Annual Report 2016 - Highlights

Roger Jackson Centre for Health and Wellness Research

Human Performance Laboratory

Sport Medicine Centre

UNIVERSITY OF CALGARY

The full version of the annual report can be found at www.ucalgary.ca/hpl

The Year 2016

This past year, I was on sabbatical leave, spending major time in New Zealand/Australia, Switzerland, and Brazil. It was my first sabbatical in 32 years at the University of Calgary. I almost felt guilty taking a leave, because sabbaticals seemed to be reserved for those who need new ideas, to replenish motivation, or require some R&R. That was not me, thus the guilt!

However, when leaving a place, you gain perspective and you start realizing what makes that place special. When I left Switzerland in 1979, I learnt what it meant to be Swiss. When I left the Human Performance Lab (HPL) a year ago, I learnt what it meant to be a member of the HPL.

I learnt, to my surprise, how recognizable the HPL was around the globe. Most everybody knew about it, had visited it, or knew of somebody who had been trained there. Many researchers I met actively collaborated with HPL members, had ongoing student exchanges, or were collaborating with former trainees from the HPL.

I also learnt that the structure and organization is of the HPL is rather unique. We share laboratory spaces, major equipment and infrastructure among groups. Students from different supervisors and different research areas are housed in the same offices. We hold monthly strategic meetings and weekly cross-disciplinary research seminars. These factors lead to a natural integration of research and educational opportunities, and to inter-disciplinary collaborations that have become a hallmark of the HPL.

Another unique feature of the HPL is the enormous array of educational and research opportunities that are offered to students across all levels of education and from all parts of the world. We have regular "open house" events for high school students, host mini-University sessions for elementary and junior high school students all summer long, and have established numerous formal and informal foreign exchange programs. We host roughly 1,000 pre-university students every year, supervise ~50 undergraduate students in capstone projects, honours theses, and volunteer programs, and welcome a similar number of foreign students for 2-6 months yearly. The HPL has become an international training ground of unique proportions at all levels of education.

By leaving the HPL, I learnt what a privilege it is to live, work, breathe, and teach in the Human Performance Lab of the Faculty of Kinesiology at the University of Calgary. If you want to share in that privilege and have the possibility, visit us! Such a possibility may arise soon, as we will be the proud hosts of the Congress of the International Society of Biomechanics and the American Society of Biomechanics just two short years away, July 31st to August 4th, 2019. We would love to welcome you to our city, our lab, and to our mountains and national parks that provide all of us with a playground that inspires and energizes.

It has been another successful year, and I would like to thank all of you for your continued support. My special thanks go to the Faculty of Kinesiology, the University of Calgary, all the sponsors and friends of the HPL, and this year as well, to the three people who directed the HPL so competently in my absence: Drs. Brent Edwards, Art Kuo, and Tannin Schmidt.

Walter Herzog
Director

Awards and Honors

Members of the Human Performance Laboratory and the Sport Medicine Centre that were honored for their scientific contributions:

Internal Awards

Guillaume Millet	RJC Faculty Award
Ian Smith	RJC Post Doctoral Fellow Award
Ursula Heinz	RJC Staff Award
Krysta Powers	RJC Student Award
Raylene Reimer	GREAT Supervisor Award, Faculty of Graduate Studies
Andrew Stewart	President's Award for Leadership (Student)

External Honors

Carolyn Emery	Fellowship, Canadian Academy Health Sciences
Salvatore Federico	Elected President, Canadian Society for Biomechanics
Walter Herzog	Elected Honorary Member, Chilean Association for Human Science

Special Appointments

Carolyn Emery	Chair, Scientific Advisory Committee, Alberta Ballet
Carolyn Emery	Regional Network Lead, Canadian Academy of Health Sciences
Jared Fletcher	Sport Physiologist (swimming), 2016 Canadian Paralympic Team, Rio de Janeiro, Brazil
Walter Herzog	Chair Person, 27th International Society of Biomechanics Conference

External Awards

Marc Bomhof	J. B. Hyne Research Innovation Award
Kelsey Collins	J. B. Hyne Research Innovation Award
Atsuki Fukutani	Young Investigator Award, Japanese Society of Biomechanics, Osaka, Japan
Teja Klancic	Vanier Canada Graduate Scholarship, Doctoral, Government of Canada
Ash Kolstad	R. Tait McKenzie and Kinemedics Award, Canadian Academy of Sport and Exercise Medicine Conference, Victoria, Canada
Jessica Kupper	Izaak Walton Killam Memorial Scholarship, University of Calgary
Jodi Nettleton	Ethan Sims Young Investigator Award, The Obesity Society, New Orleans, USA

Support

Our work was financially supported by many different sources, the University of Calgary, Government Grants, Industry and Non-Government Sources and External Student Support. The corresponding amounts in Canadian dollars were:

University	$3.7M	29%
Gov. Grants	$3.3M	26%
Industry	$3.6M	29%
Ext. Students	$2.0M	16%
Total	**$12.6M**	

For 2016, the average research dollers available per faculty member, was about $573,815. We would like to thank all supporters of our work, the Faculty of Kinesiology, the University of Calgary, all Granting Agencies, Industry and our major sponsor, Engineered Air.

Biomechanics Conference

International Society of Biomechanics

We are pleased to announce that Dr. Walter Herzog has been named chair of the 27th meeting of the International Society of Biomechanics. The conference will take place at the Telus Convention Centre in Calgary, Alberta, July 31 - August 4, 2019.

Gluten Intolerance Research

Clockwise, from top left: Raylene Reimer, Guillaume Millet, Justine Dowd, and Nicole Culos-Reed. Photo by Riley Brandt, University of Calgary

Celiac disease is an auto-immune disorder in which the body over reacts to gluten (a protein found in foods made from wheat, barley and other grains). It causes damage to the small intestine, which prevents nutrients from being absorbed. The disease is incurable, but the symptoms can be managed through diet. Exercise may also help those with celiac cope with their condition.

Dietary management is complicated. Gluten is added to many foods as a preservative or binding agent. Traditionally, patients have used a paper diary to track food and symptoms. Now, thanks to researchers in the RJC, there is an alternative. Justine Dowd, a post-doctoral fellow in the RJC and her colleagues Desiree Nielsen and Darlene Higbee Clarkin, have developed an app to help patients track their food and their symptoms. The app also provides dietary advice, diet plans and tips on avoiding gluten.

A recently launched study will take a holistic approach to helping people with the disease. In addition to assisting with dietary choices, researchers Guillaume Millet, Nicole Culos-Reed and Raylene Reimer, hope that helping their patients achieve a more active lifestyle will help them gain an overall improvement in their health and quality of life. Inactive adults diagnosed with celiac disease have been recruited from within Calgary to participate in a 12-week study involving a high intensity interval training exercise intervention with complimentary education modules. Participants randomized to the experimental group immediately began group-based classes at the University of Calgary's Thrive Centre twice per week. The control group will receive the intervention after a follow-up period. All participants are tested at baseline with fitness and quality of life measures, then again at 12-weeks and three-months. Currently, two waves (n=38) have completed the 12-week training and a final wave is scheduled to begin this fall. This pilot project data will inform Tri-Council grant applications in 2018.

Anniversary Celebrations

Student examining a sample at the HPL Open House for High Schools.

In 2016 the University of Calgary celebrated its 50th anniversary. Fifty years of being an autonomous university. The Human Performance Lab also marked a milestone. It has been 35 years since founder Dr. Benno Nigg started his research program here at the University of Calgary. The researchers, students and staff participated in several events to mark these milestone events.

On April 29th, the Human Performance Lab contributed a handful of interactive demonstrations to the kick-off event for the 50th anniversary celebration. Visitors were able to shoot a hockey puck and see their speed measured. They could also talk to researchers about healthy gut bacteria and about injury prevention and concussion.

On April 26th, the Human Performance Lab opened its doors to the city's high school students. Over 600 students attended an open house aimed specifically at them. Researchers from the Human Performance Lab and the Sport Medicine Centre presented over two dozen interactive displays, showcasing everything from 3D data collection and biofeedback driven cars, to eye lubrication and using lasers to create images of living cells. Many of these students have already expressed an interest in future careers in areas such as fitness and sport medicine. Hopefully more were inspired by the many possibilities on display.

In December, the Human Performance Lab hosted a science day, to celebrate its 35th anniversary. World renowned guest speakers in the areas of biomechanics and exercise physiology spoke of the past, present and future for research in their area. New faculty researchers talked about the future directions of their research programs. Students were invited to present posters on their current research projects. HPL founder, Dr. Benno Nigg, wrapped up the event with a history lesson and a look to the future.

Olympic Connections

Members of the Human Performance Lab and Sport Medicine Centre have been involved in the Olympic and Paralympic Games, in various capacities, for over three decades. The 2016 Summer Olympics and Paralympics in Rio de Janeiro are a perfect example of how researchers support and participate in the ultimate test of athletic performance.

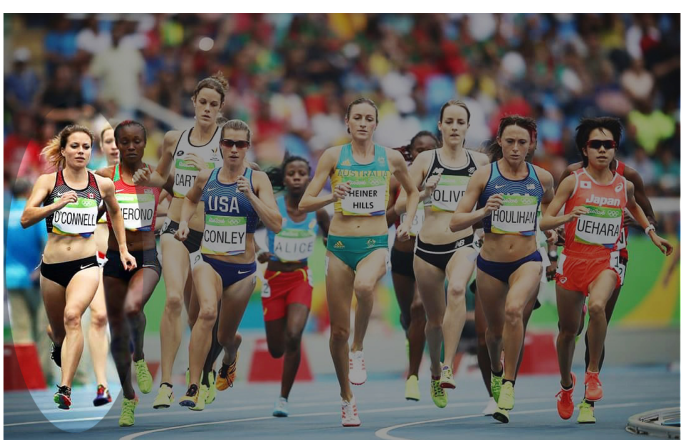
Dr. Willem Meeuwisse is a Faculty member with the Faculty of Kinesiology, and a physician with the Sport Medicine Centre. His research field is the epidemiology of sport injury; specifically injury risk assessment and prevention. Dr. Meeuwisse is also co-chair, with Dr. Carolyn Emery, of the Sport Injury Prevention Research Centre. In 2008 the centre was named as an IOC Centre of Excellence. Their research helps athletes, at all levels, prevent injuries. During the 2016 Rio Olympics, Dr. Meeuwisse joined the IOC 's Injury Surveillance Team at the games; his fourth Olympic Games in this role. Their job is to study how injuries are occurring, across all sports, and to recommend ways to prevent them from occurring in the future.

Dr. Jared Fletcher is a post doctoral fellow in the Human Performance Lab, where he researches training methods for elite athletes with Drs. Benno Nigg and Brian MacIntosh. He is also a sport physiologist with the Canadian Paralympic swim team and travelled with them to Rio de Janeiro. Jared uses his research in training fatigue and athlete monitoring, applying it directly to the training programs of these Paralympic athletes. He helps their coaches better prescribe workouts based on each individual athlete's physiological resonse and their recovery. He led the development of new warm-up and cool-down protocols. This included the introduction of heated clothing in an atempt to optimize pre-competition warm-up strategies and better promote post-competition recovery.

By studying low frequency fatigue, a form of long lasting muscle fatigue, he hopes to assist coaches in optimizing their training regimens as they approach major events, such as the Olympic or Paralympic Games.

Jessica O'Connell was a graduate student in the Human Performance Lab with Dr. Brian MacIntosh. She completed her M.Sc, defending only eight months before travelling to Rio to compete in the 5000m run. As if that wasn't an amazing enough achievment, she also worked part time as a teaching assistant in the faculty of Kinesiology.

Jessica investigated the fundamental mechanism for the slow component of oxygen uptake in her thesis. The slow component of oxygen uptake is a slow increase that continues after about three minutes of heavy exercise, exercise between the anaerobic threshold and maximal oxygen uptake. As MacIntosh explains, "Historically, this increasing oxygen uptake has been thought to occur due to growing deficiency of muscle energetics. Jessica tested the hypothesis that anaerobic supply of energy decreases while the slow component of oxygen uptake develops. She proved that total energy cost is not changing while the oxygen uptake increases. The increase in oxygen uptake associated with the slow component is countered by decreasing anaerobic energy supply. This work has changed how exercise physiologists understand the energy cost of sustained conducted at this intensity."



Through her teaching and research, Jessica was able to apply an insider's knowledge to her own training and performance. Not many researchers have the opportunity or ability to apply their own research so directly to their life goals.