, Lucy, Graehme and Eduarda.



BC Research Institute for Children's & Women's Health

Our Vision: Healthy children and women through excellence in discovery and application.

Our Mission: To attract and support a community of researchers who will discover, disseminate and integrate new knowledge for the benefit of children's and women's health worldwide.

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“Never doubt that a small community of enthusiastic, committed individuals can make a difference. Indeed, this is the only thing that ever has,” said anthropologist Margaret Mead.

Her insight aptly describes the thinking behind the BC Research Institute for Children’s & Women’s Health (BCRI), where a community of more than 200 health researchers are working to make a difference in the lives of women and children around the world.

By contributing infrastructure, funding, training and other support, our institute provides a foundation for innovative, internationally-recognized research—ranging from redefining how newborn babies feel pain, to revised treatment protocols for people with type 1 diabetes, to genetic-level work on conditions such as Huntington’s and Alzheimer’s diseases.

We foster a multi-disciplinary, collaborative environment through our partnerships with Children’s & Women’s Health Centre of BC (C&W)—where our institute is located and where many of our investigators have clinical appointments—and the University of British Columbia (UBC), where many of our researchers are faculty. Our investigators also have a number of affiliations with other hospitals and with national and international research networks.

On the following pages you’ll learn more about our institute, the research that goes on here, and some of the people who benefit from the innovation, collaboration, application, and excellence that define our work.

It’s all about research that matters.

Board & Executive Message



Mr. Mike Mahony
Interim Executive Director

For a community to thrive, it needs a balance of stability and change. The last year at BCRI was a time of transition and growth, but also one where we successfully maintained a state of calm stability.

Building on the work of Dr. Aubrey Tingle, founder of the BC Research Institute for Children's & Women's Health, who left in 2001 to head up the Michael Smith Foundation for Health Research, BCRI embarked on numerous ambitious and visionary ventures.

A strategic review to confirm the institute's needs was one of our first undertakings, and this process also reinforced the value of our governance structure, Board of Directors, as well as a new and more transparent budget process developed with input from investigators.

Following up on that work, we began the search for a new executive director, and embarked on developing a strategic plan. We established a new mission and vision, and outlined a number of strategic priorities including the development of a communications plan to promote and strengthen our voice.

On the research side, although our investigators' success can be measured in more than dollars and cents, we are proud to note our research funding continues to grow, and that our investigators attracted more than \$30 million in external grants and funding in the fiscal period ending March 31, 2002.

A number of BCRI researchers have successfully applied for and received significant funds from the Canadian Foundation for Innovation (CFI) to develop or expand facilities and infrastructure for projects such as a Laboratory for Functional Genomics, a Nutrition Research Program, the Bioinformatics Program, and the creation of a Centre for Research in Childhood Diabetes.

BCRI is now well positioned to take advantage of the opportunities available through the federal and provincial governments' commitments to research and funding, and through local collaborations and networks. We are also growing in other ways, planning for an expansion of 200,000 sq. ft. over the next five years with help from public/private partnerships.

Thanks are due to many, and at this time we'd like to acknowledge a few, including our partners, UBC and C&W; and members of the C&W Hospital Executive & Management Committees—who have been so supportive of us—with special recognition



Mr. Alistair Duncan
Board Chair

to former C&W CEO Elisabeth Riley. Also invaluable is the continuing support of the hospital fundraising foundations, and the advice provided by members of the Scientific Executive Committee. A special thanks goes to Dr. Dan Rurak for his strong service as Acting Assistant Dean Research, Faculty of Medicine, UBC. A round of applause also goes to hundreds of investigators and trainees conducting research here, to our committed Board members, and to the administrative staff who work to keep everything running smoothly.

All those involved with the BC Research Institute are focused on the work we do—research that matters. This report has only space to highlight but a few of our many stars—hundreds of people whose collaboration, innovation, application and excellence underscore our commitment to the BCRI vision: “Healthy children and women through excellence in discovery and application.” Read on.

Mr. Mike Mahony
Interim Executive Director

Mr. Alistair Duncan
Board Chair

2001/02 Board & Board Committees

Board Members:

Mr. Alistair Duncan, *Chair*
Mr. Malik Talib, *Vice Chair*
Mr. Stanley Yee, *Secretary-Treasurer*
Dr. John A Cairns
Alternate: Dr David McLean
Mr. Alan D Grimston
Mr. Poul Hansen
Dr. David Hardwick
Mr. John McKercher
Mr. Maurice Mourton
Mr. Jim Rattenbury
Mrs. Elisabeth Riley
Alternate: Mr Ron McKerrow
Ms. Ann Sturrock
Mr. Mike Mahony, *ex officio*
Ms. Faye Wightman, *by invitation*

Board Executive Committee:

Mr. Alistair Duncan, *Chair*
Mr. Malik Talib, *Vice Chair*
Mrs. Elisabeth Riley
Alternate: Mr Ron McKerrow
Mr. Mike Mahony, *ex officio*

Finance & Audit Committee:

Mr. Stanley Yee, *Chair*
Mr. Poul Hansen
Mr. Jim Rattenbury
Mr. Alistair Duncan, *ex officio*
Mr. Malik Talib, *ex officio*
Ms. Donna Hart, *non-voting member*
Mr. Mike Mahony, *ex officio*
Mr. Richard Hunter, *by invitation*

Nominating Committee:

Mr. John McKercher, *Chair*
Dr. John Cairns
Mr. Alan Grimston
Ms. Ann Sturrock
Mr. Alistair Duncan, *ex officio*
Mr. Malik Talib, *ex officio*
Mr. Mike Mahony, *ex officio*

Notes:

1. Chair is ex officio on the Finance and Audit and the Nominating Committees.
2. Vice-Chair is ex officio on the Finance and Audit and the Nominating Committees.
3. Executive Director is ex officio on the Finance and Audit and the Nominating Committees.

BCRI Overview

Our Institute:

Leadership, Community, Support & Training

The BC Research Institute for Children's & Women's Health was established in 1995 to advance the health of children, youth, women and their families through research excellence. A partnership between Children's & Women's Health Centre of BC (C&W) and the University of British Columbia (UBC), we strive to be a leader in key areas of research that hold promise for advancing a full spectrum of health issues related to these populations.

Situated on the C&W site, our 163,000 sq. ft. facilities afford researchers close access to three leading-edge health care organizations that serve children and women from around the province: British Columbia's Children's Hospital, British Columbia's Women's Hospital & Health Centre and Sunny Hill Health Centre for Children.

A key role of the institute is to provide support to individual researchers and research teams. We offer financial, business development, communications and grants office assistance. Our grants office has information on over 450 sponsoring agencies with over 1,000 different programs, and coordinates applications requiring ethical (human & animal) review, biohazard approval and/or review by hospital review committees.

More than half of our annual operating budget is allocated to merit-based awards. These include career and establishment awards for researchers as well as post-doctoral fellowships and graduate student awards. We also fund and coordinate a year-round training program and a summer student program. These support promising young researchers in science, medicine and other health disciplines by allowing them to work on individual research programs under the guidance of established investigators, and providing them with educational opportunities through seminars and workshops.

Our Research:

Collaboration, Innovation, Application & Excellence

Over 230 investigators are associated with BCRI. Working with them are more than 130 trainees (graduate students undertaking Masters and Doctoral degrees, and postdoctoral research associates).

In 2001/02, our researchers attracted over \$30 million in external grants and funding, with hundreds of research projects funded.

Five centres serve as a focus for our research....

Centre for Community Child Health Research (CCCHR)

CCCHR researchers focus on social, environmental and behavioural factors that can compromise children's health and their emotional and physical development. By applying their knowledge to community-focused prevention, intervention and health promotion, they seek to improve the health and well-being of children and their families. The centre brings together interdisciplinary expertise in child development, health promotion, epidemiology and clinical research. CCCHR activities fall under five areas: health promotion, bio-behaviour interface, family and community systems, disability, and epidemiology.

Centre for Growth & Development

The Centre for Growth & Development focuses on the relationship between the growth and development of children and key factors such as nutrition, allergies, infections and a variety of environmental hazards that can interfere with normal body chemistry. Researchers are exploring how genetic and environmental circumstances influence the development of the placenta, embryo and fetus and the rest of the reproductive system as well as the heart, brain and other major organs. They are also looking at the long-term role of these factors in the development of cardiovascular diseases, diabetes, cancer, mental disorders and more.

Centre for Healthcare Innovation & Improvement (CHII)

Health evaluation research, and the translation of that research into healthcare practice, is the focus of the Centre for Healthcare Innovation & Improvement. CHII investigators conduct research into health services, outcomes, policies and practices with the intent of providing healthcare policy- and decision-makers with the information necessary to facilitate change. The centre brings together expertise in various areas, including medical informatics, health economics, health policy, epidemiology, pharmacology, pediatrics, neonatology, maternal fetal health, surgery, obstetrics & gynecology, and statistics.

Centre for Infection & Immunity

Researchers at the Centre for Infection & Immunity are doing studies at cellular and molecular levels to better understand the ways in which infecting micro-organisms evade or overwhelm the body's immune system to cause disease. Research includes addressing lung infections in cystic fibrosis, the molecular factors controlling microbial virulence and antibiotic resistance, and the design and assessment of viral vaccines.

Centre for Molecular Medicine & Therapeutics (CMMT)

CMMT researchers are using technology to examine how cells function at the molecular level to develop new approaches to research and treatment for the more than 60 per cent of Canadians who will develop genetically-linked illnesses during their lifetime. Investigators are developing new therapies to prevent or reverse symptoms caused by genetic defects, at the same time contributing new knowledge about gene regulation in healthy cell function.

In addition to our centres, a number of program areas focus on specific lines of research inquiry. The **Cardiovascular Sciences Research Program, Neonatology Research Program, Oncology Research Program, and Women's Health Research Program** all receive specific funding support from BCRI's core budget. Enterprising researchers have formed additional programs, such as the **Biobehavioural Research Program, Diabetes Research Program, and Nutrition Research Program**.

On the following pages we profile some of our research, and feature a few children and a woman who are benefiting from the work done here.

8-month-old Arran arrived 3 months early....



Our partnership with the Children’s & Women’s Health Centre of British Columbia (C&W) puts many of our researchers on the leading edge of bench-to-crib-side research and care. As the site of the largest maternal-fetal-newborn clinical service in Canada, C&W is home to more than 7,000 births every year, and offers high-risk maternity service for all of British Columbia.

Baby Arran is just one of the thousands of infants benefiting from our researchers’ work, which includes studies into the risks associated with amniotic testing, promising in-utero surgical possibilities, and sophisticated genetic mapping as a means of anticipating hereditary illness.

Much of the work of the researchers featured next is focused on issues related to prenatal, premature and newborn development, although the multidisciplinary nature of our work means every finding can inform others, regardless of the area of specialization.

Even though he was born 11 months ago, Arran Dobson-Mack is now considered an eight-month-old. When he first came home last fall on a Thanksgiving Sunday after many weeks in hospital, his family was full of thanks indeed. These days Arran and his mother Anne participate in Dr. Ruth Grunau’s research on the cognitive development of premature infants. Anne hopes the findings may help other families who are faced with the emotional roller-coaster of a premature birth like Arran’s.

Collaboration (n.): To work together, especially in a joint intellectual effort. **That's what of the hundreds of researchers who work side-by-side at BCRI, informing and inspiring**



Pain in Premature Newborns

Very premature babies, especially those born below 28 weeks gestational age, are at risk of attention and learning problems in childhood; however the reasons are unclear. As part of their life-saving intensive care in the hospital, they are bombarded with sensations they are unprepared for at this time of their most rapid brain development, including those from repeated invasive medical procedures (for example blood sampling). There are barriers to assessing pain in these tiny babies, and although they may be given medications for their pain, the effects of these drugs and of the pain itself on their complex neuro-development are unknown.

Dr. Ruth Grunau is a pediatric psychologist whose lab is unique internationally for combining the issues of pain in premature newborns with ongoing infant development of intelligence, attention and social behavior. Together with her interdisciplinary group, she is investigating ways of improving pain assessment while premature newborns are in the hospital, and examining the long-term effects of repetitive pain on these babies.

Dr. Grunau's research may lead to improved pain management for very premature babies while they are in hospital. Her work could also help nurses, physicians, and parents to understand these babies better, and may contribute to the prevention of some developmental difficulties among the most vulnerable infants in this 'at risk' population.

Ruth Grunau, Tim Oberlander and Dan Rurak do every day, and they're just a few collaboration toward a common goal.



Drug Effects on Infant Brain Development

When a pregnant woman takes an antidepressant such as Prozac from a class of drugs called SSRIs (Selective Serotonin Reuptake Inhibitors), the level of serotonin, a neurotransmitter, may rise in her unborn infant's brain. **Dr. Tim Oberlander**, a developmental pediatrician, studies how the early experience of unborn babies influences their developing nervous systems and behaviour during childhood.

His work investigating how infant pain responses may indicate whether exposure to SSRIs alters fetal brain development, uses pain reactivity as a "window into the brain." He identifies pain during invasive procedures by measuring heart rate and its variability, breathing frequency, and other physiological indicators.

Because babies exposed to SSRIs look healthy, the drugs are considered safe, but their lasting effects, if any, on the developing brain's structure and function are unknown. His research suggests that early SSRI exposure may lead to decreased pain reactivity in very young infants, which seems to indicate an effect on the developing brain. However, the influence of maternal depression on development during pregnancy may be far worse than any currently known effect of SSRI use during that time, he says.

By contributing to science's understanding of early infant brain development and safe SSRI use during pregnancy, Dr. Oberlander's work will ultimately lead to healthier outcomes for mothers and their infants.

Drugs a Potential Concern for Women and Newborns

Dr. Dan Rurak is a physiologist who explores the development of organ functions in the fetus and newborn and the impact of drugs given to pregnant women on this process. He works closely with other researchers, and appreciates BCRI's culture of collaboration.

One example of this collaborative environment has evolved from animal studies conducted with colleague Dr. Wayne Riggs. Looking at the fetal effects of antidepressants, they began working with a pediatrician, a pharmacist and a pair of reproductive psychiatrists to assess the impacts of antidepressants on the unborn fetus (see Dr. Oberlander's entry for a further description).

In other collaborative studies, Dr. Rurak has been working with basic and clinical researchers in Ontario to assess the usefulness of a new class of anti-inflammatory drug as a treatment for preterm labor. Using animal studies as a basis once again, the group has plans for a clinical study in pregnant women. Dr. Rurak is also involved in collaborative studies to explore the physiological mechanisms that initiate labor. Preterm labor is a major contributor to perinatal mortality and morbidity, so understanding the causes and better treatment options could have a significant impact on child health.

Dr. Rurak's research will lead to greater knowledge about the usefulness and effects of drugs on the fetus and the newborn. This could help women who are deciding whether to take medication to rationally weigh its risks and benefits.

4-year-old Lucy is insulin-dependent....



Diabetes, dyslexia, Down's syndrome... these are just a few disorders children suffer from that are being researched by scientists at our research institute. In many cases, findings on these conditions at the early stages of life also benefit people who suffer in adulthood.

From the internationally-renowned work of geneticists on cystic fibrosis (CF)—the most common potentially fatal genetic disease affecting Canadians—or on the presently-incurable Huntington's disease, which affects one in 10,000 people, to active participation in a national Children's Brain Mapping Program, the innovative research of our scientists gives patients like four-year-old Lucy reason to hope for a better future.

In addition to the three researchers profiled on the next two pages, dozens of other colleagues are working collaboratively toward an improved understanding of endocrinology, immunology, cancer, neurological development and more, for the benefit of children like Lucy.

For a four-year-old, Lucy Everett has a pretty grown-up understanding of her type 1 diabetes. She's even able to test her own blood sugar level by pricking her finger and testing a drop of blood. But the list of variables affecting a diabetic person's blood sugar level is long, and Lucy and her parents, Rob and Alison, look with hope to researchers like Dr. Bruce Verchere, who is studying how to better treat and control diabetes.

Innovation (n.): The act of introducing something new. The minds of more than 200 researchers
Michael Hayden and Bruce Verchere are among this group and—just as importantly—represent
the next wave of thinking.



Enzymes Offer Hope for Kids with Genetic Defects

Lysosomes are a vital part of the cell's metabolism, constantly recycling molecules into their building blocks for re-use. Pediatrician and geneticist **Dr. Lorne Clarke** studies a rare disorder in children, MPS 1, in which lysosomes store rather than recycle complex sugar molecules, glycosaminoglycans. This results in a lack of the enzyme (L-iduronidase) causing abnormal development from conception, distorting bones, joints, the heart, liver, and spleen, and frequently leading to mental retardation.

The work of Dr. Clarke's group on MPS 1 has extended from identifying the defective gene through genetically engineering a mouse with the identical disorder, to participating in an international trial infusing affected children with the enzyme. The children are showing signs of reversal of their symptoms.

In addition to helping children with MPS 1, Dr. Clarke's research into the key cellular processes involved may have even broader implications. It could contribute to cancer research, because deficiency of the enzyme may lead to alteration of important proteins on the cell's surface believed to be important to the behaviour of cancer cells. Dr. Clarke's work also provides a model for how to breach the blood-brain barrier, which protects the brain against many foreign substances giving great potential for insights into drug therapies for brain diseases such as Huntington's and Alzheimer's.

Researchers at BCRI overflow with fresh ideas every day. Lorne Clarke, maintain a close working relationship with students and trainees who represent



Genes Hold Key to Child Treatment

“We treasure exceptional patients who have rare disorders,” says medical geneticist **Dr. Michael Hayden**. “Often they provide insight into patterns of biology that are present in all of us.” Dr. Hayden’s work with rare disorders could benefit many people. For instance, children born with Tangier disease cannot get cholesterol out of their cells due to a genetic defect. Repairing the ABCA1 gene, which Dr. Hayden has identified, and allowing the cholesterol to leave the cell, would help them. This could also lead to preventing heart attacks in people at risk by increasing HDL (high-density lipoprotein), or “good” cholesterol, in the bloodstream.

Dr. Hayden’s group has also identified a gene associated with a form of childhood ALS (amyotrophic lateral sclerosis), or Lou Gehrig’s disease. With collaborators, he has discovered the gene that brings about the major cause of hereditary blindness in children—cataracts. Furthermore, he has identified the mechanisms underlying Huntington’s disease, in which brain cells die prematurely, leading to movement abnormalities and mental deterioration. The affected gene is also critical to the regulation of cell numbers and may play a role in some cancers.

“Who would have thought—since I’m focusing on brain disease—that suddenly my attention would turn to cancer?” he says. “Genes take me down pathways I would never have imagined.”

Delving into Diabetes Prevention and a Cure

Dr. Bruce Verchere and nine other BCRI investigators have secured close to nine million dollars in infrastructure funding to begin a new Centre for Research in Childhood Diabetes.

Dr. Verchere hopes to prevent diabetes and to cure existing cases—two situations requiring very different approaches. Prevention may involve identifying and vaccinating high-risk children. But a cure—helping people whose insulin-producing beta cells have been destroyed—will require beta cell transplantation. In type 1, or juvenile-onset diabetes, the question will be how to prevent those transplanted beta cells from being killed by the immune system.

Transplantation will always be problematic, according to Dr. Verchere. For those who suffer from diabetes, lifelong immunosuppression causes difficulties, as does the limited supply of beta cells available from cadavers or from stem cells. His approach involves using a virus to transfer a healthy gene into beta cells before they are transplanted into a patient. The gene would then prompt the manufacture of XIAP (X-linked inhibitor of apoptosis protein), which would help the cells resist attack from the immune system. Although the cost of the treatment—a cure—would be very high, lifetime treatment for a diabetic is already expensive. Dr. Verchere’s approach could also reduce the toll on lifestyle that diabetes extracts from those with the disease.

11-year-old Graehme is almost always in pain....



Despite his pain, Graehme has a positive attitude. He also has patience and determination. These are qualities he has in common with BCRI investigators, including those profiled on the following pages.

Many of our researchers work directly with children like Graehme, and their families. Through practical application, their research benefits these individuals, as well as generations to come.

Our investigators also pass along their drive for excellence in discovery and application to future generations of researchers. Each year new graduate and post-graduate students join our research institute as trainees, working directly with our investigators in the lab and by the bedside.

Eleven-year-old Graehme has lived with undiagnosed severe abdominal pain for six years. As a volunteer participant in the trials of Dr. Christine Chambers on pain responses in children aged eight to 15, Graehme is helping science address the needs of future children in pain. Dr. Chambers' work indicates a large part of his coping may be attributed to the reaction of those around him, since when children are distracted from their pain they tend to suffer less.

Application (n.): The capacity of being usable; relevance. Those who work in both labs affects the lives of many. Christine Chambers, David Scheifele, David Speert and Rusu a regular basis.



Pain Coping Predictors for Children

Just one year after receiving her doctorate in clinical psychology from the University of British Columbia, **Dr. Christine Chambers** is bringing her enthusiasm to the question of how to help children with chronic pain. She is identifying what parental behaviours are linked to children's ability to cope well with pain and what behaviours might inadvertently contribute to children having difficulties.

The eight- to 15-year-olds Dr. Chambers studies have recurrent abdominal pain and headaches. Some have been in pain for most of their lives. In BCRI's biobehavioural research lab, she videotapes kids doing tests, then follows up four months later to see if their behaviours predicted how well they would be coping.

Pain can interfere with a child's ability to complete the activities of daily living that are essential for child development, such as attending school and participating in sports and social activities. At puberty, many physiological factors and psychological issues come into play. Early identification of children affected by pain and effective intervention can reduce their loss of function and their other difficulties associated with puberty.

"It's really hard for parents to see their child in pain," says Dr. Chambers. "I hope to be able to give them concrete suggestions for helping their children and preventing further pain."

Vaccine Study and Safety Key for Kids

As head of the Vaccine Evaluation Center at BCRI, pediatrician **Dr. David Scheifele** and his team test vaccines for their safety and effectiveness. Through his work demonstrating the frequency, severity and human consequences of disease, Dr. Scheifele is also involved in building the rationale for new vaccines.

Last fall, in response to an urgent need, Dr. Scheifele's team developed and implemented a protocol to successfully complete clinical trials on an influenza vaccine in an unprecedented six weeks rather than the usual six months—without compromising the thoroughness of the trials. This experience puts the team on a firm footing to safely rush vaccine trials through whenever the inevitable influenza pandemic arrives.

Dr. Scheifele also co-founded and co-leads IMPACT, a twelve-pediatric-hospital project sponsored by Health Canada. At each hospital, a designated nurse screens for vaccine-related admissions. IMPACT demonstrates that the latest baby vaccines have reduced certain vaccine-related complications by 80 per cent.

Before 1985, when vaccines for Haemophilus influenzae type B became available, this influenza caused 500 admissions annually to the IMPACT hospitals. By 2000, admissions had dropped to just four. Many of those spared would have developed meningitis, becoming deaf and brain-damaged. Dr. Scheifele was involved in almost every Canadian clinical trial of the vaccine.

and clinics at BCRI form a continuum of translational research that directly
ng Tan, along with dozens of colleagues, see and work directly with patients on



Bacteria Hold Key to CF

Dr. David Speert is a pediatrician and infectious diseases expert with a long-time interest in cystic fibrosis. He studies cystic fibrosis in relation to the bacteria that cause lung infections typical in cystic fibrosis: *Pseudomonas aeruginosa* and *Burkholderia cepacia*. Both contribute to the plugged lungs that characterize the disease. Some strains of *Burkholderia cepacia* respond to treatment, but in one quarter of cases, bacteria pass through the airway cells into the bloodstream, causing rapid death.

The lab uses very sensitive techniques to “fingerprint” and identify strains of *Burkholderia cepacia*. As the only lab in Canada capable of these procedures, the group’s work supports sometimes difficult infection-control decisions. Proper identification of *Burkholderia cepacia* is vital because some strains can be lethal and can spread between and among patients.

Dr. Speert’s group has also developed Dextran, a sugar-based drug which enhances the lung defences of people with cystic fibrosis against *Pseudomonas aeruginosa*. Dextran offers people with cystic fibrosis new hope of protection against their primary killer.

Kids’ Immune Systems Potentially Repaired

For most people, the Epstein-Barr virus (EBV) leads to the mild symptoms of infectious mononucleosis. But for some, it causes blood cancers, lymphomas, or other tumours such as nasopharyngeal carcinoma, a cancer of the throat especially affecting men of southern Chinese descent. **Dr. Rusung Tan** studies the body’s immune response to EBV.

Dr. Tan’s group investigates a natural mutation in an extended aboriginal family from the Yukon. Affected boys die once they contract EBV, many in childhood and the rest in early adulthood. They share a disorder called XLP, “X-linked lymphoproliferative disease,” resulting from a mutation of the gene for SAP, “SLAM-associated protein.” (“SLAM” signifies “signaling lymphocyte-activation molecule.”)

Normally, SAP is one of a chain of molecules carrying signals from the lymphocyte’s membrane to its nucleus. Because lymphocytes are key cells of the immune system, mutations of SAP lead to immune disorders, especially during EBV infection. Dr. Tan hopes to use a retrovirus to help to repair the defect in the boys’ abnormal cells.

Knowledge of how SAP and other lymphocyte molecules protect against EBV infection will be important not only in developing an EBV vaccine but also in understanding how EBV causes cancer and how the immune system works to control viral infections and tumors.

37-year-old Eduarda experienced depression....



Genetic factors, hormonal changes, medications, nutrition, and environmental influences—any or all of these can impact the health of children and women, positively or negatively, as Eduarda has learned.

By studying these elaborate networks of cause and effect, investigators at our research institute are able to discover, and thereby influence, those factors that bring about the most positive outcomes.

Through the accumulation, sharing and application of their knowledge, our researchers demonstrate an inspiring dedication to the health of women and children worldwide.

When her son Matthew was born five years ago, 37-year-old Eduarda Hodgins had no idea she was in for a rougher ride than most first-time mothers. She plunged quickly into severe postpartum depression and now describes that phase as among the darkest in her life. With the help of a postpartum support association, she learned how to cope. So by the time her second son Connor was born two years ago, she knew she could take antidepressants to reduce the likelihood of depression. “I didn’t want to miss my child’s first year again,” she says.

Excellence (n.): The state, quality, or condition of excelling; superiority. **Bring together umbrella of the BC Research Institute and you have excellence. Support the work, from Francis Ouellette and Elizabeth Simpson.**



Proper Nutrition for All

Clinical nutritionist **Dr. Sheila Innis** specializes in growth and development, and is developing dietary fat intake guidelines for pregnant women, breastfeeding mothers, infants, and children.

Most current nutritional guidelines are based on research into reducing the risk of heart disease in men. The goal of low fat intake has been wrongly applied to children from the age of two and to women, she says. Infants, children, and pregnant women are building tissue, and so need a high level of essential fats—a vital component of the brain and nervous system.

Babies build their brain tissue during the last trimester of pregnancy, if they are full-term, or outside the womb, if they are extremely premature. Because a mother's diet directly supplies the nutrients her fetus receives, it must include adequate essential fats. Breastfeeding mothers and infant formula also require adequate essential fats.

Dr. Innis' group is one of very few worldwide looking at the developmental aspects of nutrition. Because what an infant is fed in the uterus and after birth leads to better health, especially in terms of brain development, her guidelines will lead to a more robust next generation.

many of the best and brightest minds in health research under the
ote it, inspire it—and you attract and keep researchers such as Sheila Innis,



Computer-Powered Research Points Out Genetic Disorders

Bioinformatics is a scientific specialty that uses computer power to analyze gene and protein data. Without bioinformatics, much research such as the sequencing of the human genome would not be possible. Looking at the genome, bioinformaticians can locate genes and identify why some of them cause diseases. They can rapidly narrow down a candidate list of genes for a particular disorder. Investigators can then screen patients with the disorder for the presence, absence or malfunction of those genes. Once a disease mechanism is understood, a drug can be developed for that gene.

Francis Ouellette heads the research institute’s bioinformatics group, which collaborates with investigators, consults to them, and conducts its own research. He works to identify the 40–60,000 genes encoded within the human genome—the sum of human genetic material—by developing algorithms, ordered sets of instructions for solving a problem.

Bioinformaticians can also identify suitable targets for drug therapy by simultaneously analyzing thousands of “switched-on” genes or the interactions of the proteins they code for.

Ouellette has made a copy of the human genome available to investigators at the BC Research Institute. He is a strong advocate for biological data such as DNA sequences for the human and other genomes being freely available to researchers worldwide.

Mental Illness Genes Studied

Dr. Elizabeth M. Simpson develops mice with mental illness, primarily extremely violent behaviour and autism, to increase her understanding of the genetic and developmental mechanisms for human abnormal behaviour and disease conditions of the brain.

“Once you have a mouse that gets sick and responds to treatment for the same reasons people do, you have a wonderful tool for experimenting with innovative approaches to disease treatment,” she says.

As well, in a behavioural lab that Dr. Simpson established, mice are monitored for their responses to environmental stimuli. The combination of mouse genetics with brain and behavioural studies is an emerging field.

Dr. Simpson identified the mutation that resulted in the violent “fierce mouse.” While the fierce mouse’s brain is visibly abnormal, violent humans usually have normal-looking brains. The success of the current version of the fierce mouse is that it prompted her to study a particular molecule, Nuclear Receptor 2E1, common to mice and humans. She and her group are now developing a second-generation mouse that is expected to be more directly comparable to humans in terms of brain anatomy. Dr. Simpson anticipates that her work will lead to the development of drugs for mental illness in humans.

Partners & Funding

Our Partners

The BC Research Institute for Children's & Women's Health operates in partnership with the University of British Columbia and the Children's & Women's Health Centre of BC, part of the Provincial Health Services Authority.

The University of British Columbia (UBC)

UBC, in Vancouver, BC, is the third largest university in Canada and the oldest in the province. It ranks as one of Canada's top research universities with particular strength in the areas of medicine, biotechnology, chemistry, engineering, physics, computer systems, forestry, agriculture and food sciences. UBC is associated with four major teaching hospitals in Vancouver: BC Cancer Agency, Children's & Women's Health Centre of BC, St. Paul's Hospital and Vancouver Hospital and Health Sciences Centre.

The Children's & Women's Health Centre of BC is the primary site for the UBC Faculty of Medicine Departments of Pediatrics, Obstetrics and Gynecology and Medical Genetics.

For more information: www.ubc.ca

The Children's & Women's Health Centre of BC (C&W)

Our research institute is located on the grounds of C&W—which comprises the British Columbia's Children's Hospital, British Columbia's Women's Hospital and Health Centre and Sunny Hill Health Centre for Children. These facilities combine more than 400 in-patient beds. As a teaching hospital and major provincial resource, C&W cares for BC's most acutely ill or injured children, provides developmental and rehabilitation services to children throughout the province, offers the full range of health services required by child-bearing women and their babies, and also a broad range of specialized health programs.

For more information: www.cw.bc.ca

Our Funding

The BC Research Institute for Children's & Women's Health has experienced steady growth in funding. The 2001/2002 budget was nearly \$40 million, of which just over \$31 million was external funding (which includes grants, contracts, agreements and clinical trials). This amount is almost twice that of the year previous. Funding in 2001/02 came from more than 100 agencies, recognized on the following page.

Over \$6 million of our \$9 million in internal funding came from the BC's Children's Hospital Foundation, with the remainder from BC Women's Hospital & Health Centre Foundation and the Sunny Hill Foundation.

Donating to Research

Research at our institute is supported by generous donors through the BC's Children's Hospital and Sunny Hill Health Centre for Children Foundations and the BC Women's Hospital and Health Centre Foundation. Since 1982, BC's Children's Hospital Foundation has raised funds to help pay for essential needs of the only pediatric hospital in British Columbia, BC's Children's Hospital. Every year, approximately \$20 million is raised.

In addition to funding research, donations help purchase such things as the latest diagnostic equipment, support new and innovative preventative health programs and recruit and retain the brightest and best leaders in healthcare.

For more information on these foundations: www.bcchf.ca and www.bcwomensfoundation.org

Funding Sources

Foundations and Granting Agencies/Organizations

Alberta Heritage Foundation for Medical Research
 Amyotrophic Lateral Sclerosis Association (US)
 Arthritis Society, BC & Yukon
 B.C. Health Research Foundation
 B.C. Lung Association
 B.C. Medical Services Foundation
 B.C. Research Institute for Children's and Women's Health
 Bayer Canadian Blood Services Partnership Fund
 Canadian Celiac Association
 Canadian Cystic Fibrosis Foundation
 Canadian Diabetes Association
 Canadian Foundation for AIDS Research
 Canadian Foundation for Innovation
 Canadian Foundation for Women's Health
 Canadian Heads of Academic Radiology
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 Childhood Cancer Foundation Canada
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 The Sanfilippo Children's Research Foundation
 Tzu Chi Foundation (Taiwan)
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 Wellcome Trust
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Government

B.C. Centre for Disease Control
 B.C. Ministry of Advanced Education
 B.C. Ministry of Health
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Canadian Heritage
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Hospitals/Universities

B.C. Children's Hospital
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 UBC VPR Discretionary Research Fund
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The BC Research Institute for Children's & Women's Health thrives today because of the work of hundreds of investigators, trainees, support staff and administrators. Every effort has been made to include the correct names of all these people, but please accept our apologies for errors or omissions from this list.

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