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– Barr

Drs. Barr and Kobor will also collaborate with Dr. Tom Boyce, an expert in early childhood development who recently arrived at CFRI from UC Berkeley. Their collaborative study will focus on mother/infant interactions, and whether different levels of normal caregiving result in epigenetic differences among infants, which might ultimately translate into long-term physiological and behavioural differences. Dr. Barr expects over 120 mothers and babies will be involved in the study, with the mothers keeping a 24-hour diary of their own and their infant’s behaviours. Researchers will also observe the mothers and infants together in certain play conditions, and will record the heart rates and other physiological responses of infants to various stimuli.

Meanwhile, at regular intervals over the course of the year-long study, Dr. Kobor’s team will obtain small DNA samples from each of the infants, to see what epigenetic changes have occurred. The goal of the research is to determine whether epigenetic changes among the infants can be linked to differences in the caregiving behaviour they received from their mothers.

“Based on research up to now we have pretty good evidence for a number of long term effects stemming from early experience among humans,” says Dr. Barr, “but we have almost no idea about the mechanisms that underlie those changes.” Epigenetics has now emerged as a strong candidate for that mechanism, offering a possible explanation for why and how these long-term effects occur.

Their project was inspired in part by a landmark 2005 study, conducted by Dr. Moshe Szyf of McGill University, demonstrating epigenetic change in rats in response to caregiving stimuli. Drs. Barr and Kobor plan to collaborate with Dr. Szyf on their research.

“I’m thrilled by this study,” says Dr. Barr, who considers it among the most significant research projects he’s ever undertaken. “I bring a whole career of looking at caregiver effects on behaviour in the first three months of life, while Michael comes with a career of understanding how to measure epigenetic effects. Together we’ll be able to do something that hasn’t been done before.”

“This collaboration shows one of the big advantages of the research environment at CFRI,” says Dr. Kobor. “As part of a close-knit research community, we’re able to meet a lot of people from different backgrounds and we all benefit from the cross-fertilization of ideas.”

“We have absolutely the right team of people here for this study,” adds Dr. Barr. “It is probably one of the best teams to conduct this research in the world.”

Collaborative Study of Mother/Infant Interactions Seeks Link to Epigenetic Code

What we experience, especially during our earliest years of life, may affect our epigenetic code and ultimately aspects of our health, our behaviour and our appearance.

It has long been one of the puzzles of human genetics. Why should identical twins, with identical genes, become increasingly different as they get older? Why should one develop cancer or an allergy, while the other doesn’t?

The answers to these and many other questions – concerning how much we are the product of our genetic inheritance and how much our environment – may be found in epigenetics, an exciting new area of genetic research.

A recent study with rats, for example, showed that factors like the caregiving behaviour of rat mothers can alter the “epigenetic code” of their offspring. The epigenetic code is what governs the activity of genes within the DNA of an organism. In the rat study, the result was a difference among the young rats in their response to stress; a difference that continued for the rest of their lives.

Based on these and other studies, it now appears that what we experience, especially during our earliest years of life, may affect our epigenetic code and ultimately aspects of our health, our behaviour and our appearance.

“This collaboration shows one of the big advantages of the research environment at CFRI.”

– Kobor

“Epigenetics offers an avenue for explaining many things that people couldn’t explain in the past,” says CFRI genetics researcher, Dr. Michael Kobor, who is with the institute’s Centre for Molecular Medicine & Therapeutics. It also suggests promising possibilities for the development of more targeted treatments for diseases like cancer.

At CFRI, these possibilities have inspired a unique research collaboration between Dr. Michael Kobor, an expert in measuring epigenetic changes, and Dr. Ron Barr, an expert in early infant development, and Director of CFRI’s Centre for Community Child Health Research.

“Ron’s key question is how do experiences ‘get under our skin’ to influence our behaviour and our life course?” says Dr. Kobor. “This fits in exactly with what we explore in our epigenetic research.”



Dr. Michael Kobor is a research scientist in CFRI’s Centre for Molecular Medicine and Therapeutics, and an assistant professor in the University of British Columbia’s Department of Medical Genetics. He is also a Scholar of the Michael Smith Foundation for Health Research and a Scholar at the Canadian Institute of Advanced Research.

Dr. Ron Barr is Director of the Centre for Community and Child Health Research at CFRI, and Canada Research Chair in Community Child Health Research. He is also a professor in the University of British Columbia’s Department of Pediatrics and Director of the Experience-based Brain and Biological Development Program at the Canadian Institute of Advanced Research.



National Study Probes Dramatic Shift in Attitudes Towards Childbirth

Part medicine, part sociology and part anthropology, this four-year study could lead to the development of public and professional education that will restore trust in a woman's ability to give birth without major interventions.

Recent research shows it's common for pregnant women to undergo multiple procedures: three out of four women receive one or more major interventions during labour, including epidural analgesia, episiotomy, and medical induction of birth, either by drugs or surgical techniques.

"Childbirth is undergoing dramatic change," says Dr. Michael Klein, senior scientist at the Child & Family Research Institute. "It has become mechanized, industrialized... and many women are losing confidence in their ability to give birth without major interventions. Ten years ago cesarean by maternal request, without medical reason, wasn't much of an issue. Now it is increasingly becoming an accepted way to give birth."

Dr. Klein intends to determine some of the reasons for these changes through a four-year national study on the attitudes of women and maternity care providers towards birth, funded by the Canadian Institutes of Health Research.

His multidisciplinary team will spend the first two years of the study identifying some of the central issues by surveying maternity care providers including physicians, obstetricians, and midwives, as well as women with low-risk pregnancies. The second two years they'll focus on interviews, including with women.

Once the team's research is complete, Dr. Klein says a possible outcome is the development of public education as well as professional education for health care professionals. It also has policy implications for professional organizations.

"We want to understand what's happening and how the current situation came to be. Then we can decide whether and how to try to influence it." He adds, "This research is as much about sociology and anthropology as it is medicine."

Dr. Klein has spent more than two decades researching maternity care and recently conducted a pilot study on the attitudes of maternity care providers in British Columbia.

He has some ideas about why some of the recent changes have occurred. He also has concerns about what they mean to women and their children, health care providers, and society as a whole, in addition to concerns about increasing medical costs associated with the interventions.

"Rather than birth being a powerful personal and social experience, it has become an accident waiting to happen," he says.

Dr. Klein suggests that the normalization of cesarean section, for example, may create an environment of fear about the birth experience, and cause women to question their ability to deliver babies vaginally. "Young women may come to believe that their bodies are biologically defective."

Dr. Klein will look at a number of factors involved in the dramatic shifts, including an increase in the number of




"We want to understand what's happening and how the current situation came to be. Then we can decide whether and how to try to influence it."

women having their first child over the age of 35, when the risk of pregnancy complications increases.

A number of women these days also undergo infertility investigations and treatments. These women become used to interventions early on in pregnancy. They also tend to be significantly invested in bringing the pregnancy to term and having a healthy child, so they ask for and expect more medical intervention.

"The numbers [of procedures done] suggest that professionals and women have lost trust in women's bodies," says Dr. Klein. "Perhaps professionals and women feel they are reducing risk by electing for increasingly interventionist procedures."

However, Dr. Klein points out, while intervention rates have risen over the last 20 years, the outcomes, measured in maternal and infant mortality and morbidity, have not materially changed. 

The Child & Family Research Institute (CFRI) is dedicated to world-class research spanning a wide range of children's and women's health concerns. It is the largest research institute of its kind in Western Canada. More than 160 investigators are associated with CFRI at the current time. Working with them are approximately 150 trainees, including graduate students and postdoctoral fellows.

Research is conducted in seven program areas, with six crosscutting themes:

Research Programs

- Community Child Health Research
- Diabetes
- Healthcare Innovation & Improvement
- Infectious & Inflammatory Diseases
- Molecular Medicine & Therapeutics
- Oncology
- Reproductive Health

Crosscutting Themes

- Clinical Investigation
- Genetics
- Immunology
- Informatics
- Neurobiology & Mental Health
- Nutrition



Dr. Michael Klein is a senior scientist with CFRI's Community Child Health Research program, and Emeritus Professor, Departments of Family Practice and Pediatrics, University of British Columbia. His current research projects are funded by the Canadian Institutes of Health Research, the Vancouver Foundation and the Michael Smith Foundation for Health Research.

Vaccine Evaluation Centre Translates Discovery Research into Public Health Programs

Concerns about a global flu pandemic are focusing Canada's efforts to improve our ability to quickly convert new vaccines into effective immunization programs.

Mumps, measles, smallpox, rubella, polio – it wasn't long ago these diseases and their related complications threatened the lives of thousands of children across Canada. But with the advent of childhood immunization programs, these and many other diseases have been virtually eliminated.

With this kind of success, it's easy to understand the value of the discovery research that leads to new vaccines. Less well understood, but no less important, are the activities necessary for translating vaccines into successful public health programs, says Dr. David Scheifele, founder and director of CFRI's Vaccine Evaluation Centre (VEC), the first and largest centre of its kind in Canada. This work includes everything from providing the rationale for developing a new vaccine, to testing the safety of candidate vaccines through clinical trials, and providing ongoing surveillance of a vaccine's safety and effectiveness after its introduction.

Prior to 1985 Haemophilus influenzae type b, or Hib disease, was the leading cause of meningitis in Canada. Affecting one of every 250 kids, the disease was also responsible for most cases of acquired deafness and acquired mental retardation, and for numerous other complications.

"In the mid-80s, we always had one or two kids with Hib disease here at BC Children's Hospital," says Dr. Scheifele.

That was before the introduction of highly effective vaccines for the disease in 1992. Today Hib disease has almost disappeared - there were just four cases across Canada in the past year. As a further benefit, the hospital's capacity has increased by two beds that used to be occupied by children with the disease.



Dr. David Scheifele is Director of the Vaccine Evaluation Centre at CFRI and holds the CIHR/Wyeth Chair in Clinical Vaccine Research. He is also a professor of pediatrics in the University of British Columbia's Division of Immunology and Infectious Diseases.

CFRI's Vaccine Evaluation Centre is the first and largest centre of its kind in Canada.

Among the first activities of the VEC when it started in 1989 was work related to developing the Hib vaccine. "I was involved in virtually all of the clinical trials that led to the licensing of the Hib vaccines in Canada," says Dr. Schiefele.

"We're in a sort of renaissance era for vaccines," says Dr. Scheifele. Burgeoning technology is making the identification of antigens and the development of new vaccines easier and faster. At the same time, concerns about a global flu pandemic are focusing Canada's

efforts to improve our ability to quickly convert new vaccines into effective immunization programs. Those efforts include the VEC, as part of a national network of centres, conducting clinical trials for new vaccines, including a new made-in-Canada avian flu vaccine.

In recognition of the vital role of the VEC in protecting Canadians from emerging health threats, the Michael Smith Foundation for Health Research recently awarded the centre \$200,000 a year for much-needed infrastructure support. The four-year funding package will enable VEC to triple its number of participating researchers and widen the scope of its research activities.

Although immunization has already eliminated many of the most serious microbial health threats, Dr. Scheifele is under no illusion that his work may soon be done. "If we are not threatened with a pandemic flu as soon as we think, who knows when the next SARS-like illness will occur, or when a germ that is very familiar to us suddenly undergoes a change and becomes much more virulent?"

"Perfect Environment" Attracts One of Canada's Brightest Young Scientists

In the enterprise of health research, the role of the clinician scientist is particularly important. Trained as both practicing physicians and highly specialized researchers, clinician scientists are essential to help bridge the gap between the laboratory, where basic scientific discoveries are made, and the clinic, where the results are used with patients.

CFRI is a founding member of the Canadian Child Health Clinician Scientist Program (CCHCSP), a national training initiative to develop the skills of our next generation of clinician scientists in child and youth health. This highly competitive program, funded by the Canadian Institutes of Health Research, SickKids Foundation, and the BC Children's Hospital Foundation, provides key support for some of Canada's brightest young scientists.

"It's an excellent place for research collaborations, and the atmosphere and level of exchange between the different areas of the institute are wonderful."

Dr. Pascal Lavoie, who received a CCHCSP award in June, has chosen to further his research training at CFRI.

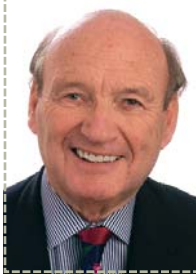
"I felt that the whole environment here was exactly what I was looking for to build the basis for my career as a clinician scientist," says Dr. Lavoie. "The environment is perfect for someone like me. It's an excellent

place for research collaborations, and the atmosphere and level of exchange between the different areas of the institute are wonderful."

With his background in immunology, Dr. Lavoie was particularly drawn by the opportunity to work with Dr. David Speert and CFRI's team of researchers in the Infectious and Inflammatory Diseases Program. As a trained neonatologist, Dr. Lavoie was also attracted by the clinical opportunities at BC Women's Hospital & Health Centre – Canada's largest birthing centre, with 8,000 deliveries a year.

"The clinical care is excellent and achieves high standards. From there you have the structure to easily support the linkage between clinical and basic science research," says Dr. Lavoie.

Message from the Board and the Executive



Maurice Mourton
Board Chair



Dr Stuart MacLeod
Executive Director



Dr Geoffrey Hammond
Scientific Director

2005/2006 was filled with anticipation as work began on our 121,000 square foot expansion. The official sod-turning took place May 31st, preceded by work to re-align roads and infrastructure and followed by excavation and the installation of a crane, which will be the centerpiece of activity for the coming months. It is a real thrill to watch the changing landscape after months of planning, collaboration and negotiation. We offer heartfelt thanks to the Provincial Health Services Authority and the BC Children's Hospital Foundation for supporting CFRI throughout the process.

On behalf of the Board of Directors, I also extend congratulations to the CFRI scientific community for another outstanding year of achievements, our best year ever. Our investigators, trainees and the research support staff have reason to be proud of the many awards and honours they have garnered; their success acts as a magnet for attracting more world class researchers to our institute. Of course, none of this could have happened without the robust academic partnerships CFRI enjoys with UBC and other BC university stakeholders – our appreciation extends to them.

Our thanks also go to Dr. Stuart MacLeod and Dr. Geoff Hammond for their unwavering leadership and to our dedicated administrative staff for the expert support they provide on a daily basis.

Maurice Mourton, Board Chair

It is the breadth and diversity of the research that gives CFRI its remarkable strength. To learn more about the research at CFRI, as well as our infrastructure, support programs, and partnerships, visit our website at www.cfri.ca

This last year for the Child & Family Research Institute has been one of building upon a strong foundation. We mean that literally – in January 2006 the final nod was given to begin construction on a new research building that will effectively double the Institute's size. The transformation of our site since has been truly remarkable. Approaching the institute, it's easy to see that there are big things going on here at CFRI.

The ideas of building and growth are echoed in a number of other areas at CFRI. The establishment of a new name and logo in mid-2005, and the development of two new websites – one for the institute as a whole, and one focused on training – have helped to solidify our identity and reputation as a world-class research institute.

We also implemented a membership program, which facilitates the allocation of appropriate levels of support for investigators and our research programs and areas. In addition, task-forces focused on clinical research have led to increased support for clinical investigation, including its administration and infrastructure. Major recommendations, which CFRI is now acting on, include targeted recruitment of clinician investigators, development of a strong training program in clinical research, and provision of support to clinical research units.

We have also built upon the foundation of key support areas such as our Research Education Program, developed a few years ago through a Michael Smith Foundation for Health Research (MSFHR) infrastructure award. Because of this program CFRI is able to provide mentorship for graduate students and postdoctoral fellows that is second to none.

In the past couple of years, the staff of the Research & Technology Development Office, which was also created through the MSFHR award, have worked with more than 100 of our investigators in developing grant applications – more than \$35 million in funding can be

directly attributed to their work. Our funding competition success rate has also increased significantly. For example, in the September 2005 competition for operating grants from the Canadian Institutes of Health Research, CFRI applications developed with the Research & Technology Development Office had a 47% success rate, compared to the national average of 25%. Overall, CFRI's funding continues to grow each year – our 2005/06 revenue was an impressive \$49.9 million, of which \$40 million was external funding, including grants, contracts and agreements.

The number of investigators associated with CFRI is growing too. Recent recruits, such as Michael Kobor and Steven Miller, two of the investigators featured in this report, are teaming up with our senior established investigators to conduct groundbreaking research. Many of these recent recruits say it is the diversity of research and the collaborative environment that inspired them to come to CFRI.

That collaborative environment is created by the people who make up the institute – the investigators, trainees, and staff. They are truly CFRI's foundation. We thank them all for their dedication, vision and hard work. We are proud of their successes.

We are also grateful to our partners. The growth and achievements of CFRI would not be possible without the bedrock of support from the BC Children's Hospital Foundation, or without our close ties to our main academic partner, the University of British Columbia, and to our clinical partners, BC Children's Hospital and Sunny Hill Health Centre, and BC Women's Hospital and Health Centre, and to the Provincial Health Services Authority. We value these relationships and look forward to working together as we grow into the future.

Dr Stuart MacLeod, Executive Director

Dr Geoffrey Hammond, Scientific Director

"The number of investigators associated with CFRI is growing... Many of these recent recruits say it is the diversity of research and the collaborative environment that inspired them to come to CFRI."

Our Partners:



BC Children's Hospital Foundation
Since 1982, BC Children's Hospital Foundation has raised money to support the work of BC Children's Hospital, the province's only pediatric acute care hospital. The Foundation is united with its donors by a single, simple passion – to improve the health and the lives of the young people who enter BC Children's Hospital every day. The foundation exists to provide financial support to BC Children's Hospital, Sunny Hill

Health Centre and the Child & Family Research Institute through accountability of contributions, stewardship of donors and advocacy to better accommodate sick and injured children and their families who live in all parts of the province.



University of British Columbia
The University of British Columbia, one of Canada's largest and most prestigious public

research and teaching institutions, is now ranked 35th among the world's 500 top universities, according to a study published by the European Commission. It offers a range of innovative undergraduate, graduate and professional programs in the arts, sciences, medicine, law, commerce and other faculties. UBC ranks in the top 10 of North American universities in creation of spin-off companies, has particular strengths in biotechnology, and its research generates more U.S. Patent applications than any other Canadian institution.

Research Funding

The Child & Family Research Institute's 2005/06 revenue was approximately \$49.9 million, of which \$40 million was external funding, including grants, contracts and agreements. Approximately \$9.9 million in internal funding was received from BC Children's Hospital Foundation, University of British Columbia, Sunny Hill Foundation for Children and Children's & Women's Health Centre of British Columbia, an agency of the Provincial Health Services Authority. External funding in 2005/06 was received from more than 150 agencies, recognized here.

FOUNDATIONS AND GRANTING AGENCIES | ORGANIZATIONS

Alzheimer Society of Canada
 American Heart Association
 Arthritis Society
 Arthritis Society – BC & Yukon
 BC Academic Health Council
 BC Children's Hospital Foundation
 BC Lung Association
 BC Medical Services Foundation
 Burroughs Wellcome Fund
 Canada Foundation for Innovation
 Canadian ADHD Resource Alliance
 Canadian Anesthesiologists' Society
 Canadian Cystic Fibrosis Foundation
 Canadian Dermatology Foundation
 Canadian Diabetes Association
 Canadian Foundation for AIDS Research
 Canadian Gene Cure Foundation
 Canadian Institute for Advanced Research
 Canadian Institutes of Health Research
 Canadian League Against Epilepsy
 Canadian Priority Setting Research Network
 Crohn's and Colitis Foundation of Canada
 Epilepsy Canada
 Flax Council of Canada
 Genome British Columbia
 Heart and Stroke Foundation of Canada
 Heart and Stroke Foundation of BC & Yukon
 High Q Foundation
 Huntington Society of Canada
 Huntington's Disease Society of America
 Institute of Health Services and Policy Research (CIHR)
 Juvenile Diabetes Research Foundation International
 Lloyd Jones Collins Foundation
 Lotte & John Hecht Memorial Foundation
 March of Dimes Birth Defects Foundation (US)
 Meningitis Research Foundation of Canada
 Michael Smith Foundation for Health Research
 Molly Towell Perinatal Research Foundation
 Multiple Sclerosis Scientific Research Foundation
 National Cancer Institute of Canada
 National Council on Bioethics in Human Research
 National Institutes of Health
 National Ovarian Cancer Association
 Natural Sciences Engineering Research Council
 Networks of Centres of Excellence (NCE)
 North American Pediatric Renal Transplant Case Study
 Peter Wall Institute for Advanced Studies
 Régie de l'assurance maladie du Québec
 Rethink Breast Cancer
 Rick Hansen Foundation
 SickKids Foundation
 Social Sciences & Humanities Research Council

Society for Pediatric Pathology (US)
 Spastic Paraplegia Foundation, Inc.
 Stollery Children's Hospital Foundation
 The Canadian Paediatric Society
 The College of Family Physicians of Canada
 The Wadsworth Foundation
 Tzu Chi Foundation (Taiwan)
 United Way of the Lower Mainland
 Vancouver Foundation
 Wegener's Granulomatosis Association

GOVERNMENT

BC Knowledge Development Fund
 BC Ministry of Children and Family Development
 BC Ministry of Health
 Canada Research Chairs
 Centers for Disease Control and Prevention
 Health Canada
 Healthy Child Manitoba
 Human Resources and Social Development Canada
 Ministry of Small Business and Economic Development
 Northern Health Authority
 Provincial Health Services Authority
 Public Health Agency of Canada
 Vancouver Island Health Authority
 Western Economic Diversification Canada

HOSPITALS | UNIVERSITIES

BC Children's Hospital
 Bluma Tischler Postdoctoral Fellowship
 Children's Hospital of Eastern Ontario
 Hôpital Saint-Luc du CHUM
 Hospital for Sick Children Research Institute
 Southwest Pediatric Nephrology Study Group
 Sunnybrook Health Science Centre
 University of Alberta
 University of British Columbia

INDUSTRY

3M Pharmaceuticals
 Abbott Laboratories
 Abbott Laboratories, Limited (Canada)
 Amersham Biosciences
 AMGEN Canada Inc.
 Axcan Pharma Inc.
 Bayer Inc.
 BD Biosciences
 Beckman Coulter Canada Inc.
 BioMarin Pharmaceutical Inc.
 Bio-Rad Laboratories (Canada) Limited
 Boehringer Ingelheim (Canada) Ltd.
 Bristol-Myers Squibb Medical Imaging
 Bristol-Myers Squibb
 Carl Zeiss Canada Ltd.
 Carsen Group Inc.
 Centocor Inc.
 Chiron Corporation
 Circa Dia BV
 Corus Pharma Inc.
 Dynavax Technologies Corporation
 Efore (USA), Inc.
 Eli Lilly and Company
 Eli Lilly Canada Inc.
 ESBE Scientific
 Fisher Scientific
 Genzyme Corporation
 GlaxoSmithKline Inc.
 Global Cancer Strategies Ltd.
 Hoffmann-La Roche Limited (Canada)
 IBM Canada Limited
 ID Biomedical Corporation
 ImmunoBiosys, Inc.
 Infectio Diagnostic (I.D.I.) Inc.
 Inhibitex Inc.
 Integrated Healthcare Communications Inc.
 Janssen-Ortho Inc.
 Leica Microsystems (Canada) Inc.
 London Health Sciences Centre
 Lundbeck Canada Inc.
 Mandel Scientific Company Inc.
 Mead Johnson Nutritional Group
 MedImmune, Inc.
 Merck Frosst Canada Inc.
 Merck Frosst Canada Ltd.
 Migenix Inc.
 Novartis Pharmaceuticals Canada Inc.
 Novo-Nordisk
 Pfizer Canada Inc.
 Pharmacia & Upjohn Inc.
 Pharmaxis Ltd.
 Purdue Pharma
 Rose Scientific Ltd.
 Sanofi Pasteur Limited
 Schering Ag
 Schering-Plough Research Institute
 Serono Canada Inc.
 Shire BioChem Inc.
 Shire Pharmaceutical Development Inc.
 SmithKline Beecham Pharmaceuticals (Canada)
 Summit Technologies
 VWR International Ltd.
 Walter Lorenz Surgical, Inc.
 Waters Ltd.
 Wyeth Pharmaceuticals
 Wyeth-Ayerst Canada Inc.
 Wyeth-Ayerst Research
 Xenon Pharmaceuticals Inc.

2005/2006 BOARD & BOARD COMMITTEES

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 Dr. Gavin Stuart
 Dr. Ron Woznow
 Dr. Stuart MacLeod (ex officio)

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 Dr. Stuart MacLeod (ex officio)
 Mr. Thomas Chan (by invitation)

Notes:

- Chair is ex officio on the Finance and Audit Committee.
- Vice-Chair is ex officio on the Finance and Audit Committee.
- Executive Director is ex officio on the Finance and Audit Committee.

CFRI Mission

The Child & Family Research Institute conducts discovery research to benefit the health of children and families.

CFRI Vision – Science Making Miracles

We passionately pursue discovery, knowing our achievements have the capacity to transform lives.

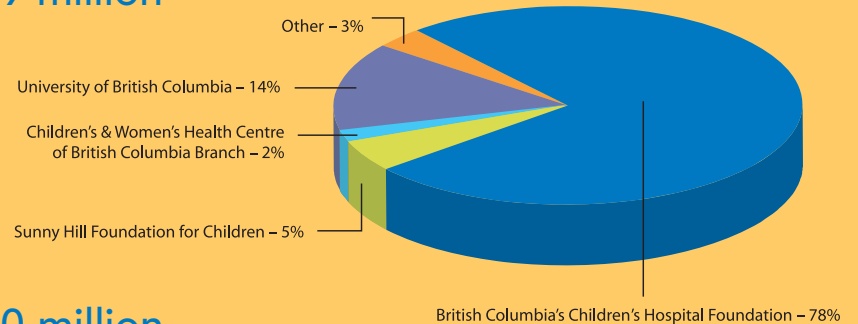
CFRI Values

We work in an environment that values:
 Integrity | Excellence | Transformation
 Interaction | Openness

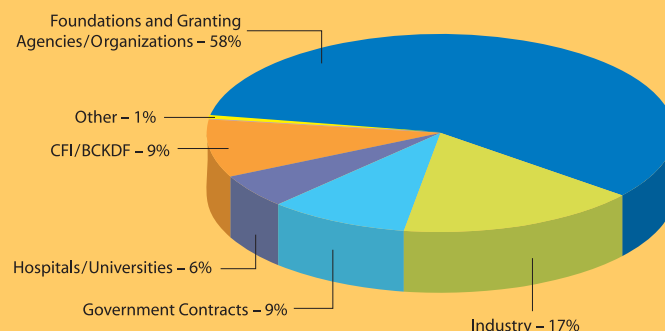
Financials

CFRI has had steady financial growth over the last number of years. 2005/06 revenue was approximately \$49.9 million, of which \$40 million was external funding, including grants, contracts and agreements. Approximately \$9.9 million in internal funding was received from BC Children's Hospital Foundation, University of British Columbia, Sunny Hill Foundation for Children, and the Children's & Women's Health Centre of British Columbia, an agency of the Provincial Health Services Authority.

Internal Funding – \$9.9 million



External Funding – \$40 million



BC Children's Hospital and Sunnyhill Health Centre for Children

Children's is home to many specialized pediatric services available nowhere else in the province, including BC's trauma centre for children, neonatal intensive care, kidney and bone marrow transplants, open heart surgery, neurosurgery and cancer treatment. The hospital also provides developmental and rehabilitation services to children throughout the province and offers a full spectrum of

health services for child-bearing women and their babies. Sunny Hill is a provincial facility that offers specialized services to children and youth with developmental disabilities.



BC Women's Hospital & Health Centre

BC Women's is the province's only facility devoted exclusively to the health of women, newborns and families. It provides the highest level of care to pregnant women and

newborns throughout BC, with provincial services including its Medical Genetics program, the Centre for Prenatal Diagnosis and Treatment, the Maternal and Infant Transport services, and the Special Care Nursery (neonatal intensive care unit). It is one of the country's busiest and largest obstetrical centres. More than 20,000 women are seen annually through its specialized women's health programs, which include world-class services in breast health, substance dependency, osteoporosis, HIV/AIDS and reproductive health.

Simulation Modelling Increases Surgical Services Capacity

Simulation modelling expert Craig O'Neill recommended BC Children's Hospital limit the number of elective surgeries scheduled for Wednesdays. His outcome prediction – a 56% reduction in cancellations within six months and a 13% reduction in operating room overtime costs with no reduction in the overall number of surgeries performed – were proven accurate within one or two per cent.

It's hard at first to imagine how a planning tool used by the military, grocery chains and factories could improve pediatric surgical services at BC Children's Hospital.

In fact, even the hospital's surgeons were sceptical when simulation modelling expert Craig O'Neill of the Office of Pediatric Surgical Evaluation and Innovation (OPSEI) suggested a simple scheduling change could significantly reduce the number of cancelled surgeries.

After all, the recommendation seemed counter-intuitive. Mr. O'Neill suggested that limiting the number of elective surgeries scheduled for Wednesdays to just six – at the time there was no limit – would reduce cancellations within six months by 56 percent and cut operating room overtime costs by 13 percent. All with no reduction in the overall number of surgeries performed.

"Six months later we saw he was absolutely right," says CFRI researcher Dr. Geoff Blair, who is also head of pediatric surgery at BC Children's Hospital. "All of his predictions have been within a one or two percent accuracy rate."

In the past year, this research project and many others using the powerful research capabilities of simulation modelling have been carried out at BC Children's Hospital, through OPSEI – an initiative founded in 2005.

In the orthopedics clinic, a wide variety of data were analysed, including patient arrival rates, treatment requirements and the availability of key personnel, to see where improvements could be made.

"In the end," says Dr. Blair, "we found that on certain days we just had to extend the hours of the cast technician by a little to make a big improvement in the process for patients."

In another project, OPSEI is developing a tool that will automatically manage the list of children waiting for surgery, balancing such things as the urgency of each patient's need for surgery, critical timing factors, their



"There is nation-wide interest in this tool, which will allow us to optimize our surgical resources in relation to the surgical priorities of kids on the wait list."

overall wait times and other considerations.

"There is nation-wide interest in this tool, which will allow us to optimize our surgical resources in relation to the surgical priorities of kids on the wait list," says Dr. Blair. Put simply, the tool will help reduce the time kids must wait for surgery while ensuring that the kids in most need of surgery are first in line.

As a sign of its success, in its first year OPSEI generated almost \$1 million in funding for more than 25 projects, from such sources as the BC Children's Hospital Foundation, the Provincial Health Services Authority, the BC Academic Health Council, the Vancouver Foundation and others. This year, in

association with CFRI, OPSEI is pursuing funding for a clinical research and training program in surgery at BC Children's Hospital designed to help attract the best and brightest students to careers in pediatric medicine and surgery. And there are many more opportunities for identifying process improvements through simulation modelling.

"Recognizing there's a limited box of resources for improving services, I think this is an area of research that will continue to grow," says OPSEI managing director, Damian Duffy.

"The complexities of healthcare delivery demand that we use the same sophisticated modelling tools that major corporations use for business planning," says Dr. Blair. "We don't know anybody in healthcare who has used these tools as extensively as we have. We're unique." ✍️



Dr. Geoff Blair is Chief of Surgery in the Department of Pediatric Surgery at BC Children's Hospital and Clinical Professor of Surgery at the University of British Columbia.

Mr. Damian Duffy is Managing Director of OPSEI.

Mr. Craig O'Neill is OPSEI's Operations Research Analyst.

Funding From Foundation Supports Busy Clinician Investigators

CFRI offers its researchers a particularly fertile environment for clinical investigation. Its location with the BC Children's Hospital and the BC Women's Hospital and Health Centre provides unparalleled opportunities for bridging the gap between research and its application.

Many of CFRI's 160 investigators are clinicians, who split their time between caring for patients and engaging in research questions that arise from that work. The importance of their efforts was recognized in 2006 by the BC Children's Hospital Foundation, which provided additional funding of \$600,000 to specifically support clinical research.

This support will go to building clinical research strength through three interrelated initiatives. "I'm calling it our 3-C agenda," says Dr. Anne Junker, CFRI's associate director for clinical research.

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First, the introduction of CFRI's Clinician Scientist Salary Awards will enable recruitment of clinician researchers in either the basic or clinical sciences who have developed a reputation for excellence in research. "These individuals will have training to do research, protected time for research, and a responsibility to bridge the gap between the clinical and research worlds," says Dr. Junker.

"Second, we'll recruit core academic health research faculty who can collaborate with our clinician investigators in areas like clinical trials design, so we can take the lead in multicentre studies. Other important areas include health economics, technology assessment, and health informatics," she adds. These faculty will help expand the support already provided by the institute's Clinical Research Support Unit (CRSU), which assists any site researcher in the areas of biostatistics, methodology and data management.

Through the third initiative, CFRI plans to match support for senior clinical research program managers in a scheme where clinical research units align with hospital program structure. This way, research manager support is available to all hospital program personnel to assist with things like project design, budget development, and ethics applications. ✍️

Newborns at Risk of Brain Injury Benefit from Advanced Imaging Techniques

A MRI-compatible incubator – the first of its kind in Canada – allows Dr. Miller and his team to accomplish the difficult task of bringing critically ill newborns to the MRI unit at BC Children’s Hospital.

The developing brain is a masterpiece in the making. Like a painting in progress – where a misplaced brush stroke can affect the entire composition – it is also delicate and vulnerable. Injury to the newborn brain can affect both cognitive and motor development and result in lifelong disability.

Unlike art, the newborn brain is not easily viewed. But imaging techniques used by CFRI researcher Dr. Steven Miller are now providing a clearer picture of brain injury and how it leads to changes in brain function.

Dr. Miller uses magnetic resonance imaging (MRI) to study three newborn populations at high risk of brain injury: premature babies, babies with perinatal asphyxia, and babies with congenital heart disease. Up to half of each of these groups of newborns exhibit motor and cognitive deficits resulting from brain injury.

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Using MRI, Dr. Miller is able to develop more accurate measures and indications of early brain injury, particularly to white matter, the nerve fiber-rich portion of the brain that facilitates signal transmission between the nerve cells of the brain’s grey matter.

“It’s crucially important to be able to identify and quantify brain injury as soon as possible after birth, which is a time when intervention is possible,” says Dr. Miller. “With these infants, lots of things can make a difference – nutrition, ventilation, medication. We want to know how these affect brain development, and what we can do to support and protect the brain.”

In addition to contributing to the development of new techniques, technologies and therapeutics that will help physicians, nurses and parents give better care to high-risk newborns, Dr. Miller says his research can be used to provide information about the predicted developmental outcomes of children with brain injury.

“Parents, of course, have the question, ‘What will this mean for my child?’ We used to have to say we didn’t know. Now we have a better understanding of what to expect.”

Over the next five years, Dr. Miller will study 175 premature babies to understand how systemic illness impacts brain development and leads to brain injury. After the initial scans, he’ll follow up when the children are 18 and 36 months of age. He hopes to understand the timing and mechanisms of brain injury, and the impact of critical care therapies.

In his studies of newborns with congenital heart defects, Dr. Miller is working with cardiologists, anaesthesiologists and surgeons to look at risk factors for brain injury before, during and after heart surgery. Dr. Miller’s research has shown white matter injury in more than




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30 per cent of newborns who’ve had heart surgery. He says the patterns of injury are similar to those seen in premature infants, suggesting similar causative mechanisms – which he believes involve impaired oxygen delivery to the brain. The question is: when does the injury occur?

“We’ve found that in newborns with heart defects, brain development is delayed even before surgery.

So, when it comes to the actual surgery, these newborns may be predisposed to white matter injury.” Dr. Miller says, however, that while it was previously thought that brain injury happened during surgery, when there is a necessary reduction in blood flow, he’s found that injury is common before surgery, and often relates to factors after surgery.

“There are immediate clinical implications of these findings. We’re able to bring the research to the cardiologists, who can then develop more efficient procedures to take to clinical trial and incorporate into clinical practice,” says Dr. Miller. 



Expanding Opportunities for Collaboration and Innovation

Over the last several years, CFRI’s increasing success and growth has outstripped available space and that trend shows no sign of ending. To accommodate the boom a new \$42.4 million research complex is being added to the existing site, effectively doubling the institute’s size.

Since the official sod-turning for the 121,000 square foot expansion at the end of May 2006, the various aspects of construction – including the removal of an astounding 2,768 dump truck loads of dirt to make way for the building’s foundation – have proceeded smoothly and rapidly.

The new facilities are designed to cultivate increased collaboration among CFRI’s basic, clinical and population health researchers. The four-storey complex will support wet bench, dry lab, clinical, and office-based research, and will provide accommodation for various programs and departments.

A significant amount of space will be allocated to clinical research and clinical trials to encourage greater integration between basic and clinical research, creating a feedback loop that will lead to more innovation, stronger research outcomes, and shorter research process times – a direct benefit to the children and families we serve.



Dr. Steven Miller is a clinical researcher with CFRI’s Neurobiology & Mental Health Program, and Assistant Professor, Division of Neurology, Department of Pediatrics, University of British Columbia. He is a Canadian Institutes of Health Research Clinician Scientist and Michael Smith Foundation for Health Research Scholar. His research is now funded through grants from the Canadian Institutes of Health Research, March of Dimes Foundation, and National Institutes of Health (USA). The MRI-compatible incubator, developed by Advanced Imaging Research, was purchased through funding from the BC Children’s Hospital Foundation and grants to Dr. Miller from the Canadian Foundation for Innovation and British Columbia Knowledge Development Fund.

Our People

The outstanding success of the Child & Family Research Institute is possible because of its community of committed investigators, trainees, support staff and administration. Every effort has been made to be accurate; please accept our apologies for any errors or omissions.

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