

### annual report







FACULTY OF MEDICINE

## from the acting director:

These are exciting times for ICORD! The year of 2009-10 included a visit from our Prime Minister, our Premier, the Lieutenant-Governors from across Canada, and various other dignitaries. The central reason for these visits was to witness the development of a truly multidisciplinary and integrated approach to tackling one of Canada's major unsolved health care problems—spinal cord injury.

ICORD researchers made important advances in 2009-10 and this report outlines a few notable examples. From strategies to prevent spinal cord injury, to innovative approaches to dealing with secondary complications, to the use of stem cells for neural regeneration, ICORD investigators are committed to world-class research that makes a difference.

The past year was also a year of significant change. ICORD's move into the UBC Faculty of Medicine and the arrival of many research labs into the Blusson Spinal Cord Centre at VGH align us well for the future. Our Founding Director, Dr. John Steeves, stepped down from his leadership of ICORD. On behalf of our entire ICORD team, I would like to thank Dr. Steeves for his vision and his leadership over the past 15 years.

In my role as Acting Director of ICORD, it has been a pleasure to witness first-hand our committed and excellent administrative team. I wish to thank Lowell McPhail, Cheryl Niamath, Jeremy Green and Saima Khan for working enthusiastically and tirelessly to support all ICORD researchers and partners.

As we look towards 2010-11 and beyond, we are delighted to work with our partners in the Blusson Spinal Cord Centre–Vancouver Coastal Health Spine Clinic and the Rick Hansen Institute–on enhancing the quality of life for spinal cord injured individuals and eventually finding a cure for spinal cord injury.

> Thomas R. Oxland Acting Director, ICORD

### icord at a glance, 09-10

| principal investigators | 38     |
|-------------------------|--------|
| trainees2               | 254    |
| technical staff         | 59     |
| admin staff             | 12     |
| scholarly publications  | 257    |
| competitively-awarded   |        |
| research grant funding  | 522.4N |



By August, 2009, ICORD Principal Investigators had completed moving their research programs into the **Blusson Spinal Cord Centre**. The Blusson Spinal Cord Centre is a unique facility dedicated to advancing world-leading integrated research and care for people with spinal cord injury. By combining research and clinical space in the

### new home

same building, investigators will be able to rapidly translate discoveries into validated clinical practices

to ensure effective outcomes are achieved. The Blusson Spinal Cord Centre is also home to Vancouver Coastal Health's Brenda and David McLean Integrated Spine Clinic and the Rick Hansen Institute. The building has hosted several major events since its official opening ceremony in November, 2008, including the first *Spinal Chord* gala fundraiser (November, 2009–see last page), ICORD's 7<sup>th</sup> Annual Research Meeting (January, 2010), a reception for the Lieutennant Governors of all Canada's provinces (March, 2010) and the celebration of the 25th Anniversary of the start of Rick Hansen's world tour (March, 2010–see next page).





On March 21, 2010, Rick Hansen celebrated the 25th Anniversary of the start of his world tour. Prime Minister Stephen Harper and BC Premier Gordon Campbell visited ICORD's research space in the Blusson Spinal Cord Centre as part of the celebratory events. Pictured from left to right: Dr. David Farrar (Provost and VP Academic, UBC); Dr. David Ostrow (CEO, Vancouver Coastal Health); Dr. Brian Kwon (ICORD PI and VCH Clinician); Colin Ewart (Rick Hansen Foundation); Premier Gordon Campbell; Prime Minister Stephen Harper; Anna Sammarco (ICORD research study participant); Rick Hansen; Daryl Rock (Board Chair, Rick Hansen Institute); Dr. Tania Lam (ICORD Associate Director and PI); Katie Pauhl (ICORD Study Coordinator); Dr. Antoinette Domingo (ICORD Postdoctoral Fellow); Dr. Tom Oxland (ICORD Acting Director and PI), Dr. Wolfram Tetzlaff (ICORD Associate Director and PI); Lyall Knott (Board Chair, Rick Hansen Foundation).



### FACULTY OF MEDICINE

Effective March 4th, 2010, ICORD was repositioned from the UBC College for Interdisciplinary Studies to the Faculty of Medicine. This change to the reporting relationship of ICORD reflects both the strong interprofessional focus across health disciplines for research and patient outcomes and the strong connections to Vancouver Coastal Health and the Vancouver Coastal Health Research Institute.



### healthy workplace

ICORD received a **Healthy Workplace Initiatives Program** grant from UBC to fund yoga-pilates classes. The classes are offered at lunch and after work in the Blusson Spinal Cord Centre. ICORD was also able to equip a fitness room in the building. Trainees, staff and faculty now have a number of options for getting some exercise and staying fit in our new, off-campus space.

### ell McPhail

### new team

The ICORD Administrative Team has changed significantly over the past year: Dr. John Steeves ended his term as Director, and Dr. Tom Oxland took over as Acting Director (see next page); Dr. Chris McBride, left his position as Managing Director to pursue other opportunities. Dr. Lowell McPhail's position evolved from Facilities Manager to **Operations Manager with** the completion of building construction. Jeremy Green took on the new role of Program Coordinator, and Saima Khan and Amy Liu joined the Admin Team staffing the information desk in the Blusson Spinal Cord Centre atrium.

### ICORD researchers represent many Faculities and Departments within several institutions. See the ICORD web site for more information about the researchers profiled to the right, and these other researchers and their research programs:

Dr. Hugh Anton Physical Medicine and Rehab, UBC & VCH Dr. Michael Boyd Orthopaedics, UBC & VCH Dr. Mark Carpenter Human Kinetics, UBC Dr. Romeo Chua Human Kinetics, UBC **Dr. Peter Cripton** Mechanical Engineering, UBC Dr. Kerry Delaney **Biology**, UVic Dr. Anita Delongis Psychology, UBC Dr. Marcel Dvorak Orthopaedics, UBC & VCH **Dr. Stacy Elliott** Psychiatry, UBC & VCH **Dr. Charles Fisher Orthopaedics, UBC & VCH** Dr. Thomas Grigliatti Zoology, UBC **Dr. Timothy Inglis** Human Kinetics, UBC Dr. Piotr Kozlowski Radiology & Urologic Sciences, UBC Dr. Bill Miller Occupational Therapy, UBC & VCH Dr. Wayne Moore Pathology & Laboratory Medicine, UBC Dr. Mike Negraeff Anesthesiology, UBC & VCH Dr. Mark Nigro Urologic Sciences, UBC & VCH Dr. Tim O'Connor Cellular & Physiological Sciences, UBC **Dr. Scott Paquette** Orthopaedics, UBC & VCH Dr. Matt Ramer Zoology, UBC Dr. Jane Roskams Zoology, UBC Dr. David Sanderson Human Kinetics, UBC Dr. William Sheel Human Kinetics, UBC **Dr. John Steeves** Zoology, UBC Dr. Wolfram Tetzlaff Zoology, UBC Dr. Andrea Townson Physical Medicine and Rehab, UBC & VCH Dr. Darren Warburton Human Kinetics, UBC Dr. David Wilson Orthopaedics, UBC Dr. E. Paul Zehr

Kinesiology & Neuroscience, UVic

# these icord researchers received awards or honours in 2009-10:

Dr. Tom Oxland, P.Eng. became Acting Director

Acting Director of ICORD on March 15th, 2010. He was also honoured during the year as a Fellow in the American Society of Mechanical Engineers (ASME). Dr. Oxland, a biomechanical engineer, is a Professor in the Department of Mechanical Engineering, Faculty of Applied Science and the Department of Orthopaedics in the Faculty of Medicine. He holds the Canada Research Chair in Spine Biomechanics, and is co-director of ICORD's Orthopaedics and Injury Biomechanics Lab. The objectives of his current research are to enhance the understanding, diagnosis and



treatment of clinically relevant musculoskeletal problems with a focus on spinal cord injury and the treatment of the aging spine. Dr. Oxland is also collaborating with the Centre for Hip Health and Mobility in the area of management of and prevention of bone loss.

## gary birch

On Dec. 30, 2008, Her Excellency the Right Honourable Michaëlle

Jean, Governor General of Canada, appointed ICORD member and Executive Director of the Neil Squire Society, Dr. Gary Birch an **Officer of the Order of Canada** "for his contributions to the development of the Neil Squire Society, an organization that develops programs, services and assistive technology for people with physical disabilities, and for his determination and ingenuity in helping Canadians with disabilities to achieve a higher quality of life." Dr. Birch received the award at an investiture ceremony on April 7, 2010.

| victoria claydon | Dr.Claydon (Kinesiology, SFU)<br>was honoured with a <b>Heart &amp;</b><br>Stroke Foundation of Canada New<br>Investigator award.                                  |
|------------------|--|
| sue forwell      | Dr. Forwell (Neurology & Occupational<br>Therapy, UBC) won the <b>Canadian</b><br>Association of Occupational Therapists'<br>President's Medal.                    |
| andy hoffer      | Dr. Hoffer (Kinesiology, SFU) won the<br>BC Innovation Council's 2009 <b>Emerging</b><br><b>Technologies Award</b> for his spin-off<br>company, Lungpacer Medical. |
| tania lam        | Dr. Lam (Human Kinetics, UBC) received<br>a Canadian Institutes of Health Research<br>New Investigator award.  |

### bonita sawatzky

Dr. Bonita Sawatzky was asked by UBC's Dean of Medicine to represent the Faculty and the University in the Paralympic Torch Relay at UBC on March 12, 2010.

Dr. Sawatzky is an associate professor in the Dept. of Orthopaedics and an ICORD principal investigator. Her research explores the biomechanics of human movement, particularly in children with disabilities.

"It was a huge honour to be nominated by the Dean of Medicine to represent our faculty and university," said Dr. Sawatzky. "Carrying the torch for the Paralympics, I felt it was cheering on that drive for excellence we see in our athletes. It's sort of like what we do as faculty for students-passing on the enthusiasm to acheive excellence as they learn new things, asking questions and striving to making a difference in people's lives."



brian kwon **ICORD** Principal Investigator and physician with the VGH Spine Program, won the 2010 Young Investigator Award from the Kappa Delta Sorority and the Orthopaedic Research and Education Foundation. The award is given to outstanding authors who are under 40 years of age or no more than seven years beyond training. Dr. Kwon was honoured for his paper, Cerebrospinal Fluid Pressure Monitoring and Biochemical Analysis in Acute Spinal Cord Injury – A Translational Approach. Dr. Brian Kwon also received a CIHR New Investigator Award and was named one of

Dr. Brian Kwon,

Business In Vancouver's Top 40 under 40, honouring corporate leaders, entrepreneurs and non-profit leaders in British Columbia who have reached a significant level of success before the age of age 40.

### janice eng

Dr. Janice Eng, a GF Strong and ICORD researcher and professor in the UBC Department of Physical Therapy, has received the prestigious 2009 Jonas Salk Award from March of Dimes Canada. The Jonas Salk Award is a lifetime achievement award presented annually to a Canadian scientist, physician or researcher who has made a new and outstanding contribution in science or medicine to prevent,



alleviate, or eliminate a physical disability. The award is jointly presented by Sanofi Pasteur and March of Dimes Canada.

Dr. Andrei andrei krassiouko Krassioukov won the 2009 Alan T. Brown



Surrounded by international media, Dr. Sawatzky and her assistance dog, Leon, start the relay.



which has demonstrated excellence in translating basic science research developments to clinical care on secondary conditions, long term outcomes and/or issues relating to aging after spinal cord injury. Dr. Krassioukov received the award in recognition of his clinical and basic science research in autonomic function following SCI. He was Chair of ASIA's International Committee

Foundation Award for research in Spinal Cord Injury, presented by the American Spinal Injury Association (ASIA). The Alan T. Brown Foundation SCI Research Award is presented to a researcher, clinician, or group

to develop standards for the evaluation of autonomic functions in individuals with SCI. These standards were recently published in Spinal Cord (January 2009) and endorsed by two major international societies involved in research and clinical management of individuals with SCI: ASIA and International Spinal Cord Society (ISCoS).

5

**CORD Research** From cells to community, ICORD researchers are working together to discover and implement solutions for the complex and multifaceted impacts of SCI. Currently, ICORD brings together 38 Principal Investigators from basic science, education, engineering, clinical, rehabilitation, and community-based research. ICORD Principal Investigators research three major areas: Basic Discovery Science (pre-clinical discovery research), Human Discovery Science (minimal intervention, human-based research, including Community-based research), and Clinical Care Research (human-based intervention). In 2009-10, ICORD researchers produced more than 250 academic publications and garnered more than \$22 million in competitively-funded research grants. For a list of selected publications, please see www.icord.org.

### stem cells

divide and give rise to all cells in the body. Stem cells are also found in the adult body, however they are more limited in their repertoire and often restricted to some type of tissue (e.g. neural stem cells in the brain and spinal cord, or skin-derived stem cells in the skin). ICORD Principal Investigator **Dr. Wolfram Tetzlaff** and his research team are working with skin-derived stem cells since they are easy to harvest. Using research models, the cells are transplanted into the spinal cord injury site either at 7 days or 8 weeks after injury. By treating these skin-derived cells with specific factors before they are transplanted, they can be made into special ensheathing cells (called Schwann cells) which bridge the site of spinal cord injury, promote the regrowth of

The term stem cell is used for

cells in the embryo that can



Skin-derived stem cells producing myelin

nerve fibers and produce insulation around nerve fibers. The latter allows nerve fibers to conduct an impulse, very much like plastic insulation around a cable.

**Dr. Wolfram Tetzlaff** and **Dr. Femke Streijger** are studying the effects of simple dietary strategies to improve functional recovery in models of spinal cord injury. Previously, they discovered that fasting every other day is beneficial after SCI. However, given that a fasting regimen may be met with little enthusiasm from patients, dietitians and physicians, they felt the need to further explore the implementation of alternative dietary strategies. Hence, they are currently investigating a high-fat, and very low-carbohydrate regimen known as the ketogenic diet.

Drs. Wolfram Tetzlaff and Femke Streiger's study on the effects of a ketogenic diet on recovery after SCI was featured in *Science Daily* and *PhysOrg.com*. Dr. Tetzlaff presented the research project at a press conference at the 2009 Society for Neuroscience Annual Meeting in Chicago.

### paralympics

Paralympic athletes are exposed to tremendous physical and emotional stress during training and competition, and athletes with spinal

cord injury (SCI) have unique disadvantages during competition. One of these disadvantages is unstable blood pressure control. On a daily basis, individuals with SCI deal with either extremely low resting blood pressure, and/or uncontrolled episodes of high blood pressure. The latter is called autonomic dysreflexia (AD). Low blood pressure and a poor response from the heart results in significant fatigue and presents a serious problem for athletes during both training and competition. In contrast to low blood pressure, AD is a life-threatening situation whereby individuals with cervical and upper thoracic injuries experience a drastic increase in blood pressure. If left untreated, AD can lead to bleeding in the brain and/or death. ICORD Principal Investigator Dr. Andrei Krassioukov is an expert in AD, and received funding from the Craig Neilsen Foundation to bring evidencebased clinical knowledge and crucial practical information on unstable arterial blood pressure control among athletes with SCI to Paralympians and their coaches at Vancouver's 2010 Winter Paralympic Games. This project is a collaboration between clinicians and scientists from ICORD, individuals with SCI in the BC Wheelchair Sports Association and former Paralympic athletes.



US Paralympian Augusto Perez, HRH Prince Edward and Dr. Krassioukov at the Paralympic Clinic



Dr. Peter Cripton, Principal Investigator and Co-Director of the UBC Orthopaedic and **DECEMPTION** Principal Investigator and Co-Director of the UBC Orthopaedic and Injury Biomechanics Group, and PhD candidate **Tim Nelson** have invented a sports helmet that, according to preliminary tests, reduces direct impact to the neck during head-first

impact forces by between 27 and 56 per cent, depending on the impact configuration. Dubbed Pro-Neck-Tor™, the patent-pending technology features a movable inner shell that guides the head to tilt slightly forward or backward in a head-on impact, thus allowing dissipation of direct loads to the cervical spine. The inner shell mechanism is deployed only when the wearer lands with a certain speed and angle at impact. It works otherwise like existing sports helmets.

Today's helmets are extremely effective at protecting their wearers against head injuries in a collision or during an impact to the head in sports. However, their design does not protect the wearer against neck and spinal cord injury in a head-first impact as can happen, for example, against the boards in hockey or against the ground in skiing. Most people are personally aware of examples of these injuries but--fortunately--head-first impacts that result in neck injuries of this kind are not common. However, because they are so debilitating and there is no cure for consequences of spinal cord injury, prevention is of utmost importance, especially if prevention can be offered through a helmet that is the same size and configuration as a common helmet. The Pro-Neck-Tor™ helmet technology under development at ICORD in the Orthopaedic Injury Biomechanics Laboratory is being designed to provide the additional level of protection that no state-of-theart helmet so far has been able to offer: protection for the head and neck during

head-first impacts. The technology is not yet available commercially but thus far research and development testing has shown promising results and a spin-off company has been established to commercialize it.

Dr. Bill Miller, an ICORD Principal Investigator and faculty member in the UBC Dept of Occupational Therapy &

Occupational Sciences and GF Strong Rehab Centre, along with Drs. Gary Birch, Bonnie Sawatzky and several others, received \$1,485,447 over 6 years through the Emerging Team Grant: Alliances in Mobility in Aging competition for their program of research, CIHR Team in Wheeled Mobility for Older Adults. Their research will focus on improving the mobility opportunities of older adults who use power wheelchairs.

Wheeled mobility-or more specifically, wheelchair use by older adults-is expected to grow over the next 50 years. The goal of this interdisciplinary team is to develop a program of research dedicated to improving the wheeled mobility of older Canadians who no longer have the ability to walk safely. The team,



consisting of engineers, computer scientists, biomechanists and clinical researchers from across Canada, will research new technologies and intervention strategies designed to improve wheeled mobility, and develop and assess new measurement tools with which to determine the impact of new devices and intervention strategies.

Poster presentations showcasing trainee research projects are an important and valued part of the ICORD Annual Research Meeting. Through the support of generous donors, we were able to provide poster awards to ICORD



L-R: Maryam Shahrokni, Claire Jones, Gillian Simonett

trainees in three categories at our February 3-4, 2010 meeting. The **ICORD Trainee Award** for the best poster presented by an ICORD trainee at the Masters Student level was awarded to Maryam Shahrokni (Oxland Lab), with honorable mention to Jessica Inskip and Colin Russell. The Aaron Moser Award for the best poster presented by an ICORD trainee at the Doctoral Student level was awarded to Claire Jones (Cripton Lab). The Gordon Hiebert Award for the best poster by an ICORD trainee at the Postdoctoral Fellow or Resident level went to Gillian Simonett (Krassioukov Lab).

For more information about Trainee awards, please see www.icord.org.







for more details, see
www.spinalchordgala.com

ICORD joined forces with the Vancouver Cantata Singers in the fall of 2009 to present a unique fundraising gala in support of both organizations. The event, called *Spinal Chord*, was not only very succesful, but also very fun. ICORD and the Vancouver Cantata Singers are sincerely greatful for the generous support of Westjet, Stantec, Eve Aesthetics, Andy Yuen Couture, Granville Island Brewery, Coup Salon, VWR and all of our other corporate and private event sponsors.

Dave Carlin, General Manager of the Vancouver Cantata Singers, is excited about the partnership with ICORD. "Over the last year, Vancouver Cantata Singers has developed an exceptionally rewarding partnership with ICORD," he said. "Our joint November fundraiser set a new standard for our organization, and we're thrilled to have the opportunity to hold the event once again this year, on November 6<sup>th</sup>. The exceptional acoustics in the Blusson Spinal Cord Centre make it an ideal performing space for us, and ICORD's willingness to launch into a creative and untested partnership with us is generating tremendous support from our audiences and supporters. We're pleased to continue this interdisciplinary exploration in the upcoming year, and look forward to collaborating with ICORD once again."

## building partnership





ICORD has a long-standing relationship with the **Rick Hansen Foundation**. RHF is one of ICORD's Founding Partners, along with UBC and the Vancouver Coastal Health Resarch Institute. Now that ICORD is sharing a building with the **Rick Hansen Institute**, we look forward to furthering productive collaborations between our two groups.

research connections







SIMON FRASER UNIVERSITY THINKING OF THE WORLD

ICORD's Annual Report is produced by the ICORD Administrative Office. For more information about ICORD's programs, people, research and partners, please see www.icord.org or contact us.

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ICORD is a UBC and VCH-based research centre that is proud to have Principal Investigators representing the following institutions:





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