



# Innovations in Prosthetics and Orthotics - Program

## ISPO Canada Symposium 2011

### Program

| September 30 – Room 4101 (Desmarais Hall) |   |   |
|---|---|---|
| 7:30 – 8:30                               | Registration<br>Coffee and Pastries (Room 12110 – 12 <sup>th</sup> floor)   |   |
| 8:30 – 8:45                               | Welcome   | Edward Lemaire, PhD<br>President, ISPO Canada   |
| 8:45 – 9:00                               | ISPO Greetings  | Bengt Soderberg , CPO (Sweden)<br>President-Elect, ISPO (via video conference)  |
| 9:00 – 9:10                               | ISPO Canada /War Amps 2011 R&D Award  | Karen Valley, The War Amps  |
| 9:10 – 10:15                              | Robot Suit HAL based on Cybernics   | Prof. Yoshiyuki Sankai, PhD (Japan)<br>Tsukuba University, Cyberdyne Inc.   |
| 10:15–10:45                               | Break (Room 12110 – 12 <sup>th</sup> floor)   |   |
| 10:45 – 11:15                             | Appropriate Prosthetic and Orthotic Technologies in Low Income Countries (2000-2010)  | Dan Blocka, BSc, CO(c), FCBC<br>Past President, ISPO  |
| 11:15 – 11:45                             | Mind, Body, and Pain  | Hillel Finestone, MD, FRCPC<br>Medical Director, Stroke Rehabilitation, Elisabeth Bruyere Hospital, University of Ottawa                                    |
| 11:45-12:05                               | Clifford Chadderton Award Presentation<br>Evidence Based Practice in the P&O Profession:<br>Barriers, Beliefs and Demographic Associations                            | James Christensen   |
| 12:05 – 13:15                             | Buffet Lunch (Room 12102 – 12 <sup>th</sup> floor)  |   |
|   | <b>Prosthetics – Room 4101</b>  | <b>Orthotics – Room 12102</b>   |
| 13:15 – 14:30                             | Wearable Measurement Technology<br>David Boone – Orthocare Innovations (USA)<br>Laurent Frossard - L'Université du Québec à Montréal                                  | Adult Scoliosis Pain Management using SpineCor<br>Marc Tessier  |
| 14:30 – 15:00                             | CAREN Virtual Reality Applications for Prosthetics<br>Col. Agali Mert, Physiatrist & flight-surgeon<br>(National Military Rehabilitation Center, Netherlands)         | The Science of Strategic Friction Control to Protect Soft Tissue<br>J. Martin Carlson, CPO, MS (Engr.)<br>(Tamarack Habilitation Technologies, USA)         |
| 14:30 – 15:15                             | Break (Room 12110 – 12 <sup>th</sup> floor)   |   |
| 15:15 – 16:00                             | High performance rehabilitation for P&O<br>Pauline Godsell, Markus Besemann (Canadian Forces Health Service), Nancy Dudek (The Ottawa Hospital Rehabilitation Centre) | CAREN Virtual Reality Applications for Orthotics<br>Col. Agali Mert, Physiatrist & flight-surgeon<br>(National Military Rehabilitation Center, Netherlands) |
| 16:00 – 16:30                             | Helping to Learn to Reach Out Again:<br>Development of a Myoelectric training tool for upper arm amputees.<br>Michael R Dawson (Glenrose Hospital, Alberta)           | Smart Orthosis for the Treatment of Scoliosis<br>Edmond Lou, PhD, PEng (Alberta Health Services, Alberta)   |
| 16:30 – 17:00                             | Limbs International: Prosthetics for Developing Countries (via web conference)<br>Roger V. Gonzalez, PhD, PE (LeTourneau University, USA)                             | Hydraulic Safety Knee<br>Reza Samadi  |
| 17:00                                     | Closing Remarks   |   |
| 17:30 – 19:00                             | Wine and Demonstrations (Room 12102 – 12 <sup>th</sup> floor)   |   |

## Wine and Demonstrations (Room 12102 – 12th floor)

September 30: 17:30-19:00

### Sponsor: Otto Bock

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| Edward Lemaire, Ted Radstake,<br>Jonathan Kofman, Louis<br>Goudreau, Reza Samadi, Terris<br>Yakimovich | <b>Ottawalk-Speed: Prototype Angular Velocity Control Orthotic Safety Knee:</b> A new Ottawalk-Speed orthotic knee joint design that includes size optimization, revised hydraulic cylinder placement to better accommodate thigh anatomy, and easy adjustment.<br><b>Ottawalk: Prototype Belt-Clamping Stance Control Orthosis</b><br>A stance control KAFO knee joint with stance flexion upon limb loading and options for mechanical, electronic, or pneumatic control.                              |
| Jan Andrysek   | <b>Controlling artificial knee joints:</b> Unique new techniques for controlling motions at the prosthetic knee joint will be presented and described. This includes a low-tech, biomechanically appropriate approach for achieving stance-phase control.  |
| TechMed 3D   | <b>Scan and modify a knee in few clicks with TechMed 3D and Rodin 4D:</b> With this short demonstration, TechMed 3D will show how easy scanning a knee and making the required modifications are now. With Rodin 4D, the digital rectification allows the practitioner to work virtually on his patient's orthopedic correction in a three-dimensional view. Rectifying has never been easier, and viewing the modifications in real time is now possible.   |
| Otto Bock<br>Gary Sjonnesen  | <b>Genium:</b> See a new user with the Genium transfemoral prosthesis.   |
| The Knee Centre<br>Nolan Hayday  | <b>The New WalkAide System:</b> This presentation will share new improvements including Bi-Flex cuff, new electrodes, and Rapid Programming and Adjustment using the WalkAnalyst 3.0 software. Guests will receive a general overview of these improvements and how using them can greatly improve their efficiency and save time when using with the New WalkAide System with their patients.   |
| Edmond Lou   | <b>Smart Scoliosis Orthosis:</b> A battery-powered microcomputer system (smart orthosis) was developed to monitor and maintain orthosis loads for treating children with spinal deformities during daily living. This system not only records how well and how much time the brace is used, but also helps patients ensure that the brace is being worn as the prescribed tightness. The smart orthosis was able to improve the portion of time the orthosis was worn at the prescribed tightness level. |
| Alex Spring  | <b>Orthotic Knee Extension Assist:</b> A prototype device for providing energy storage and return at the knee for a KAFO.  |
| David Boone<br>Orthocare Innovations   | <b>Compas and Galileo</b> - Computerized objective clinical evaluation and optimization for prosthesis and orthosis treatment. The science of prosthetics and orthotics will advance only with our ability to measure and control the outcomes of treatment.   |

## October 1 – Workshops (Desmarais Hall)

|               |  |  |   |
|---------------|--|--|---|
| 8:00 – 8:30   | Coffee and Pastries  |  |   |
| 8:30 – 10:00  | CAREN Lab Tour<br>Courtney Bridgewater<br>(The Ottawa Hospital<br>Rehabilitation Centre)<br><b>* Pre-register (20 places)</b>  | Motion Analysis in the Clinic<br>Stephen Hale, Edward<br>Lemaire<br>(Room 4101)  | Wii Fit for Amputee Balance<br>Training<br>Jan Andrysek, Shirlene Campbell<br>(Room 12110)  |
| 10:00 – 10:30 | Break (Room 12110 – 12 <sup>th</sup> floor)  |  |   |
| 10:30 – 12:00 | The Role of Friction and Shear<br>Forces in Pressure Ulcer<br>Generation<br>Mark Payette, Tamarack<br>Habilitation Technologies<br>(Room 12110)                            | Genium Transfemoral<br>Prosthesis<br>Gary Sjonnesen (Otto Bock)<br>(Room 4101)   | FES – Walkaide and Bioness<br><br>WalkAide: Nolan Hayday, Kevin<br>Shopland (The Knee Centre)<br>Bioness: Francois Nadeau<br>(Room 12102) |
| 12:00 – 13:00 | Light Lunch / Closing remarks  |  |   |
| 13:00 – 14:15 | <b>Free Papers (Orthotics, Research)</b><br>(Room 12102)   |  | <b>Free Papers (Prosthetics)</b><br>(Room 4101)   |
|               | <b>A Novel Design for Addressing Drop-foot:<br/>Comparing an Anterior-draped, Dorsi-assist<br/>AFO Against the Traditional Flexible AFO</b><br>A. Penn, J. Brown, A. Moore | <b>Healing a wound with vacuum assisted total<br/>surface weight bearing socket</b><br>Carole St-Jean  |   |
|               | <b>Evidence for practitioners: A more helpful view<br/>of EBM</b><br>Amanda Gibeault   | <b>Energy expenditure in transtibial prosthesis:<br/>comparison between Seal-In X5 liner and Dermo<br/>liner</b><br>S. Ali, N.A. Abu Osman, H. Gholizadeh, A.<br>Eshraghi, M. Verdan |   |
|               | <b>Clinical Application of Stance Control Knee<br/>Ankle Foot Orthoses in Polio and<br/>Myelomeningocele</b><br>J.H. Campbell, M.H. Lofiego, M. Sibila                     | <b>A Novel use of Motion Analysis System:<br/>Prosthetic Suspension Evaluation</b><br>A. Eshraghi, N.A. Abu Osman, H. Gholizadeh, S.<br>Ali, E.S. Yahyavi                            |   |
|               | <b>Design and Evaluation of a Knee Extension<br/>Assist for Sit-Stand Movements</b><br>A. Spring, E.D. Lemaire, J. Kofman  | <b>Stump Atrophy: Improper use of an Iceross<br/>Silicone Liner in a Bilateral Transtibial</b><br>H. Gholizadeh, N.A. Abu Osman, A. Eshraghi, S.<br>Ali, E.S. Yahyavi                |   |
|               | <b>Charcot Joint Arthropathy Treatment</b><br>M. Tessier, P. Riley   | <b>Visual Attention Assessment of Gaze Behaviour<br/>Patterns in Upper Limb Prosthesis Users</b><br>F.A. Popa, A. Hussaini, P. Gosine, P. Kyberd                                     |   |
| 14:15 – 14:40 | ISPO Canada Annual General Meeting (Room 4101)   |  |   |
| 14:45 – 17:30 | OAPO Annual Meeting (Room 4101)  |  |   |

- The CAREN Lab Tour takes place at The Ottawa Hospital Rehabilitation Centre (TOHRC). A shuttle will pick up participants at the Desmarais Hall north parking lot, main floor (8:10).
- Please **preselect this workshop** by sending an email to [ispocanada@gmail.com](mailto:ispocanada@gmail.com). Spaces are on a first-come-first-serve basis.

## Speaker Bios

### **Professor Yoshiyuki Sankai**

**Professor, University of Tsukuba; President, Cyberdyne Inc.**

Professor Yoshiyuki Sankai is professor of the Graduate School of Systems & Information Engineering at the University of Tsukuba, and President and CEO of CYBERDYNE Inc. He is also president of Japan Society of Embolus Detection & Treatment, chairman of International Journal of the Robotics Society of Japan (RSJ) and an executive board member of RSJ.

Previously in his career he was assistant professor, associate professor, and professor at the Institute of Systems & Engineering at the University of Tsukuba, and a visiting professor of Baylor College of Medicine in Houston, Texas in the United States. He received a PhD in engineering from University of Tsukuba in Japan in 1987.

He is the inventor, creator and driving force behind the advanced robotics Robot Suit HAL® (Hybrid Assistive Limb ®) and various cybernics, medical, care and welfare technologies. In 2006 and 2009, he was invited to provide direction to Japan's future science and technology policies by the Council for Science and Technology Policy advising the prime minister, other Japanese ministers and senior government officials.

He has won numerous awards including the World Technology Award (2005), Good Design Gold Award (2006), Japan Innovator Award (2006), Best Paper Award (International Journal of Advanced Robotics) (2006), Award from American Society for Artificial Organs, Award from International Society for Artificial Organs, Award from the Minister of Economy, Trade and Industry of Japan (2007), Award from National Institute of Science and Technology Policy (2007), NIKKEI Top – Quality / Service Award (2008) , Award from IEEE / IR, Invention & Entrepreneurship Award (2009), the 21st century Invention Award from Japan Institute of Invention and Innovation (2009) among others.

In 2007, he was appointed as leader of Global COE (Centre of Excellence) program for cybernics by the Japanese Ministry of Education, Culture, Sports, Science and Technology of Japan. He obtained significant grants from NEDO (New Energy and Industrial Technology Development Organization), health science grants from the Japanese Ministry of Health, Labor and Welfare, and a grant-in-aid for scientific research from the Japanese Ministry of Education, Culture, Sports, Science and Technology. In September, 2009, he was selected as the core researcher of the Funding Program for World-Leading Innovative R and D on Science and Technology, set up by Cabinet Office of Japan. He continues to promote the application of the HAL™ technology for the benefit of senior citizens, physically challenged people and patient groups with specific diseases.

### **Jan Andrysek, PhD, PEng**

**Scientist, Bloorview Research Institute**

Jan Andrysek is a Scientist in the Bloorview Research Institute of Holland Bloorview Kids Rehabilitation Hospital, Toronto and an Assistant Professor at the Institute of Biomaterials and Biomedical Engineering at the University of Toronto. His primary research interests include the design, development and clinical evaluation of interventions that aim to improve mobility and postural balance in children and adults with lower-limb impairments. This includes the development of new prosthetic and orthotic technologies, as well as evaluation of potential interventions such as video game systems for improving postural balance.

**LCol Markus Besemann, B.Sc., M.D., FRCP, CSPQ, Dip. Sport Med., Dip CSCN (EMG)  
Head of Physical Medicine and Rehabilitation, the Canadian Forces Medical Services**

Dr. Markus Besemann was a medical officer for the Canadian Forces before training as a specialist in physical medicine and rehabilitation (PM&R). Dr Besemann was Chief of Physiatry at Centre Régional de Réadaptation La Ressource in Gatineau, QC until 2008, before moving to his current position as Head of Physical Medicine and Rehabilitation for the Canadian Forces Medical Services. In addition, LCol Besemann is a Lecturer at the uOttawa Department of Neurosciences and McGill University Department of Family Medicine, and Consultant Physiatrist for the National Capital Division Nordic Ski Teams.

**Dan Blocka, BSc, CO(c), FCBC  
Past President, ISPO**

Dan Blocka is currently the Immediate Past President of the International Society for Prosthetics & Orthotics (ISPO) after a term as President from 2007 to 2010. He is also currently the Chair of the USAID-ISPO Steering Committee and Assistant Chair of the ISPO Education Committee. Since 1988, Dan has been the President and owner of Clinical Orthotic Consultants in Mississauga. Dan was also on faculty as a lecturer in the School of Human Biology at the University of Guelph from 1985 to 2004. Dan was recently appointed to the Board of Directors of Cambodia Trust, a UK based charity established in 1989 that works for equality for people with disabilities in the developing world. Other notable achievements include: Canadian Association for Prosthetics and Orthotics Life Membership for his leadership and dedication to the field of Prosthetics and Orthotics; Canadian Board for Certification of Prosthetists and Orthotists Life Fellowship; Nominee for the Premier's Award in 2004 and 2006, awarded to outstanding graduates of the College Educational system in the province of Ontario.

**David Boone, CP, MPH, PhD  
Chief Technology Officer, Orthocare Innovations**

David Boone, CP, MPH, Ph.D. is Co-Founder of OrthoCare Innovations, LLC and serves as its Chief Technology Officer. Dr. Boone has spent the past twenty years as an innovator, developer, researcher and instructor in rehabilitation and bioengineering. A frequent lecturer at academic medical centres on a range of prosthetic and rehabilitation topics and a widely published author, he is credited with multiple technology patents, including a foot scanning technology that was licensed to Nike. Recently, in the field of prosthetics, he was the inventor and lead developer of two new patent pending alignment technologies, with the support of the National Institutes of Health. He began his work in prosthetics and prosthetic research under the direction of a pioneer in the field, Dr. Ernest Burgess, and later assumed leadership of Dr. Burgess' lab, Prosthetic Research Study (PRS) in Seattle. Dr. Boone was recently named Editor-in-Chief of the Journal of Prosthetics and Orthotics by the American Academy of Orthotists and Prosthetists. Dr. Boone received his Ph.D. in Bioengineering from The Hong Kong Polytechnic University and became one of fewer than ten American Ph.D.s with formal training and clinical experience in prosthetics.

**Shirlene Campbell, BScPT  
Holland Bloorview Kids Rehab Hospital**

Shirlene Campbell is a certified physiotherapist. She received her BScPT from the University of Toronto in 1991 and has worked at St. John's Rehab Hospital for 20 years in adult amputee rehabilitation. Recently she has switched her practice to paediatric amputee rehabilitation at Holland Bloorview Kids Rehab Hospital. Shirlene is a clinical lecturer at the University of Toronto, and guest lecturer at George Brown College Prosthetics and Orthotics Program

**J. Martin Carlson, CPO, MS**  
**President, Tamarack Habilitation Technologies**

Marty Carlson received BS and MS degrees in aeronautics and engineering mechanics at the University of Minnesota. For six years, he worked on the development of new instruments for measuring force, pressure, and temperature for industrial process control. He then shifted his career focus to orthopedic/rehabilitation engineering. He received his formal orthotic and prosthetic training at Northwestern University and served as Director of Habilitation Technologies at Gillette Children's Hospital for sixteen years. He has published two dozen articles in a variety of medical and orthotic-prosthetic journals. He founded Tamarack in 1990. Carlson and his staff have gained an international reputation for design, development and biomechanical analyses.

**Michael Rory Dawson, MSc**  
**Performance Management Consultant - Myoelectrics Glenrose Rehabilitation Hospital**

Michael Rory Dawson graduated with his BSc in Mechanical Engineering from the University of Alberta in 2008. Following his interests in biomechanics and robotics he pursued a MSc in Mechanical Engineering under the supervision of Dr. Jason Carey and Dr. Farbod Fahimi. His MSc research was completed in January 2011 and focused on the development of a myoelectric training tool to aid upper-limb amputees in learning how to use myoelectric technology. Currently, Michael is working as a research associate for the Glenrose Rehabilitation Hospital and is developing the training tool into a portable clinical version to be used at a prosthetic lab or taken home by patients.

**Nancy Dudek, MD, MEd, FRCPC**  
**Associate Professor, uOttawa**

Dr. Nancy Dudek is an Associate Professor in the Faculty of Medicine at the University of Ottawa. She received her MD from The University of Western Ontario in 1999 and became a Fellow of the Royal College of Physicians and Surgeons of Canada in 2004 in PM&R. In 2005, she completed a Master of Education program at the University of Toronto.

She has a diverse clinical practice and works at The Ottawa Hospital Rehabilitation Centre, the Ottawa Children's Treatment Centre, and the Children's Hospital of Eastern Ontario. She focuses on Amputee Rehabilitation, Prosthetics, Orthotics and Neuromuscular Medicine. Dr. Dudek's academic interests are in Medical Education. Her focus is related to the evaluation of medical students and residents with a particular interest in In-training Evaluation. Dr. Dudek has served as the uOttawa undergraduate coordinator for Musculoskeletal Medicine and is currently Director of the PM&R Residency Program at the University of Ottawa. She is the recipient of an Ottawa Hospital Compass Award and the Association of Faculties of Medicine of Canada Young Educators Award.

**Hillel M. Finestone, MDCM, FRCPC (Physiatry),**  
**Medical Director Stroke Rehabilitation Program, Elisabeth Bruyere Hospital**  
**Electromyographer, The Ottawa Hospital Rehabilitation Center**  
**Associate Professor, Division of Physical Medicine and Rehabilitation, University of Ottawa**

Dr. Hillel Finestone is a specialist in PM&R, or physiatrist. He graduated from McGill Medical School and received PM&R specialty training at the University of Ottawa and the University of Michigan. He is an Associate Professor in the division of PM&R at the University of Ottawa. Dr. Finestone is the Medical Director of the Stroke Rehabilitation Program at the Elisabeth Bruyere Hospital. He also has a musculoskeletal pain practice and is a Fellow of the American Association of Neuromuscular and Electrodiagnostic Medicine.

Dr. Finestone has research interests in stroke rehabilitation related topics including: 1) nutrition in the stroke patient, 2) driving issues post stroke, and 3) use of virtual reality exercise training post stroke. He was recently awarded the Dr. Tony Hakim Innovative Stroke Research Award from the Centre for Stroke Recovery of the Heart and Stroke Foundation of Ontario, in June 2010, concerning a project on Virtual Reality exercise training in rehabilitating stroke inpatients.

Dr. Finestone has published many research articles and, recently wrote a book for health care professionals and laypersons titled “The Pain Detective, Every Ache Tells a Story” ([www.thepaindetective.com](http://www.thepaindetective.com)). The book describes, in a clinical case format, the roles that psychological and social factors may play in healing and recovery from a painful musculoskeletal injury.

**Randy Kelly – Director of Sales  
SensorTech Corporation**

Randy has over 25 years of automotive test experience with a primary focus on occupant safety while managing test facilities for TRW VSSI, Morton International and Autoliv North America. In addition to his management positions, he served as vice president of sales for eleven years with a major crash test dummy/load cell manufacturer with worldwide sales, marketing and public relations responsibilities. Mr. Kelly holds a mechanical engineering degree from Clark Technical College in Springfield, Ohio and taken numerous engineering courses at Wright State University in Ohio and business courses at Walsh College in Michigan. For SensorTech, Mr. Kelly is responsible for sales for all potential market opportunities such as medical, industrial, transportation, military, government, aerospace, etc.

**Edward Lemaire, PhD  
The Ottawa Hospital Rehabilitation Centre (Ottawa)**

Edward Lemaire, PhD hold a number of appointments, including Clinical Researcher at the Institute for Rehabilitation Research and Development (The Ottawa Hospital Rehabilitation Centre), Associate Professor at the University of Ottawa Faculty of Medicine, Adjunct Professor with the University of Ottawa Schools of Human Kinetics and Mechanical Engineering, Adjunct Professor with the University of Waterloo Department of Systems Design Engineering, President of the International Society of Prosthetics and Orthotics (Canada), and Associate Editor for Prosthetics and Orthotics International. Dr. Lemaire has been extensively involved with the evolution of assistive technologies that improve mobility for people with disabilities and telehealth for clinical service and continuing education.

**Edmond Lou, PhD, PEng  
Alberta Health Services, Alberta**

Edmond Lou is a Research Associate with Glenrose Rehabilitation Hospital and Adjunct Professor with the University of Alberta Departments of Electrical & Computer Engineering, Pediatrics, and Surgery. His research is to improve quality of life for patients with scoliosis, osteoarthritis and osteoporosis. Specific research interests are to develop, assess and provide better treatment to patients who have musculoskeletal injuries and disorders and provide better assessment and treatment for children with spinal deformity.

**Colonel Agali Mert, MD, PhD**

National Military Rehabilitation Center, Netherlands

Col. Agali Mert trained as a physiatrist and flight-surgeon with the Royal Netherlands Airforce and completed a PhD in 2011 on the topic of “Motion-based simulators in health and disease”. Col. Mert currently leads orthopaedic rehabilitation at the National Military Rehabilitation Center ‘Aardenburg’ and is the coordinator of research and development on Virtual Reality in the field of Rehabilitation.

**Professor Laurent Frossard, PhD**

Department of Kinesiology, University of Quebec in Montreal, Montreal, Canada

Dr Laurent Frossard has been involved in Biomechanics related research for the last 15 years and is committed to apply his expertise in qualitative and quantitative research to the field of prosthetics. Prior to his current appointment at UQAM, he was a Senior Research Fellow for The University of Queensland's Centre for Health Innovation and Solutions (2007-2010) and for the Queensland University of Technology's Institute of Health and Biomedical Innovation (2003-2006), both in Australia.

Since 2000, Dr Laurent Frossard has lead several research projects including one focusing on the biomechanical analyses of individuals with lower limb amputation. His activities aim at developing biomechanical tools and improving basic knowledge of the locomotion of individuals with lower limb amputation during key stages of the rehabilitation and activities of daily living. He has also been extensively involved in the evidence-based evaluations of osseointegration applications for prosthetics.