



MAKING SPINAL CORD INJURY PREVENTABLE, LIVABLE, & CURABLE

ICORD is a world-leading health research centre focused on spinal cord injury (SCI). Located at Vancouver General Hospital in the Blusson Spinal Cord Centre, ICORD is supported by UBC Faculties of Science and Medicine and Vancouver Coastal Health Research Institute, as well as the the Rick Hansen Foundation-funded Blusson Integrated Cures Partnership.

### OUR MISSION

Conduct research and training towards the development and translation of more effective strategies to promote prevention, functional recovery, and improved quality of life after SCI.

### OUR STRATEGY

ICORD's vision is broad, and therefore, our strategy is not to focus solely on a narrow definition of 'cure' for SCI, but rather to foster excellence across the entire research continuum that affects the lives of those with SCI. This includes preclinical discovery science, the development of therapies for acute and chronic SCI, and solutions for successful and fulfilled living with SCI.

### Preclinical discovery

Can a particular diet be effective in preventing secondary damage to the spinal cord after injury? Can we combine existing drugs in new ways as a treatment for SCI? How can we encourage axons to regenerate? What strategies of cell transplantation are safe and effective? Can biomarkers predict injury severity? Can we create skin-substitutes to treat non-healing wounds? Can we create better models of injuries as they occur in humans? What causes SCI-induced pain?



**Annual Report 2014-2015**

### Injury prevention

Can a specialized helmet prevent spinal cord injuries? Is there a better way to transport newly-injured people to mitigate further damage?

### Clinical interventions after SCI

Can Botox prevent episodes of dangerously high blood pressure? How can we alleviate neuropathic pain? How does physical activity affect cardiovascular health? Is home-monitoring of bladder health effective? What are the functional and medical challenges of aging with SCI?



### Rehabilitation strategies

How can robotic devices be used effectively in rehabilitation for people with SCI? How does getting regular exercise improve quality of life for people with SCI? Can a peer-led wheelchair training program improve wheelchair mobility?



a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA



## welcome from the Director

On behalf of ICORD, I am pleased to present this overview of our activities and accomplishments between April 2014 and March 2015. Be sure to follow the links to get the full stories. If you would like to know more about our research, people, or programs, I encourage you to visit our website ([icord.org](http://icord.org)) or contact me directly.

**Wolfram Tetzlaff, MD, PhD**  
ICORD Director • 604-675-8848

## funding

Competitive research grants: **\$23,863,230**

BICP grant: **\$1,475,000**

provided by UBC Faculty of Medicine

Operating funding: **\$200,000**

SCI-related projects: **\$8,223,650**

other projects: **\$14,164,580**

ICORD researchers received competitive grant funding from institutional, national, and international sources. The **Blusson Integrated Cures Partnership (BICP)**, funded by the Rick Hansen Foundation, also provided targeted funding to identify new treatments for SCI, and apply existing treatments for other neurological disorders, injuries and diseases to SCI. The BICP also funds research-related activities such as seminars and symposia, and shared services within the Blusson Spinal Cord Centre.



## people

**2**  
Vanier Award winners

**3**  
CIHR Banting & Best Graduate Fellows

**2**  
NSERC Ugrad Summer Scholars

**1**  
VCHRI Top Graduating Student

**1**  
UBC President's Staff Award winner

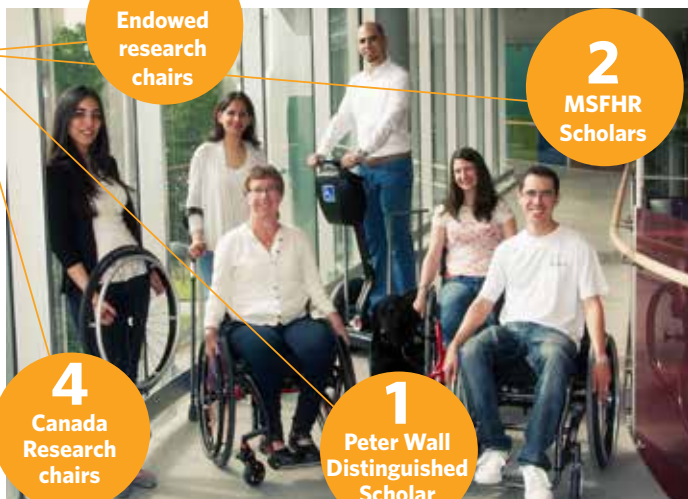
**57 RESEARCHERS**  
42 Principal Investigators  
8 Investigators  
7 Associate members  
**230 TRAINEES**  
61 Undergraduate students  
80 Masters students  
60 PhD students  
21 Postdoctoral fellows  
8 Residents  
**83 STAFF**  
67 Technical staff  
16 Admin staff  
**83 VOLUNTEERS**

**5**  
Endowed research chairs

**2**  
MSFHR Scholars

**4**  
Canada Research chairs

**1**  
Peter Wall Distinguished Scholar



## research

**221**  
peer reviewed journal articles

**371 JOURNAL ARTICLES, BOOKS, CHAPTERS, CONFERENCE PROCEEDINGS, REVIEW ARTICLES**

**60+**  
peer reviewed journal articles with 2+ ICORD authors

**115**  
SCI-related peer reviewed journal articles

cumulative impact factor (2014): **659**

Drs. **West** and **Krassioukov** published a study showing that passive hind-limb cycling improves cardiac function and reduces cardiovascular disease risk in rodent models of SCI. Drs. **Cripton** and **Wellington** merged pathology and biomechanics in their new non-surgical CHIMERA model of traumatic brain injury. Drs. **Street**, **Paquette**, **Dvorak** and **Kwon** described biomarkers in cerebrospinal fluid 24 hours after traumatic SCI. Drs. **Stothers** and **Nigro** published several papers on aspects of using near infrared spectroscopy (NIRS) to diagnose urinary tract infection. Drs. **Ghahary** and **Jalili** described a skin substitute that improves healing in a hypertrophic scar model. Dr. **Ramer** published a comprehensive review of experimental treatments for SCI in *The Lancet Neurology*, examining the potential for treatments in development to move to clinical trial and use. This article was the Editor's Choice in the December 2014 issue of *The Lancet*.

Contact ICORD's Administrative Team  
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FUNDING PARTNERS



RESEARCH PARTNERS





## news

The Government of BC invested **\$350,000** to support ICORD's **Physical Activity Research Centre (PARC)**.

[icord.org/news/2014/07/funding-for-parc/](http://icord.org/news/2014/07/funding-for-parc/)



Four **new faculty members** joined ICORD as Principal Investigators: welcome to **Drs. Reza Jalili, John Kramer, Catherine Pallen, and Christopher West**. Drs. Kramer and West received **Michael Smith Foundation for Health Research** scholar awards, co-funded by the **Rick Hansen Institute** and **ICORD**. [icord.org/news/2014/09/new-faculty-join-icord/](http://icord.org/news/2014/09/new-faculty-join-icord/)

Her Royal Highness **Sophie, the Countess of Wessex**, visited the Blusson Spinal Cord Centre in September 2014, presenting **Rick Hansen Difference Maker Awards** to ICORD Trainee **Peggy Assinck** and staff member **Mustafa Hasan**.

[icord.org/news/2014/09/hrh-visits-icord/](http://icord.org/news/2014/09/hrh-visits-icord/)

A wheelchair ballroom dance showcase held at ICORD in October 2014, inspired **Dr. Tania Lam** to develop a research project to study the benefits of dance for people with SCI.

With funding from the **Blusson Integrated Cures Partnership**, ICORD awarded 12 **seed grants** in 2014. These grants are designed to support novel research projects proposed by ICORD Principal Investigators and Investigators.

[icord.org/news/2014/12/seed-grants/](http://icord.org/news/2014/12/seed-grants/)

**Dr. Brian Kwon** received a **\$3M Brain Canada grant** to lead a multi-centre collaborative study on biomarkers in SCI. [icord.org/news/2014/09/kwon-biomarkers/](http://icord.org/news/2014/09/kwon-biomarkers/)

ICORD's 12th **Annual Research Meeting** took place on March 3 and 4, 2015. With more than 150 participants, three visiting speakers, 40 posters, 12 talks by ICORD researchers, and a special appearance by **Rick Hansen**, there was a lot of science and enthusiasm in the air.

[icord.org/news/2015/03/ARM-2015/](http://icord.org/news/2015/03/ARM-2015/)



**Rick Hansen with poster prize and staff award winners at the Annual Research Meeting, March 2015.**

## community partnerships



ICORD hosted a very well-attended **Café Scientifique** at the **G.F. Strong**

**Rehabilitation Centre** in March, with a casual dinner and lively discussion about SCI-related research going on around the world, including epidural stimulation (Kentucky) and olfactory bulb cell transplantation (Poland).

**Alfiya Battalova** started work as a **Peer Recruitment Coordinator** in early 2015. Her position is co-funded by ICORD (through the **Blusson Integrated Cures Partnership**) and community partner **Spinal Cord Injury-BC**. She will be working with clinical researchers to assist with participant recruitment.

ICORD and the **Vancouver Cantata Singers** hosted our sixth annual **Spinal Chord Gala** in November, 2014. Presented by **Medtronic** and the **Hong Kong Spinal Injury Foundation**, the event brought in close to \$40,000. This unique fundraising partnership has raised more than \$200,000 since 2009.

At ICORD, gala funds support **PARC** and the **Community Resource Centre**, as well as **equipment grants** for researchers and **staff awards** for excellence in research and service. [spinalchordgala.icord.org](http://spinalchordgala.icord.org)

**\$200K**  
raised at six  
events

*Being a member of ICORD provides a critical network of collaborators and mentors who bring a broad range of backgrounds to our common interest in spinal cord injury.*

- Dr. Carolyn Sparrey

*ICORD is an exceptionally well-functioning interdisciplinary environment. My group and I feel at home among other staff, faculty, and trainees who work in vastly (but still SCI-related) fields. This opens lines of communication and leads to great conversations, research ideas and collaborations.*

- Dr. Peter Cripton

*I receive numerous emails from highly-experienced trainees who want to study within the ICORD environment. They often cite the translational and collaborative nature of ICORD as reasons for wanting to study here.*

- Dr. Christopher West

# ICORD's Principal Investigators

**Birch, Gary** | Executive Director, Neil Squire Society, Adjunct Professor, Electrical & Computer Engineering, UBC | Research interests: brain-computer interface, assistive technology, real-world application design.

**Bishop, Paul** | Clinical Professor, Orthopaedics, UBC / VCHRI | Research interests: spinal nerve root injury biomarkers, translational research, clinical trials.

**Borisoff, Jaimie** | Canada Research Chair in Rehabilitation Engineering Design, Applied Research, BCIT | Research interests: accessibility, mobility, rehabilitation, sensory substitution, wheelchair design.

**Claydon, Victoria** | Assistant Professor, Biomedical Physiology and Kinesiology, SFU | Research interests: cardiovascular health, fainting, high altitude.

**Cripton, Peter** | Professor & Associate Head External, Mechanical Engineering, UBC / VCHRI | Research interests: concussion, helmets, hip injury, injury biomechanics, injury prevention, orthopaedic biomechanics.

**Dvorak, Marcel** | Professor & Head, Div. Spine, Orthopaedics, UBC / VCHRI / VCH | Research interests: arthritis, outcome measures, traumatic SCI, translational research, surgical spine techniques.

**Elliott, Stacy** | Clinical Professor, Psychiatry & Urologic Sciences, UBC, Medical Director, BC Centre for Sexual Medicine, VCH | Research interests: autonomic dysreflexia, fertility, sensory substitution, sexual rehabilitation, brain neuroplasticity.

**Eng, Janice** | Professor, Physical Therapy, UBC / VCHRI | Research interests: clinical trials, knowledge translation, stroke, rehabilitation.

**Forwell, Sue** | Associate Professor, Associate Head, Occupational Science and Occupational Therapy, UBC / VCH | Research interests: chronic disease self-management, fatigue, assessment, rehabilitation treatment, disability policy.

**Ghahary, Aziz** | Professor, Surgery / BC Professional Fire Fighters' Burn & Wound Healing Lab, Associate Member, Dermatology & Skin Science, UBC / VCHRI | Research interests: cell transplantation, diabetes, scaffolds, skin substitutes, wound healing.

**Hoffer, Andy** | Professor, Biomedical Physiology and Kinesiology, SFU | Research interests: diaphragm pacing.

**Hundza, Sandra** | Assistant Professor, Exercise Science, UVic | Research interests: Neural control of human movement, maintenance & recovery of gait/balance with aging or after neurotrauma.

**Jalili, Reza** | Assistant Professor, Surgery, UBC / VCHRI | Research interests: wound healing, bioengineered skin substitutes, transplantation immunology.

**Kozlowski, Piotr** | Associate Professor, Radiology & Urologic Sciences, UBC / VCHRI | Research interests: diagnosis, MRI, myelin, plasticity, prostate cancer.

**Kramer, John** | Assistant Professor, Kinesiology, UBC / VCHRI | Research interests: clinical trials, MRI, neuropathic pain, outcome measures.

**Krassioukov, Andrei** | Professor, Physical Medicine & Rehabilitation, UBC / VCHRI / VCH | Research interests: autonomic dysreflexia, cardiovascular health, blood pressure control, vascular dysfunctions, bowel dysfunctions.

**Kwon, Brian** | Professor, CRC, Div. Spine, Orthopaedics, UBC / VCHRI / VCH | Research interests: biomarkers, clinical trials, neuroprotection, spine surgery, translational research.

**Lam, Tania** | Associate Professor, Kinesiology, UBC / VCHRI | Research interests: ambulation, locomotor training, outcome measures, plasticity, robotics in rehabilitation.

**Laule, Corree** | Assistant Professor, Radiology, Pathology & Laboratory Medicine, UBC / VCHRI | Research interests: MRI, myelin, neurodegeneration, pathology.

**Miller, Bill** | Professor & Associate Dean, Occupational Science & Occupational Therapy / Health Professions, UBC / VCHRI | Research

interests: aging, fatigue, mobility disability, self-efficacy, wheelchair, self-efficacy.

**Mills, Patricia** | Clinical Associate Professor, Medicine, UBC / VCHRI | Research interests: autonomic dysreflexia, cardiovascular health, clinical trials, traumatic & non-traumatic SCI.

**Moore, Wayne** | Clinical Professor, Pathology & Laboratory Medicine, UBC / VCHRI | Research interests: MRI pathology.

**Mortenson, Ben** | Associate Professor, Occupational Science & Occupational Medicine, UBC / VCHRI | Research interests: accessibility, aging, assistive technology, mobility.

**Nigro, Mark** | Clinical Professor, Urology, UBC / VCHRI | Research interests: infertility, organ transplantation.

**Oruc, Ipek** | Assistant Professor, Ophthalmology, UBC / VCHRI | Research interests: facial recognition, psychophysics, visual perception.

**Oxland, Tom** | Professor, Orthopaedics, Mechanical Engineering, UBC / VCHRI | Research interests: aging, mechanical testing, orthopaedic biomechanics, rehabilitation, surgical implants.

**Pallen, Catherine** | Professor, Pediatrics, UBC | Research interests: cell signaling, myelin, regeneration, neuropathic pain.

**Paquette, Scott** | Neurosurgeon, SPINE, UBC / VGH | Research interest: surgical education.

**Ramer, Matt** | Associate Professor, Zoology & Neurosurgery, UBC / VCHRI | Research interests: pain, plasticity, regeneration, sensory neurons, sympathetic neurons.

**Sawatzky, Bonita** | Associate Professor, Orthopaedics, UBC / VCHRI | Research interests: fatigue, mobility, segway, tire pressure, wheelchair propulsion biomechanics, wheelchair skills, spasticity, crutch gait, children.

**Sparrey, Carolyn** | Assistant Professor, Mechatronic Systems Engineering, Engineering Science, SFU | Research interests: Patient specific technologies, SCI mechanics, SCI models, finite element methods, cost effective healthcare technologies.

**Spring, Miriam** | Assistant Professor, Ophthalmology, UBC / VCHRI | Research interests: eye movements, hand-eye coordination, visual perception.

**Steeves, John** | Professor, ICORD, UBC / VCHRI | Research interests: arm and hand rehabilitation, clinical trials, myelin, outcome measures, plasticity.

**Stothers, Lynn** | Professor, Urologic Sciences, UBC / VCHRI / VCH | Research interests: NIRS, neurogenic bladder, telehealth, urodynamics

**Street, John** | Assistant Professor, Div. Spine, Orthopaedics, UBC / VCH | Research interests: helmet performance, injury prevention.

**Tetzlaff, Wolfram** | Professor, Zoology & Surgery, Director, ICORD, UBC / VCHRI | Research interests: cell transplantation, diet, myelin, neuroprotection, regeneration.

**Warburton, Darren** | Professor, Kinesiology and Experimental Medicine, UBC | Research interests: cardiovascular health, chronic disease, clinical exercise rehabilitation, sport cardiology.

**Wellington, Cheryl** | Professor, Pathology and Laboratory Medicine, UBC | Research interests: traumatic brain injury, injury models.

**West, Christopher** | Assistant Professor, Kinesiology, UBC / VCHRI | Research interests: cardiovascular health, exercise, rehabilitation, sport cardiology.

**Whitehurst, David** | Assistant Professor, Health Sciences, SFU | Research interest: health economics.

**Willerth, Stephanie** | Assistant Professor, CRC in Biomechanical Engineering, Mechanical Engineering and Medical Science, UVic | Research interests: biomaterials, regeneration, scaffold, stem cell, tissue engineering.

**Zehr, Paul** | Professor & Director, Rehabilitation Neuroscience Laboratory, UVic | Research interests: ambulation, coordination, neural control, rehabilitation, stroke.

see [icord.org](http://icord.org) for full profiles and details about ICORD's Investigators & Associate Members